stress is THE MEDICAL CONCERN
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Stress is THE Medical Concern

Introduction

This book is an extensive treatise on stress reduction as the key element of medicine. Every doctor has told virtually every patient to reduce stress to increase healing. The doctors all know that the para-sympathetic nerve system is the immune and digestive system nervous regulator. So stress reduction prompts absorption of nutrients, as well as immune repair of traumatized tissue. Every doctor knows this.

Every doctor knows, everyone knows, all intelligent people know that stress reduction can help prevent disease. But the chemical companies would not sell as much synthetic drugs if we used stress reduction (a drugless therapy) intervention in disease. Plus stress reduction is universal and not associated with a diagnosis. So a stress reduction therapist can see anyone with stress and since we all have stress a stress reduction therapist can see anyone. Universal ideas like anyone are not understood by small minds.

Small minds like to reduce things and big words like everyone, universal, international, versatile, these are not comprehended by the small mind. Small minds like to categorize and reduce things.

Dr. Selye developed a stress style of medical thought that was a revolution in medicine. Reducing stress component in a person’s life will help the whole of his body defend against disease. It was an elegant principle that he turned over to Dr. Nelson who expanded and refined the medical practice. A new medicine aimed at reducing the causes of disease and stimulating recovery by educating people to live healthier. As Thomas Edison said...

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If you do not have the money pay what you can, and if you cannot pay anything please pay the cosmos back with good deeds to others. Pass on the good karma by being good to others and helping them the way I am helping you. Pass it on.
diseases, just as all intelligent people already know.

Small minds will ignore research that disagrees with their perspective. Small minds see only what they want to see and ignore the rest. This makes the ignorant as they ignore truths.

This book is meant to make it difficult to ignore the vast ever increasing research the validates our treatise, Stress reduction is the medical concern.

We cannot do all of medicine with stress reduction and behavioral medicine. There is a time for all things under heaven so there is a time for drugs, antibiotics, surgery Allopathy. Our form of medicine is not meant to replace but to assist. J-use said I have not come to change the law but to fulfill. This is similar. But the lock of the drug companies must change. People have the right to choose safer drugless therapies and if they don’t work then go onto drugs and surgery. Small minds do not like choice, but our system of government is based on the freedom to choose.

"The doctor of the future will give no medicine, but will interest his patients in the care of the human frame, in a proper diet, and in the cause and prevention of disease." - Thomas A. Edison

The future is here

Desiré Dubounet
Stress as the Medical Concern CPT and ICD codes

Stress is a medical disease and concern. International Classification of Diseases #9 (ICD#9) lists 308.0 as Acute Reaction to Stress and 308.3 Stress, Acute Situational Disturbance, and ICD#10 lists F43 Reaction to severe stress, and adjustment disorders and F43.0 Acute stress reaction, F43.1 as Post-traumatic stress disorder, F43.2 as Adjustment disorders, F43.9 as Other reactions to severe stress and F43.8 as Reaction to severe stress, unspecified. The opinion of the word “acute” is to be made by the therapist or the patient and is not the responsibility of the manual or the SCIO2. Biofeedback is a medical therapy for stress. Current Procedural Terminology (CPT) codes for therapy lists 90901 as Biofeedback training by any modality and 9081X as approximately 45-50 minute sessions.

From the ICD listings we see that stress is recognized as a medical concern. The diagnosis of medical stress is for a qualified doctor or trained therapist. Acute stress is different for all patients. One person’s acute stress is another’s relaxation. A simple spider might set off one person, where a spider can have no effect or even a pleasurable effect on another. Stress is an individual INTERNAL response to an EXTERNAL situation. Subclinical stressors exist every day. These can be accumulative and combine to produce an Acute Stress medical situation. A list of major stressor that can accumulate and produce a medical situation includes Christmas. The stress of Christmas might be the straw that breaks the healthy camel’s back and produces a medical situation. At any rate stress reduction might be a preventative to stopping the risk of hurting the camel’s back and producing a medical health risk.

There can be no Objective definition of Stress. It is always an individual Subjective internal reaction to External Situations. People react differently to situations. Some are more sensitive to minor subclinical stress than others. Stress can be accumulative. And stress must be assayed individually.

There once was a farmer looking for a good worker, a case of occupational placement under the Bureau of Labor Statistics NET 45-2011.00. A big strong young man seeking employment used the Occupational Outlook Handbook (OOH) and applied to the farmer. The farmer wanting to challenge his occupational level of abilities first assigned him the excessive task of plowing an acre of land with a plow and no horse, being careful to not disobey animal safety regulations code 23-4500. The young man finished in two hours. This was validated by the OSHA Occupational Safety and Health Administration, compliance directive CPL 02-00-135. Next to further assay his occupational range of services code 311100. The farmer assigned the task of loading one hundred bales of hay into the loft of the barn. The big strong young man finished his assignment in two hours with no distress, passing code 45-2000. The farmer was now satisfied that this young man was proper for occupational assignment and he hired him, internal document 80011. To make the young man more comfortable the farmer assigned him the task of sitting under a shady tree, with a glass of lemonade, and to sort a bushel of apples, code 45-2011. Good apples place on the left bad on the right. After thirty minutes the young man was sweating and over stressed and came rushing to the farmer with a protest and a request to quit employment. The young man registered the complaint “There is too much job stress, These decisions are killing me, I Quit.”

This joke points out how regulatory picayune rules and regulations have been imposed to access in our society. Over use of imposed rules and regulations have made us lose some of our honest humanity. Medicine has been over regulated and a sea of paperwork and an ocean of regulations have made medicine impersonal and expensive. Stress is an individual concern for the personal touch of the therapist client relationship. It is paramount to medicine to maintain a personal human touch and to realize that stress reduction is a key and very important part of medicine.

The diagnosis of medical stress is for a qualified doctor or trained therapist to perform on an individual basis. The diagnosis of medical stress is NOT the job or responsibility of regulatory officials, review boards, or governmental agencies. Regulatory officers and agents intrusion into the diagnostic process is both irregular and inappropriate. Stress is an individual INTERNAL response to an EXTERNAL situation, and thus must be done on a case by case basis. Since stress reduction benefits all any stress reduction therapy such as biofeedback can have universal benefits for all patients.

The following article from Dr. Janos Selye will define this further:

The best way for us to review the SCIO policy on stress reduction is to introduce the philosophical father of the device Canadian doctor Hans Selye. A current updated literature review follows as well as our own sponsored independent research.

Hans Hugo Bruno Selye, CC (Hungarian: Selye János) (January 26, 1907 — October 16, 1982) was a Canadian endocrinologist of Austro-Hungarian origin and Hungarian ethnicity. Selye did much important factual work on the hypothetical non-specific response of the organism to stressors. While he did not recognize all of the many aspects of glucocorticoids, Selye was aware of this response on their role. Some commentators considered him the first to demonstrate the existence of biological stress.

Hans Selye, or in the Hungarian Selye János

Hans Selye was born in Vienna in 1907, of Hungarian descent, but did most of his work in Canada. As early as his second year of medical school (1926), he began developing his now-famous theory of the influence of stress on people’s ability to cope with and adapt to the pressures of injury and disease. He discovered that patients with a variety of ailments manifested many similar symptoms, which he ultimately attributed to their bodies’ efforts to respond to the stresses of being ill. He called this collection of symptoms--this separate stress disease--stress syndrome, or the general adaptation syndrome (GAS).

He spent a lifetime in continuing research on GAS and wrote some 30 books and more than 1,500 articles on stress and related problems, including Stress without Distress (1974) and The Stress of Life (1956). So impressive have his findings and theories been that some authorities refer to him as “the Einstein of medicine.” His medical genius has gone unrewarded for his work did not depend on any synthetic drug solution in an overly reductionistic style of modern medicine. He has shown that at first the symptoms of disease are alarm reactions to stressors. If the stressor continues the person’s body adapts to the alarm reaction and the symptom goes away. The stressor continues to develop disease but the alarm reaction (symptom) goes away. Thus as Selye has said “being symptom free is not an indicator of health, and a medicine based on symptoms is irregular.”

A physician and endocrinologist with many honorary degrees for his pioneering contributions to science, Selye also served as a professor and director of the Institute of Experimental Medicine and Surgery at the University of Montreal. More than anyone else, Selye has demonstrated the role of emotional and biological stressor responses in causing or combating much of the wear and
The Nature of Stress
by Hans Selye

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About the Author: Dr. Hans Selye is without question one of the great pioneers of medicine. His famous and revolutionary concept of stress opened countless avenues of treatment through the discovery that hormones participate in the development of many degenerative diseases, including coronary thrombosis, brain hemorrhage, hardening of the arteries, high blood pressure and kidney failure, arthritis, peptic ulcers and even cancer. At present, most of his research is concerned with formulating a code of behavior based on the laws governing the body's stress resistance in dealing with personal, interpersonal, toxic, nutritional, traumatic and group problems.

Dr. Selye has served since 1945 as professor and Director of the Institute of Experimental Medicine and Surgery at the University of Montreal. Now he is President of the International Institute of Stress, founded by him in 1976 at the University of Montreal.

What stress is not

The word stress has been used so loosely, and so many confusing definitions of it have been formulated, that I think it will be best to start by clearly stating what it is not. Contrary to current popular or medical opinion:

1. Stress is not nervous tension. Stress reactions do occur in lower animals and even in plants, which have no nervous system. The general manifestations of an alarm reaction can be induced by mechanically damaging a denervated limb. Indeed, stress can be produced under deep anesthesia in patients who are unconscious, and even in cell cultures grown outside the body.

2. Stress is not an emergency discharge of hormones from the adrenal medulla. An adrenaline discharge is frequently seen in acute stress affecting the whole body, but it plays no conspicuous role in generalized inflammatory diseases (arthritis, tuberculosis) although they can also produce considerable stress. Nor does an adrenaline discharge play any role in "local stress" reactions, limited to directly injured regions of the body.

3. Stress is not that which causes a secreton by the adrenal cortex of its hormones (the corticoids). ACTH, the adrenal-stimulating pituitary hormone, can discharge these hormones without producing any evidence of stress.
4. Stress is not the nonspecific result of damage only. Normal and even pleasant activities - a game of tennis or a passionate kiss - can produce considerable stress without causing conspicuous damage.

5. Stress is not the deviation from homeostasis, the steady state of the body. Any specific biologic function, e.g., the perception of sound or light, the contraction of a muscle, eventually causes marked deviations from the normal resting state in the active organs. This is undoubtedly associated with some local demand for increased vital activity, but it can cause only "local stress" and even this does not necessarily parallel the intensity of the specific activity.

6. Stress is not that which causes an alarm reaction. The stressor does that, not stress itself.

7. Stress is not identical with the alarm reaction or with the G.A.S. as a whole. These are characterized by certain measurable organ changes which are caused by stress.

8. Stress itself is not a nonspecific reaction. The pattern of the stress reaction is very specific: it affects certain organs (e.g., the adrenal, the thymus, the gastrointestinal tract) in a highly selective manner.

9. Stress is not a reaction to a specific thing. The stress response can be produced by virtually any agent.

10. Stress is not necessarily undesirable. It all depends on how you take it. The stress of failure, humiliation, or infection is detrimental; but that of exhilarating, creative, successful work is beneficial. The stress reaction, like energy consumption, may have good or bad effects.

11. Stress cannot and should not be avoided. Everybody is always under some degree of stress. Even while quietly asleep our heart must continue to beat, our lungs to breathe, and even our brain works in the form of dreams. Stress can be avoided only by dying. The statement "He is under stress" is just as meaningless as "He is running a temperature." What we actually refer to by means of such phrases is an excess of stress or of body temperature.

If we consider these points, we may easily be led to conclude that stress cannot be defined, and that perhaps the concept itself is just not sufficiently clear to serve as the object of scientific study. Nevertheless, stress has a very clear, tangible form. Countless people have actually suffered or benefited from it. Stress is very real and concrete indeed, and is manifested in precisely measurable changes within the body. So before we proceed to a formal definition of the nature of stress, we will describe these manifestations.

**What stress is**

Mechanism. The workings of stress are extremely complex (see Figure). Apart from specific stimuli, which need not be discussed here, the first effect of any, agent or demand made upon the body - be it running up a flight of stairs, dealing with a viral infection, or performing a dance - is to produce a nonspecific stimulus (the agent's "stressor effect"). This may be a nervous impulse, a chemical substance or lack of an indispensable metabolic factor; it is referred to simply as the "first mediator," because we know nothing about its nature. We are not even certain that it has to be an excess or deficiency of any particular substance; it is possible that various derangements of homeostasis can activate the stress mechanism.

Although we have still to identify the first mediator(s), we do know that eventually stress acts upon the hypothalamus and particularly upon the median eminence (ME). This action appears largely to be mediated through or modified by nervous stimuli coming from the cerebral cortex, the reticular formation and the limbic system (especially the hippocampus and amygdala). The incoming nervous stimuli reach certain neuroendocrine cells, most of which are located in the ME. These act as "transducers," transforming nervous signals into a humoral messenger, the corticotrophic hormone releasing factor (CRF), which can be demonstrated histochemically in the ME region and can also be extracted from it. Oddly enough, the posterior pituitary contains the highest concentration of CRF, and it has been isolated from this source in pure form, thus permitting the determination of its chemical formula as a polypeptide which subsequently was synthesized. Yet we have no conclusive proof that the CRF-active material extracted from the hypothalamus is identical with that obtained from the posterior lobe since only the structure of the latter has been definitely ascertained. Although vasopressin (antidiuretic hormone) possesses considerable CRF activity it is not identical with CRF; this has been shown by the well-documented differences in their chemical structure and physiologic activity.

CRF reaches the anterior lobe through the hypothalamo-hypophyseal portal system that originates in the ME region within a network of capillaries into which CRF is discharged by the local neuroendocrine cells. It is then carried down through the larger veins of the pituitary stalk to a second capillary plexus in the pituitary.

The hypothalamus does not stimulate the adrenocorticotrophic hormone (ACTH) secretion of the anterior lobe through nervous pathways descending in the pituitary stalk but rather through blood-borne substances carried by way of the portal veins. That is why transection of the stalk inhibits the ACTH secretion only before vascular connections between the hypothalamus and the gland are reestablished; if regeneration of these vessels is prevented by interposing a plate between the cut ends of the stalk, this pathway is permanently blocked.

Both in vivo and in vitro experiments have proven that CRF elicits a discharge of ACTH from the adenohypophysis into the general circulation. Upon reaching the adrenal cortex, it causes secretion of corticoids, mainly glucocorticoids such as cortisol or corticosterone. These induce gluconeogenesis, thereby supplying a readily-available source of energy for the adaptive reactions necessary to meet the demands faced by the body. In addition, they facilitate various other enzymatically regulated adaptive metabolic responses and suppress immune reactions as well as inflammation, assisting the body to coexist with potential pathogens (syntoxic reactions). Furthermore, the glucocorticoids are responsible for the thymic lymphatic involution, eosinopenia and lymphopenia characteristic of acute stress. Curiously, glucocorticoids are needed for the acquisition of adaptation primarily during the alarm reaction, but not so much to maintain the adjustment during the stage of resistance. ACTH plays a comparatively minor role in the secretion of mineralocorticoids, such as aldosterone, which is regulated mainly by the renin-hypertension system and the blood electrolytes, whose homeostasis is in turn influenced by them.

This chain of events is cybernetically controlled by several biofeedback mechanisms. Whether an excess of CRF can inhibit its own endogenous secretion is still doubtful because its lifespan in the circulating blood is very short. On the other hand, there is definite proof of an ACTH feedback (short-loop feedback) by a surplus of the hormone, which returns to the hypothalamo-pituitary system and inhibits further ACTH production. We have even more evidence to substantiate the existence of a corticoid feedback mechanism (long-loop feedback) in that a high blood corticoid
level similarly inhibits ACTH secretion. It is still not quite clear to what extent these feedbacks act upon the neuroendocrine cells of the hypothalamus, the adenohypophysis or both. (Hence, in the Figure the corresponding arrowheads merely point towards the hypothalamo-hypophyseal region in general, without specifying exactly where their target areas are situated.)

Another major pathway involved in the stress mechanism is carried through the catecholamines liberated under the influence of an acetylcholine discharge, at autonomic nerve endings and in the adrenal medulla. The chromaffin cells of the latter secrete mainly epinephrine, which is of considerable value in that it stimulates mechanisms of general utility to meet various demands for adaptation. Thus it provides readily available sources of energy by forming glucose from glycogen depots and free fatty acids from the triglyceride stores of adipose tissue; it also quickens the pulse, raises the blood pressure to improve circulation into the musculature, and stimulates the CNS.

In addition, epinephrine accelerates blood coagulation and thereby protects against excessive hemorrhage should wounds be sustained in conflicts. All of this is helpful in meeting the demands, whether they call for fight or flight.

At this point it will be helpful to discuss two apparent objections to accepting the concept of a single stereotyped response to stress:

1. Qualitatively different agents of equal toxicity or stressor potency do not necessarily elicit exactly the same reactions in different people.

2. Even the same degree of stress, induced by the same agent, may produce different effects and even lesions in different individuals.

3. The effects specific to any given agent usually modify the effects and manifestations of the general stress syndrome. (Thus, it took many years to recognize and prove the existence of the latter.)

4. The fact that the state of stress, even if due to the same agent, can cause different effects in different individuals, has been traced to "conditioning factors" that can selectively enhance or inhibit one or the other stress effect. This conditioning may be endogenous (genetic predisposition, age or sex) or exogenous (treatment with certain hormones, drugs, or dietary factors.) (See Figure.) Under the influence of such conditioning factors, a normally well-tolerated degree of stress can even become pathogenic, selectively affecting those parts of the body that are particularly sensitized both by those conditioning factors and by the specific effects of the eliciting agent, just as physical tensions of equal strength in different chains will break the particular link that is the weakest as a result of internal or external factors.

The foregoing processes are the principal ones involved in the stress reaction, but by no means the only ones. As well, the level of STH, the growth hormone, may rise, and changes in the output of thyroid hormones of the ovary or testis may take place.

Stressors. The agents or demands that evoke this coordinated response which I have designated 11 stress are referred to, quite naturally, as stressors; and of course something is a stressor to the same degree that it calls forth the syndrome.

When the stressor in question is some organism or substance foreign to the body, the curative process resulting from the stress reaction can take either of two forms, according to whether the pathogen causes trouble directly or indirectly. Direct pathogens cause disease irrespective of our body's reaction, whereas indirect pathogens produce damage only through the exaggerated and purposeless defensive responses they provoke. If a patient accidentally exposes his hand to a strong acid, alkali, or boiling water, damage will occur irrespective of his reactions. Because all these are direct pathogens; they would cause damage even to the body of a dead man who obviously could not put up any vital defense reactions. On the other hand, most common inflammatory irritants, including allergens, are essentially indirect pathogens, which do not themselves cause disease, but are damaging only by stimulating an inopportune and harmful fight against what is innocuous.

During evolution, immunologic reactions which lead to destruction of microbes, grafts, and other foreign tissues undoubtedly developed as useful defensive mechanisms against potentially dangerous foreign materials. However, when - as in the case of many allergens, heart transplants, etc. - the attack against the "foreign" agent is unnecessary or even harmful, man can improve upon the wisdom of Nature by suppressing this hostility. Nevertheless, when the aggressor is dangerous, the defensive reaction should not be suppressed but, if possible, increased above the normal level, which can be done, for example, by catactic substances that carry the chemical message to the tissues to destroy the invaders even more actively than would normally be the case.

However, stressors are not exclusively physical in nature. Emotions, e.g., love, hate, joy, anger, challenge and fear, also call forth the changes characteristic of the stress syndrome.

Stress and disease. Stress is an individudal INTERNAL response to an EXTERNAL situation. In general, the hormonal responses outlined above aid adaptation to environmental change or stimuli; but they are sometimes the cause of disease, especially if the state of stress is prolonged or intense. In this latter case, the body goes through the three stages of what I call the "general adaptation syndrome" (G.A.S.). The first is the alarm reaction, characterized by the changes above described. Of course, if the stressor (stress-producing agent) is so severe that continued exposure is incompatible with life, the organism will die within a few hours during this stage; otherwise, a stage of adaptation of resistance will ensue, since no organism can be maintained continuously in a state of alarm. The adaptive stage is characterized by the vanishing or diminishing of the initial symptoms, since the body has achieved optimal adaptation.

After still more prolonged exposure to the stressor, however, this acquired adaptation is lost and a third stage of exhaustion is entered into, which, unless the organism receives emergency aid from some outside source, leads to death. Apparently, the adaptability of an organism is finite.

Also of interest is the routine picture of endocrine gland disturbance that Selye (The Stress of Life, New York, McGraw-Hill, Inc., 1956) so ably depicted in the General Adaptation Syndrome brought on by any Stress to the body."

Definition. Let us see now whether the following definition will fit all our facts:

Stress is the state manifested by a specific syndrome which consists of all the nonspecifically-induced changes within a biologic system. Thus, stress has its own characteristic form and composition, but no particular cause. The elements of its form are the visible changes due to stress, which are addictive indicators expressing the sum of all the different adjustments that are going on in the body at any time.

The above is essentially an "operational definition"; it tells what must be done to produce and recognize stress. A state can be recognized only by its manifestations; you have to observe a great
Stress is the nonspecific response of the body to any demand, whether is is caused by, or results in, pleasant or unpleasant conditions. Stress as such, like temperature as such, is all-inclusive, embodying both the positive and the negative aspects of these concepts.

Within the general concept of stress, however, we must differentiate between distress (from the Latin dis = bad, as in dissonance, disagreement), and eustress (from the Greek eu = good, as in euphoria). During both eustress and distress the body undergoes virtually the same nonspecific responses to the various positive or negative stimuli acting upon it. However, the fact that eustress causes much less damage than distress graphically demonstrates that it is “how you take it” that determines, ultimately, whether you can adapt successfully to change.

**The general adaptation syndrome GAS**

Definition. While stress is reflected by the sum of the nonspecific changes as they develop throughout time during continued exposure to a stressor, the G.A.S. encompasses all nonspecific changes as they occur during continued exposure to a stressor. One is a snapshot, the other a motion picture of the response to demands.

Thus, the G.A.S. may be defined as the manifestation of stress in the whole body, as they develop in time. As we have seen, a fully-developed G.A.S. consists of three stages: the alarm reaction, the stage of resistance, and the stage of exhaustion. Yet it is not necessary for all three stages to develop before we can speak of G.A.S. Only the most severe stress leads rapidly to the stage of exhaustion and death. Most of the physical or mental exertions, infections, and other stressors, which act upon us during a limited period, produce changes corresponding only to the first and second stages: at first they may upset and alarm us, but then we adapt to them.

Normally, in the course of our lives, we go through these first two stages many, many times. Otherwise we could never become adapted to all the activities and demands which are man’s lot. Even the stage of exhaustion does not always need to be irreversible and complete, as long as it affects only parts of the body. For instance, running produces a stress situation, mainly in our muscles and cardiovascular system. To cope with this, we first have to limber up and get these organs ready for the task at hand; then for a while we will be at the height of efficiency in running, but eventually exhaustion will set in. This could be compared with an alarm reaction, a stage of resistance, and a stage of exhaustion, all limited primarily to the muscular and cardiovascular system. But such exhaustion is reversible; after a good rest we will be back to normal.

Most human activities go through three stages analogous to those of the G.A.S.: we first have to get into the swing of things, then we get pretty good at them, but finally we tire and lose our acquired efficiency. This triphasic evolution of adaptation is quite characteristic also of all bodily activities, including those that only the physician can fully appraise; for instance, of inflammation. If some virulent microbes get under the skin, they first cause what we call acute inflammation (reddening, swelling, pain); then follows chronic inflammation (ripening of a boil or abscess); and finally an exhaustion of tissue resistance takes place, which permits the inflamed, purulent fluid to be evacuated (breaking through of an abscess).

The diseases of adaptation. Many maladies are due not so much to what happens to us as to our inability to adapt, and they have therefore been called “diseases of adaptation.” The most common of such diseases are peptic ulcers in the stomach and upper intestine, high blood pressure, heart accidents, and nervous disturbances. Of course, any event makes demands upon us and, hence, causes some stress, but it is only people who cannot cope, either because of innate defects or lack of knowledge, who develop stress diseases.

Yet this is a relative concept. No malady is just a disease of adaptation. Nor are there any disease producers which can be so perfectly handled by the organism that maladaptation plays no part in their effects upon the body. Such agents would not produce disease. This haziness in its delimitation does not interfere with the practical utility of our concept. We must put up with the same lack of precision whenever we have to classify any other kind of disease. There is no pure heart disease, in which all other organs remain perfectly undisturbed, nor can we ever speak of a pure kidney disease or a pure nervous disease in this sense.

The concept of adaptation energy. The selective exhaustion of muscles, eyes, or inflamed tissue all represent final stages in local adaptation syndromes (L.A.S.) only. Several of these may develop simultaneously in various parts of the body; in proportion to their intensity and extent, they can activate the G.A.S. mechanism. It is when the whole organism is exhausted - through senility at the end of a normal life-span, or through the accelerated aging caused by stress - that we enter into the (fatal) stage of exhaustion of the G.A.S.

Apparently, we have hidden reserves of adaptability, or adaptation energy, in ourselves throughout the body. As soon as local stress consumes the most readily accessible local reserves, local exhaustion sets in and activity in the strained part must stop. This is an important protective mechanism because, during the period of rest thus enforced, more adaptation energy can be made available, either from less readily accessible local stores or from reserves in other parts of the body. Only when all of our adaptability is used up will irreversible, general exhaustion and death follow.

Adaptation energy and a natural code of behavior

There seem to be close interrelations between the G.A.S. and aging. We have already mentioned that several local adaptation syndromes may develop consecutively or even simultaneously in the same individual. People can get used to a number of things (cold, heavy muscular work, worries), which at first had a very alarming effect; yet, upon prolonged exposure, sooner or later all resistance breaks down and exhaustion sets in. The term “adaptation energy” has been coined for that which is consumed during continued adaptive work, to indicate that it is something different from the caloric energy we receive from food; but this is only a name, and even now we still have no precise concept of what this energy might be. Further research along these lines would seem to hold great promise, since we appear to touch upon the fundamentals of fatigue and aging.

Seemingly, each individual inherits a certain amount of adaptation energy, the magnitude of which is determined by his genetic background, his parents. He can draw upon this capital thriftily for a long but monotonously uneventful existence, or he can spend it lavishly in the course of a stressful, intense, but perhaps more colorful and exciting life. In any case, there is just so much of...
it, and he must budget accordingly.

How can we, as individuals, best manage our limited store of this energy? Surely scientists have found enough evidence to justify trying to develop the fundamentals of a code of behavior based only on the laws of Nature, though we may need much more scientific work to learn how to apply them in our daily life and to make them easily understandable.

In the light of what my own laboratory and clinical study of somatic diseases has taught me concerning stress, I have tried to arrive at a code of ethics based not on the strictures and traditions of society, inspiration, or blind faith in the infallibility of a particular prophet, religious leader or political doctrine, but on the scientifically verifiable laws that govern the body’s reactions in maintaining homeostasis and living in satisfying equilibrium with its environment. By means of such a code, we can adjust our personal reactions to enjoy fully the eustress of success and accomplishment without suffering the distress commonly generated by frustrating friction and purposeless, aggressive behavior against our surroundings.

It is a biologic fact that man - like the lower animals - must fight and work for some goal that he considers worthwhile. We must use our innate capacities to enjoy the eustress of fulfillment. Only through effort, often aggressive, egoistic effort, can we maintain our fitness and assure our homeostatic equilibrium with both the social and the inanimate world. To achieve this state, our activities must earn lasting results; the fruits of work must be cumulative and must provide a capital gain to meet future needs. To succeed, we have to accept the scientifically established fact that man has an inescapable natural urge to work egoistically for things that can be stored to strengthen his homeostasis in the unpredictable situations with which life may confront him.

We should not combat or be ashamed of these instincts. We can do nothing about having been built to work, and it is primarily for our own good. Organs that are not used (muscles, bones, even the brain) undergo inactivity atrophy, and every living being looks out first of all for its own benefit. Neither should we feel guilty because we work for treasures that can be stored to ensure our future homeostasis. Hoarding is a vitally important biologic instinct that we share with animals such as ants, bees, squirrels and beavers. In man, the urge first manifests itself when children start to gather match boxes, shells or stickers; it continues when adults collect stamps or coins. Such a universal drive cannot be an artificial, indoctrinated tradition.

On the other hand, there is no example in Nature of a creature guided exclusively by altruism and the desire to protect others. In fact that man has an inescapable natural urge to work egoistically for things that can be stored to strengthen his homeostasis in the unpredictable situations with which life may confront him.

We should not combat or be ashamed of these instincts. We can do nothing about having been built to work, and it is primarily for our own good. Organs that are not used (muscles, bones, even the brain) undergo inactivity atrophy, and every living being looks out first of all for its own benefit. Neither should we feel guilty because we work for treasures that can be stored to ensure our future homeostasis. Hoarding is a vitally important biologic instinct that we share with animals such as ants, bees, squirrels and beavers. In man, the urge first manifests itself when children start to gather match boxes, shells or stickers; it continues when adults collect stamps or coins. Such a universal drive cannot be an artificial, indoctrinated tradition.

On the other hand, there is no example in Nature of a creature guided exclusively by altruism and the desire to protect others. In fact, a code of universal altruism would be highly immoral, since it would expect others to look out for us more than themselves. Of course, “Love thy neighbor as thyself” is a command full of wisdom; but, as originally expressed, it is incompatible with biologic laws; no one needs to develop an inferiority complex if he cannot love all his fellow men on command.

What are the ingredients of a code of ethics that accepts egoism and working to hoard personal capital as morally correct? After four decades of clinical and laboratory research, I would summarize the most important principles briefly as follows:

1. Find your own stress level - the speed at which you can run toward your own goal. Make sure that both the stress level and the goal are really your own, an not imposed upon you by society, for only you yourself can know what you want and how fast you can accomplish it. There is no point in forcing a turtle to run like a racehorse or in preventing a racehorse from running faster than a turtle because of some “moral obligation.” The same is true of people.

2. Be an altruistic egoist. Do not try to supress the natural instinct of all living beings to look after themselves first. Yet the wish to be of some use, to do some good to others, is also natural. We are social beings, and everybody wants somehow to earn respect and gratitude. You must be useful to others. This gives you the greatest degree of safety, because no one wishes to destroy a person who is useful.

3. Earn thy neighbor’s love. This is a contemporary modification of the maxim “Love thy neighbor as thyself.” It recognizes that not all neighbors are lovable and that it is impossible to love on command.

Perhaps two short lines can encapsulate what I have discovered from all my thought and research:

_Fight for your highest attainable aim._

But do not put up resistance in vain.

So far as possible, I myself have followed this philosophy, and it has made my life a happy one. Frankly, in looking back, I realize that I have not always succeeded to perfection, but this has been due to my own shortcomings, not those of the philosophy. As I have often said. The builder of the best racing car is not necessarily its best driver.

As to a driver, I turn my life’s work over to my successor William Nelson who I believe can drive this car and revolutionize medicine.

Notes

Undoubtedly, in man, with his highly developed central nervous system (CNS), emotional arousal is one of the most frequent activators. Yet it cannot be regarded as the only factor, since typical stress reactions can occur in patients exposed to muscle fatigue, trauma, hemorrhage, etc. while under deep anesthesia. Indeed anesthetics themselves are commonly used in experimental medicine to produce stress, and 11 stress of anesthesia” is a serious problem in clinical surgery.

Bibliography


The work of the Canadian genius medical doctor Hans Selye, has shown the world the pervasive and comprehensive effects of stress on the body. Stress and stressors weaken the body’s immune system and generally weaken the whole defense system, thus the genetic or systemic weak link of the body will give out first from continued stress. Reducing stressors helps all diseases. Our system uses a health questionnaire to assay behavior or lifestyle stressors and to educate the client to reduce the stress burden.

**Towards a new Safe and Effective truly Modern Medicine**

This is a new common sense method of modern medicine, that is Health motivated not just symptom control. We respect the complexity and the whole body, and respect the Natural process of health

Health is Ease of Flow, Stressors block Flow, Stress is more than Just personal stress.

Stress Reduction is the key to Medicine.

Major Stressors or Causes of Disease include:

- **LACK OF AWARENESS OR LACK OF EDUCATION**
- **STRESS**
- **HEREDITY**
- **MENTAL FACTORS** (Greed, anger, delusion arrogance ETC)
- **ALLERGY**
- **BAD POSTURE**
- **TOXICITY**
- **TRAUMA INJURY**
- **PATHOGENS** (microorganisms, bacteria, fungus, virus, prions, worms etc.)
- **PERVERSE ENERGY** (heat, cold, wind, dryness, radiation, magnetic etc.)
- **DEFICIENCY OR EXCESS OF NUTRIENTS**

When the stressor or stressors weaken the defenses of the body, the weakest link of the body (from nature or nurture) is most prone to distress and thus disease.

---

**Selye Pathway of Disease**

Health then enter stressor (toxin etc)-criteria

1. **ALARM Stage**: symptoms are the alarm, note the entity, symptoms at first are related to the stressor, later the dysfunction

   - *if stressor continues then*

2. **ADAPTATION Stage**: symptoms go away as we adapt, the disease is generated deeper. You can have no symptoms and be very sick.

   - *Being symptom free is not an indicator of Health*

   - *if stressor continues then*

3. **EXACERBATION Stage**: the stressors bunch, the weakest organs

   - *If stressor continues then a. FUNCTIONAL: first the stressors effect the weakest organ function*

   - *If stressor continues then b. ORGANIC: then the weak organs start to swell or shrink*

   - *If stressor continues then c. DEATH: cellular, organ, organ system, organism death*

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Since the body’s weakest link is prone to disease from the stressor, any disease will improve with reduction of the stressors. If there is good nutrition and no excess or deficiency of nutrients, the body’s repair system improves. With stress reduction the Pan-Sympathetic system becomes free to boost digestion and immunity as well as eliminate toxins. Some stressors can have more specific target tissues such as cigarettes target the lungs primarily. But with the lack of systemic pressure, any other weak link in the body from genetics or from life will be involved. Thus stress reduction is a universal therapy for all diseases. Reductionism of diseases via inaccurate and expensive current medical diagnostic processes, are accurate, inaccurate, overly complex, non-productive, expensive, unsafe, risky and most often ineffective. Add to this the side effects of toxic drugs and we see the poor history of medicine. Nelson and Selye have plotted out a safe, inexpensive and effective new and modern medicine.
HEALTH THEN ENTER STRESSOR (TOXIN ETC)-enters

1. ALARM Stage: symptoms are the alarm, not the enemy, symptoms at first are related to the Stressor, later the dysfunction

   if stressor continues then

2. ADAPTATION Stage: symptoms go away as we adapt, the distress + disease penetrates deeper. You can have no symptoms and be very very sick.

   Being symptom free is not an indicator of Health

   if stressor continues then

3. EXHAUSTION Stage: the stressors burden the weakest organs

   if stressor continues then

   a. FUNCTIONAL first the stressors effect the weakest organ function

   if stressor continues then

   b. ORGANIC then the weak organs start to swell or shrink

   if stressor continues then

4. DEATH cellular, organ, organ system, organism death

   1. Reduce the Causes of Disease, Change Behavior, get patients to Care, get the nail out of the tire

   2. Repair the organs weakened by the Causes. Restore Health. Fix the Tire

   3. Unblock the Blockages to energy, nutrition, Oxygen, waste, Para, acupuncture, nervel FLOW

   4. Treat the symptoms with natural means before resorting to Synthetic. Use foods, exercise, herbals, homeopathics any and all natural means before resulting to Synthetics

   5. Balance the metabolic typing or Constitutional Imbalances. Treat the patient as an Individual Whole

Since the body’s weakest link is prone to disease from the stressors, any disease will improve with reduction of the stressors. If there is good nutrition and no excess or deficiency of nutrients, the body’s repair system improves. With stress reduction the Para-Sympathetic system becomes free to boast digestion and immunity as well as cellular repair. Some stressors can have more specific target diseases, such as cigarettes target the lungs primarily. But with the lack of systemic oxygen,
any other weak link in the body from genetics or from life will be involved. Thus stress reduction is a universal therapy for all diseases. Reductionism of diseases via inaccurate and expensive current medical diagnostic means, are archaic, inaccurate, overly complex, non-productive, expensive, unsafe, risky and most often ineffective. Add to this the risk of side effects from synthetic drugs and we see the poor history of medicine. Nelson and Selye have plotted out a safe, inexpensive and effective new more modern medicine.

SUPPRESSION AND OBSTRUCTION TO CURE - The SOC Index

SOC Index:
The SCIO interview opens with a behavioral medicine interview. This is called the SOC Index. Named after the work of Samuel Hahneman the father of homeopathy, he said that the body heals itself with its innate knowledge. But the patient can suppress or obstruct the healing process with some behavior. Hahneman said that the worst way to interfere with the healing natural process was allopathy or synthetic drugs. These upset the natural healing process by unnatural intervention and regulation disturbance. Other ways to Suppress or Obstruct the Cure are smoking, mercury amalgams, stress, lack of water, exercise and many others. This behavioral survey then gives an index of SOC.

The scores relate to the risk of Suppression and Obstruction to the natural Cure. The higher the scores the more the Suppression and or Obstruction. The scores of 100 or lower are ideal. The SOC index questions are: mostly based on a scanine (1-10) answer. Some answers can be more. These questions include:

1. Number of organs removed:
2. Number of Synthetic drugs taken currently:
3. Number of cigarettes you smoke a day
4. Number of metal or amalgam fillings in the teeth during the last year:
5. Number of street drugs used per month:
6. Number of known allergies:
7. Number of unresolved mental factors:
8. Are you responsible for you body and the diseases you have:
9. Amount of fat in diet as a percent:
10. Personal stress 0-10 10 being max. numbers can be larger than 10.
11. Number of sugar servings per day:
12. Number of exercise sessions 20 min or more per week:
13. Number of alcoholic drinks per day average:
14. Number of cups of coffee or any caffeine product:
15. Number of extreme toxic exposures last year:
16. Number of major injuries in past:
17. Number of major infections in past:
18. Number of glasses of water or natural fruit juice per day:
19. Number of pounds overweight:
20. Interpersonal stress 0-10 10 being max. Numbers can be larger than 10.
21. Job-school stress 0-10 10 being max. Numbers can be larger than 10.
22. Money stress 0-10 10 being max. Numbers can be larger than 10.
23. Sickness stress 0-10 10 being max. Numbers can be larger than 10.
24. Family stress 0-10 10 being max. Numbers can be larger than 10.
25. Desire stress 0-10 10 being max. Numbers can be larger than 10.
26. Bowel detox stress 0-10 10 being max. Numbers can be larger than 10.
27. Sweat detox stress 0-10 10 being max. Numbers can be larger than 10.
28. Urine detox stress 0-10 10 being max. Numbers can be larger than 10.
29. Mucous detox stress 0-10 10 being max. Numbers can be larger than 10.
30. Skin detox stress 0-10 10 being max. Numbers can be larger than 10.
31. Sleep stress 0-10 10 being max. Numbers can be larger than 10.
32. Number of Root canals:

Each of these questions relates a behavioral burden on the body that can create a suppression or obstruction to the curative process. Scores below 50 are very good and show little risk of suppression or obstruction. Scores above 50 and below 100 are good and show some chance of suppression or obstruction to cure. Numbers above 100 are of risk.

**Social Stress Inventory Form**

DETERMINING THE SOURCES AND EXTENT OF STRESS IN YOUR LIFE

Stress that is not handled properly can affect you in many ways. It can impair your ability to function mentally at home and at work. You can experience a variety of physical symptoms that can range from headaches to gastrointestinal upsets. Everyone experiences the negative effects of stress at various points in their lives. The danger lies in chronic stress overload. When your body is constantly in the fight or flight mode, you are bound to blow a fuse at your body’s weakest point. For some people the end result is a serious mental or physical illness.

This survey is designed to help you determine:
1) Your general level of stress.
2) Your level of stress at work.
3) Your physical symptoms of stress.
4) Your level of stress in interpersonal situations.

Take a look at the checklists that follow to see how stressed you are.

**How Stressed Are You?**

Directions: Indicate how often your feelings agree with the statements below. Scoring for each item is based on the following scale:
1 = Never feel that way
2 = Seldom feel that way
3 = Sometimes feel that way
4 = Frequently feel that way
5 = Always feel that way

**How Stressed Are You? (General Feelings)**

1. I worry a lot.
2. I feel unhappy.
3. All kinds of worrisome thoughts run through my mind.
4. There are times when I feel like crying for no reason.
5. I don’t know what’s the matter with me. I’m so irritable.
6. I have lost my ability just to sit around and do nothing.
7. I feel like I’m living inside a pressure cooker and about to explode.
8. Lately I’m bored with my life, job, friends and even my loved ones.
9. Deep inside, I’m dissatisfied and I don’t know why.
10. I forget things.

Total Score =

**How Stressed Are You? (Work Performance)**

1. I have trouble concentrating on my work.
2. It takes me forever to make decisions.
3. I can’t seem to stick to a job.
4. From the time I get there until I leave, I’m plain fidgety.
5. I overreact to things at work.
6. I let minor things get to me.
7. I procrastinate.
8. I can’t seem to get organized.
9. I’m unclear about my role at work.
10. I do a lot of paper shuffling.

Total Score =

How Stressed Are you? (Physical Symptoms)
1. My heart races or pounds.
2. I have trouble catching my breath.
3. I get diarrhea.
4. I have headaches.
5. I have to urinate frequently.
6. I get dizzy for no reason.
7. I spend my nights awake, or it takes forever to fall asleep.
8. I’m tired.
9. My throat and/or mouth is often dry.
10. My stomach is tense.
11. I have no energy.
12. I’m chilly.
13. My neck (or shoulders, eye, chest, lower back, throat, hands) is sore, stiff or painful.
14. Lately I seem to have one bug or cold after another.
15. In the afternoon I run out of steam.
16. My posture is terrible.

Total Score =

How Stressed Are You? (Interpersonal Relations)
1. I startle easily when people come up on me.
2. Around people, I can’t speak correctly.
3. I can’t stand to be around a particular person (or group).
4. I can’t stand to be around people when they are emotional.
5. I can’t tell anyone how I feel.

6. I don’t feel anything.
7. I can’t laugh at myself.
8. Down deep, I’m not happy with my sex life.
9. I don’t trust anybody.
10. I need help (food or drink) to be social.

Total Score =

SCORING
CategoryNo.: Total Score / Average Score
Items (Add Up) / Divide Total Score by Number of Items

General 10
Work 10
Physical 16
Interpersonal 10

ALL SCALES 46

To compute overall average score, add up your total scores for each scale and divide by 46.

5 is the highest score, 1 the lowest.
The Desi-astrous Sign of Stress

ANXIETY

LACK OF CONCENTRATION
SLEEPLESSNESS
IRRITABLE
OVERREACTING
STOMACH PROBLEMS
ANTSY

FEAR
MUSCLE TENSION
FATIGUE
RACING HEART
HEADACHE

STRESS IS CAUSED BY THE DESIRE FOR THINGS TO BE DIFFERENT

RELAX
BREATHE FULLY
YOGA & EXERCISE
REDUCE DISTRACTION

SIMPLIFY
PLAN & ORGANIZE
REDUCE CLUTTER
SET LIMITS

IDENTIFY TRIGGERS
THOUGHTS
FEELINGS
FOOD

SHARE
THOUGHTS
FEELINGS
FEARS

NOURISH SPIRIT & INTELLECT
LIVE IN THE PRESENT
JOURNAL
IDENTIFY SPIRITUAL BELIEFS

AVOID
PROcrastination
NEGATIVE THINKING
CATASTROPHIZING

Learn to ACCEPT the things you can't change & Change the things you can...and find the Wisdom to Know the Difference

The world is awakening to WELLNESS. This was not even a word until recently. Now it is a world wide movement, people want to become WELL. Desiré has developed and credited a new Doctorate in Wellness to awaken people and teach the art of making themselves and others WELL. For more details go to the International University at www.imune.net
Clinical Review of Biofeedback Stress Therapy with the SCIO/EPFX Biofeedback Device Two Decades of Stress Reduction

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This study was performed in the field by practising Biofeedback technicians. Data was collected and the study supervised by the Ethics International, Ethics Committee of Romania. The Data analysis and study presentation is done By
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Abstract
This article reviews the clinical results and experiences of users of the SCIO/EPFX biofeedback device after almost two decades of use. The practice of biofeedback dates back to the fifties. The technique of using biofeedback devices to diagnose stress and treat stress is receiving more attention in our increasingly stressful world. In this article we review the positive results achieved from clinical experience treating patients on a day to day basis.

In over two hundred million patient visits the SCIO/EPFX was estimated at an 80% success rate in reducing stress.

Key Words: Biofeedback, stress, stress reduction

Introduction
In 1976 the World Health Organization announced to the world that stress was the major cause of disease in the world at that time, and any ways or means to reduce stress were encouraged.

Stress is the most incipient killer of people today. Stress is responsible for 70 to 80 percent of the disease in America. Stress reduction is a must in today’s society for longevity, health and happiness. Stress awareness begins with recognition or awareness. As we become aware of stress, we can begin to deal with it. The "ostrich" technique of stress reduction never works. Humans resist change. Whether change occurs in the body, mind, social, spirit or environment, most humans will resist. To learn to relax, we must learn to break our old habits of stress reaction and substitute more productive reactions such as clear thinking, calm headed and relaxed understanding. To change requires perseverance, positivity, proper goals and beneficial rewards. Whether changing eating habits, exercise routines, stress reactions or social skills, change requires work, but the rewards of a healthy body and mind for you and your family are worth it.

Although biofeedback is an effective clinical procedure, it is not used in isolation from other therapeutic techniques. Since many of its clinical applications focus on the reduction of anxiety or physiological arousal, relaxation procedures have been used with biofeedback to maximise this effect. The patient undergoing biofeedback treatment is often introduced to a relaxation technique prior to receiving biofeedback. Clinicians using biofeedback frequently develop their own individual relaxation procedures. Most of these modified techniques are based on the progressive relaxation method originally developed by Jacobson in 1958.

Standardised relaxation techniques are effective for most patients. If the patient has difficulty, the therapist must be certain that the patient’s failure to relax is not due to a misconception or to therapeutic resistance. For example, some patients try too vigorously to relax, which results in increased tension. This may occur with Jacobson’s technique because patients spend too much time tensing muscles and too little time relaxing. If a well-motivated patient, however, cannot adjust to the standard relaxation procedure, other methods are available. Biofeedback therapists must be familiar with alternative procedures when a standard technique fails to generate the desired response (i.e. lowered arousal). We define arousal as it is commonly used in the field of psychology; i.e. an excess level of muscular tension and or hyperactivity to stress.

Gage Tarrant is a professional Biofeedback Therapist and Stress Consultant practising in the Los Angeles area of California , USA. She has been using the SCIO/EPFX device as her principle
intervention biofeedback tool for approximately four and a half years. The focus of Gage’s work is on stress reduction which involves in-depth stress testing, analysis and the biofeedback therapies found in the SCI/EPYX process. The intention is to identify unresolved stressful conflicts which are then reduced and resolved through a series of biofeedback sessions.

Mrs. Tenent has conducted over one thousand sessions in the past two and a half years using the SCI/EPYX device. One hundred and eleven clients appear in this study. Some patients received multiple sessions while some received a single Comprehensive Initial Sessions involving an extensive stress analysis, biofeedback therapy and a program for self guided stress reduction techniques based on the stress profile as indicated by the SCI/EPYX processes.

William Cunningham is a LBT practising in Boulder Colorado. He has used the system for over two decades. He has seen over twenty five thousand patients and 523 clients have participated in this study.

Debbie Drake is a M.D. in Ontario, Canada. Her experiences with the SCI device and stress reduction have been extensive and an important part of this study. She reports a clinical review of over two thousand patients over a eight year period. In this study she reports on the results of 490 patients.

Igor Cetojevic MD, of Cyprus has also used the SCI for over a decade and reports a ninety percent success rate in stress reduction. He shares with us that the stress reduction is accompanied with cellular rejuvenation and immuno-stimulation.

Matthias Heiliger M.D. of Germany and Switzerland has used the system for over five years with his patients and finds that reducing their physiological stress burden is key to promoting change and a drive for a more healthy life style. He reports on 302 patients in this study.

Anna Maria Cako M.D. of Hungary reports a 93% success rate with her patients in many areas after first reducing the physiological stress burden. She had 320 patients in this study.

Mezei Iosif MD, of Romania has used the system for over a decade with wondrous results. He reports an 80% SCI success rate on dealing with stress in his medical practice. In this study, He was given a placebo deactivated device and was assigned 70 patients. Only 63 patients reported for study completion. This was a double blind as that he and his patients were not aware of the placebo device. Iosif was chosen for his particular lack of charisma, which was valuable in the placebo group.

In this article we will concentrate on the results of using the SCI/EPYX device in a clinical setting for stress reduction. This study is a repeat of the basic study done in 1996. A new study was deemed necessary for revalidated confirmation of the safety and efficacy of the device versus a placebo group.

Results

In the collective experiment there were 1746 participants and 63 in a placebo group.

INTERVENTION SCI. group

The average first visit score on the pretest stress interview was 3.9. The post test score is 2.8. the significance of the data easily meets alpha factors of .5. There was significant evidence of the SCI/EPYX device ability to reduce stress. 85% of the patients had significant reduction in stress.

PLACEBO group

The average first visit score on the pretest stress interview was 3.6. The post test score is 3.3. The placebo group had significantly less stress reduction. There was 20% overall stress reduction.

There was significant evidence of the SCI/EPYX device ability to reduce stress versus a double blind test group.

There is proof of safety, as that not one patient in this study had any significant risk. In over 25,000 devices sold and well over 200,000,000 patient visits, there has been no record of any significant risk.

From the desk of Gage Tarrant

Study of Stress Reduction using combined techniques of NLP, Hypnosis, Development Theory and the EPFX Biofeedback Device:

Gage Tarrant is a professional Biofeedback Specialist, Certified Hypernotherapist and Stress Consultant who practiced in the Los Angeles area of California, USA, and is now located on Vancouver Island, British Columbia, Canada. She has been using the SCIO/EPYX device as her principle intervention biofeedback tool for approximately 6 years. The focus of Gage’s work is on stress reduction which involves in-depth stress testing, analysis and the biofeedback therapies found in the SCIO/EPYX process. The intention is to identify unresolved stressful conflicts which are then reduced and resolved through a series of biofeedback sessions.

Ms. Tarrant has conducted over one thousand sessions in the past 6 years using the SCI/EPYX device. One thousand and eleven appear in this study. Some clients received multiple sessions assessed.

Informed consent was attained on all participants in the study. (See appendix 2) Patients were evaluate medically and the stress questionaries was used to evaluate the stress on each visit. Other improvements were observed from immuno-stimulation to cellular regeneration but this study will confine it’s examination to the simple issue of stress reduction.

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while some received a single comprehensive Initial session involving an extensive stress analysis, biofeedback therapy and a program for self guided stress reduction techniques based on the stress profile as indicated by the SCL/EPYX programs.

Her comments are as follows:
The primary focus of my hypnotherapy practice has always been to identify and resolve subconscious conflicts operative within my clients' minds which were acting as stressors blocking the attainment of their emotional, mental and physical comfort, as well as their goals of success in various areas of life. I have found no greater tool to assist me in this endevour than the SCL/EPYX biofeedback stress reduction system, as it enables me to compare my client's concerns against their stress responses during session in a sophisticated and in depth way, and enables us to subsequently reduce their conditioned stress responses associated with these conflicts more effectively.

I, along with the client's participation, cooperation and desire, am able to help them achieve this by replacing painful conditioned responses stored in their "memory" systems with positive conditioned responses to "new memory" we create for them. They have described this process as the greatest stress reduction they have ever experienced. Before I can describe how I have been able to use the device to assist in accomplishing this, I must briefly explain the theory that this methodology is based in, called "The Theory of Mind".

The Theory of Mind
In mind and behavioural theory, the subconscious mind stores responses to events in ways that behave as "memories" and operate as "beliefs", whether true or false in actual content. The emotional, physical and mental impact of responses to events, and the subsequent memory of them stored within the mind/body system, is always an individual and internal perception, something referred to in the field of Biofeedback as an "internal locus" of control.

This implies that each individual's response to a common circumstance, such as the pain of a particular emotional trauma (such as the loss of a parent) is always unique to each individual's reaction to it, regardless of how common the actual trauma is. Their reactions, which often include physiological stress reactions governed by the autonomic nervous system's fight/flight mechanisms, which in turn affect other organ systems, are often stored as memory in a way that is often recalled and/or reactivated when similar circumstances or even recollections of the events present themselves again. The memories of these responses, including the emotional, physical and physiological reactions involved with the original response, do not have to be based in truth or falsehood; they simply have to be stored as "known" within the individual's memory through experiencing them in order to be retriggered by similar stimuli.

Because memory can be reactivated through circumstances similar to the original event that created them, this can cause a recurrent and similar level of discomfort and stress if the original reaction was emotional and/or mental pain. Because there is usually a series of physiological reactions that accompany mental and emotional pain, these biological activities may also have been stored in the memory of the response system by association, and also reactivated due to the way the subconscious stores information within the mind/body system. Because the flight/flight mechanisms are automatic response mechanisms, if the flight flight mechanisms were active during the first experience of the memory, they risk being automatically being reactivated during recollection of the original memory, and can create an enormous amount of stress. This process causes many clients recurrent pain and a feeling of loss of control over their internal responses to stressful stimuli.

The reason for this is because of the laws of hypnosis, or learning. The "Theory of Mind" states that when we are born, there are only 2 common fears possess instinctually: the fear of falling and the fear of loud noises. Every other fear and belief is learned through the process of "identification" and "association". From age 0 to approximately age 8, the mind develops a library of positive and negative associations and identifications which operate in the subconscious system as "knowns" or beliefs, whether true or false, and can operate as the basis of conditioned responses to the environment and events. These positive and negative associations and identifications form what is essentially our subconscious belief "system", or memory base, which operates much the same way as learned "scripted" or automatic responses to the common stimuli that created them. This "script" is based on what we remember, or "know". The script does not yet know the difference between good and bad, or right from wrong. It's only aware of "knowns" that are stored in memory, or through the experience of imagination, which uses the same circuits in the body as memory.

Between the ages of approximately 8 and 12 we start to solidify our ability to use logic and reason. We become capable of making more complex decisions and developing will power. This capacity represents what is referred to as our "conscious" verbal mind, which this theory states is approximately a small 12% of our total mind power. The remaining subconscious mind, containing the "script" based on "knowns" whether true or false, constitutes the remaining 88% of our total mind power. Components of the subconscious mind are involved in autonomic response systems such as the more primitive fight or flight survival response, as well as the conditioned responses referred to above. Superconscious theory, or the "new" theory of mind, would suggest our conscious mind represents only .1%, and that the superconscious represents 99.9% of our total mind power. The superconscious processes information on all perceptual levels, and is aware of spiritual, biological, mental, emotional and environmental factors operating in our external and internal environment, and much more.

The subconscious operates on a "pain vs. pleasure" principle which states that a "known", whether false or negative, is always a more comfortable or "pleasurable" reference and/or response mechanism over an "unknown", be it positive and desirable to the conscious mind. Because the subconscious "pleasure" or comfort zone may be based in "knowns" that are mentally or emotionally painful, this can represent a stumbling block to more positive conscious desires. Positive conscious desires may be counter to the subconscious base of beliefs that it will "allow" to operate within it's "comfort zone". Because the subconscious is usually at least 85% more powerful than the conscious verbal mind, this means that our client may have a conscious goal that does not match the subconscious "comfort" level, and may be struggling to attain their conscious goals of comfort and success because of the inherent strength of the subconscious over the conscious mind. In simpler terms, it may mean that they consciously feel overpowered by negative subconscious memories which create a stress response that they experience recurrently.

Our "critical" mental faculties separate the conscious and super-conscious "areas" of mind and protect the superconscious from the pain of "unknowns" coming from the environment or internally through stress. The "critical" faculties of mind are able to manage 7 or 8 bits of information well
Case History 1: Client X: male, 37 years of age.

Client X sought my services because he was unable to control his responses to the stress of memories of sexual abuse by his father. He was assaulted nightly by his father from ages 5-12. He was unable to identify reactive emotional, physical and mental stressors to the memories of the events, reduce them down to comfortable levels, re-imagine a less stressful response to the events while using biofeedback stress reduction, and reorganize his “memory” of knowns into one of control and a higher sense of self esteem. He has not self mutilated since that one session intervention, using biofeedback stress reduction, and reorganize his “memory” of knowns into one of control. He is able to identify reactive emotional, physical and mental stressors to the memories of the events, reduce them down to comfortable levels, re-imagine a less stressful response to the events while using biofeedback stress reduction, and reorganize his “memory” of knowns into one of control and a higher sense of self esteem. He has not self mutilated since that one session intervention, which was 3 years ago.

Many of these new “beliefs” are undesirable and create complicated stress responses on several levels, including the biological level. Unfortunately, the “age of information” and the activity of modern life often keeps our “critical” faculties in a perpetual state of stress, activating our autonomic nervous system more frequently than it was designed to be, which further complicates our ability to manage stress.

This process of memory storage and reactivation represents a much more serious picture when we consider someone with a history of frequent abuse. More often than not, part of their conditioned responses to stress are the resulting mental beliefs or “conclusions” they made about the abusive situation regarding their beliefs about “life” or “self” in general, which operate on an internally auditory level as negative, self-deprecating statements about themselves. This internal activity can result in more than 7 or 8 pieces of information to the critical faculties of mind, retrigger a stress response, and reach the subconscious in ways that operate as stressful and negative beliefs. Since the subconscious mind seeks to prove the “truth” of its “knowns” (whether they are false in actuality or not), this can cause clients a great deal of internal stress, which activates the rest of the stress response, even on a physiological level that they feel cannot control.

I therefore based my work in attempting to stop the painful automatic stress responses of my clients’ subconscious memory storage systems, change resulting negative beliefs into positive new ones by using stress reduction and imagination to create “new memories” until they became operative as automatic responses. When I practiced hypnotherapy alone to achieve this end, I usually asked for a minimum of 6 sessions, if not more. By employing the EPFX biofeedback system to assist me in this endeavor, I was able to achieve not only faster results, but stronger ones. Below are 2 examples of such results.

Case History 1: Client X: male, 37 years of age.

Client X sought my services because he had never been able to completely experience a sense of trust, and the perpetual feeling of mistrust that she experienced caused her self doubt, dissatisfaction and stress. She had sought psychotherapy, and was not diagnosed with paranoia, but felt that she had never experienced a deep sense of trust in herself, others or her life path that she desired. By measuring stress responses with the EPFX to the stimuli of certain references to age, we were able to determine that she had a strong stress response to age 1. She then shared that she had been in the hospital for the first 6 months of life, a stage of human development associated with learning “trust” through Normative Attachment theories of bonding with the primary care taker. Being deprived of a regular and rhythmic bonding experience through hospitalization and separation from her primary care taker (her mother), coupled with the stress of being on life support during the first stage of development, she became aware that she had never adequately “learned” trust.

In session, we cultivated a sense of biological “earned trust” in her body/mind system through theatrical “trust exercises” of my catching her as she deliberately fell backwards into my hands. I then caught and supported her back into a normal standing position repeatedly, for a sense of trust to develop through the process. We were then able to, using the EPFX, measure and transfer the electrical profile of her freshly conditioned “trust” response into the system, and then fed it back to her in a way that she “learned”, and was able to continue recognizing in association with additional EPFX stress reduction signals we sent throughout the session process.

We repeated this technique for 3 sessions to reinforce the work. She has reported that ever since, she has been able to maintain this positive feeling of healthy trust and experience it in a way that she never obtained from her first stage of development. She has stated that this has positively changed her entire adult perception to a level of satisfaction and comfort.

EPFX Facilities Used:

I have many client reports of this nature, and I credit the use of the EPFX for producing such fast and effective stress reduction, which facilitates the subconscious mind’s ability to accept new positive information I am “suggesting” through hypnotherapy with less inherent subconscious resistance to change.

Because the electrical signature of a homeopathic of “resistance to change” is stored on the system much the same way I stored my client’s “earned trust” into the system, I am able to “invert” this electrical signature on resistant clients. In my observation, this consistently further speeds the process of subconscious acceptance of new positive knowns they wish to have operative on the deeper subconscious level of memory.

EPFX Unconscious Reactivity:

This panel within the EPFX program is designed to detect stress responses pertaining to associated biological stress reactions linked to emotional traumas in a way that, through my observation and feedback from clients, seems to cause their subconscious to feel “validated” without the pain of judgment. I further “validate” the sensitive and vulnerable information obtained through the client’s stress responses in this part of the program by sending them stress reduction pulses to the areas of the body that they indicate stress reactions to. This seems to enable most clients to effectively remove the negative memory responses of the original painful event so that they can...
more easily instill the new positive belief they wish to hold in it’s place with less resistance to change.

EPFX Spinal Program: Nerval Stress Reduction:

the nervous system is entwined with the spine, reducing the stress associated with the emotional traumas in question as we perform stress reduction on the muscle/nerval memory system of the spine has allowed my clients to hold what they refer to as a “different posture” as a result of the work. Most of them have commented that they seem to hold their bodies differently with less pain, and with a more pleasant feeling by reorganizing their biological memory responses held in their spinal nervous system through the EPFX stress reduction process.

Muscle Memory Stress Reduction:

Because most clients are able to identify, through EPFX stress responses, the muscles that hold the tension of the painful memory, we are able to send stress reduction signals to those muscles which helps to reeducate the muscles to hold the new “memory” of the positive new patterns of beliefs I am suggesting to them, along with their goals of self improvement and a higher self esteem.

Hormonal Memory Stress Reduction:

Because the autonomic fight or flight response impacts the adrenals and affects the entire hormonal balance of the body, clients have reported that by reorganizing and controlling their internal response to pain and stress, that a positive improvement on their overall hormonal balance has resulted, creating an overall improved state of health and well-being, and a greater sense of self control over external and internal stimuli.

Brainwave Stress Reduction Training:

By changing internal responses to emotional traumas into positive new beliefs in their place, I have observed that clients are able to hold less stressful and more positive brain wave speeds and patterns as reflected on the EPFX with greater ability. The EPFX brainwave training facilities helped train them to learn these new patterns with greater control and recall, and most clients report the changes they experience as a result of these components of the program as “subtle but positive and powerful”.

EPFX Electro Hypnosis:

I have observed that the positive hypnotic suggestions that I give in session, when coupled with the EPFX electro-hypnosis program, are accepted by the client with greater speed and depth, and with less resistance to change. Clients have consistently reported a sense of peace and relaxed euphoria created by the use of this portion of the program, and has been effective on even my most resistant of clients.

EPFX Main Test Page Stress Reactivity Programs:

I have found this facility to be the most profound in observing stress reactions to a very detailed search effort of one stressor in association with another. For example, I can measure the client’s reactive stress response to an electrical signature of a homeopathic of “depression”, and then test their stress reaction of that “depression” item against a subfile of 73 more electrical signatures of emotional homeopaths, in a way that most clients recognize and validate immediately as operative emotional “associations” accompanying the original signature of depression, if not a week later as the insight becomes more comfortable for them. In this way, the client can discern which stressors accompany other stressors, and begin managing their emotional responses down to simpler, less stressful levels with more self control.

In conclusion, I have found the EPFX to be the most effective tool available to rapidly identify a client’s stress reactions to memory storage patterns they hold in a way that causes them to gain insight into what they desire to be changed, and how to identify positive new beliefs, or “goals”, for them to create in their place. By suggesting these new positive beliefs to the client throughout the process of stress reduction, the success of instilling the positive new belief is greatly increased. The work is a co-creative joy, creates a strong rapport of partnership with the client, and teaches them self control in a way that they have described as nothing short of life changing and seemingly miraculous.

Gage Tarrant

Discussion:

Stress is a part of all disease pictures and stress reduction should be a part of all medicine. The SCIO/EPFX or in fact any biofeedback can be helpful for stimulating awareness, control, responsibility and return of health. The techniques tested in this paper were shown extremely helpful in reducing stress.

In conclusion, the authors views the SCIO/EPFX as an important biofeedback tool useful in many stages of stress reduction-oriented therapy and would encourage allied professionals and regulatory bodies to recognize its value.

BIBLIOGRAPHY

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5. James R. Evans & Andrew Abarbanel ed. Introduction to Quantitative EEG and Neurofeedback
Informed Consent

The EPFX Biofeedback Medical device is registered in the USA and Europe. It is a Biofeedback device that measures how a person reacts to items. It is designed to measure reactions for allergy, homeopathy, nutrition, sarcodes, nosodes, vitamins, minerals, enzymes and many more items. Biofeedback is used for pre-diagnostic or therapy.

The USA allows us to develop an Institutional Review Board and operate an Investigational Device Exemption for this software. To use this software in the USA we need to get informed consent from the patients or persons who are tested. Informed consent must be signed, implied, or understood.

The registered EPFX software and hardware uses a micro current medically safe pulse applied to the wrists, ankles and forehead. We safely measure some of the electrical aspects of the body. A variant micro current is then adapted to the patient to feedback the signal. The EPFX software will use the same medically safe standards to develop a wider range of variant wave forms to the body. The patient will choose and direct the therapy by their unconscious electrical reactions. The EPFX software will also use a subspace system or Prayer wheel if there is no biological signals present. The system will show the patient reactions to homeopathic or nutritional items. This will help the therapist and the patient choose items that might be helpful. These choices are voluntary suggestions. The patient can greatly benefit from help with these choices. No items of significant risk are possible. These items are not part of the study and purchase of them is the patient’s responsibility.

There is insignificant risk and the only discomfort is sitting still for the 30 or 40 min evaluation. The patient name will be held confidential in the study. Participation is always purely voluntary. There is no penalty for withdraws. The other facts of the case are e-mailed to QX ltd IRB. The FDA of America reserves the right to inspect records. But confidentiality is always guaranteed.

The results of the studies are to be published on the International Journal of the Medical Science of Homeopathy. These results are available in 2006 on the internet or through your therapist. Over 35 studies on the device have already been published.

Since there are over 10,000 EPFX machines around the world, and all have access to the EPFX software, assuming 10 patient visits a week there might be over 400,000 data streams per month. We fully expect over a million bits of data in the first year alone. We will analyze all types of diseases - all types of clients - in one of the world’s largest studies of its kind. We welcome your participation.

The clinical therapist is responsible for ensuring that informed consent is obtained from each research subject before that subject participates in the research study. FDA does not require the therapist to personally conduct the consent interview. The therapist remains ultimately responsible, even when delegating the task of obtaining informed consent to another individual knowledgeable about the research.

The Centro Ricerche of Prof. William Nelson University of Venice + Padova, Italy is the headquarters for the study IRB. There are researchers in over 25 different countries. If you have questions or comments please ask your therapist or send them in writing to www.irbEPFX.net.

I am informed of the experiment on the EPFX software. I willingly give my consent to participate in the study. I give my consent for any children under my supervision or custody. I am to be guaranteed confidentiality of the data. I will be allowed to see the results of the publication in roughly one year. I recognize that there is no firm diagnosis resulting from the software. We are diagnosing and treating only Stress via Biofeedback.
I give my full and informed consent to partake in this research.

SIGNATURE_________________________________

DATE______________________________________

THERAPIST OR WITNESS_____________________________

In short
1. The EPFX software research is to study millions of people with a wide variety of diseases to see who gets or feels better.
2. The EPFX software will allow the unconscious of the patient to guide to repair electrical and vibrational aberrations in your body.
3. The device and the study is always voluntary, confidential and safe.
4. There are a wide amount of benefits already displayed by the thousands of users and millions of patients. A millions of people have already been helped.
5. Results of the study and answers to your questions are available.

The above diagram shows a key little known fact of biology. The factors of the wave formations of people differ from person to person. The values shown are not perfect. The height of the curve is the Voltage. Voltage is easily calculated from the electro-potential readings coming from the harness skin contacts. The area under the curve is the Amperage. An incremental measure of variant amplifications gives us an Amperage correlate. Resistance is easily calculated by determining the resistance to flow of a known voltammetric signal. With Voltage and Resistance known with the Amperage correlate and an application of Ohms law (Volts equals Amps times Resistance) we can virtually calculate Amperage better.

Amperage is the amount of charged particles flowing and Voltage is the pressure behind the flow. Without Volts and Amps there is no life.

Proton and Electron pressure or the charge stability of the system affects the polarity and the resting potential. The slight changes in these electrical profiles can be measured.

As we measure the changing Volts and Amps we get inductance and capacitance virtual scores and this allows us to find a Hydration and Oxygenation index. As Amperage changes slightly with each breath, we get an Oxidation index from comparing max and min values. Electrical measures of Oxidation are well known in the literature. We need to observe several normal breaths to establish a Oxidation index during the Calibration procedure. Voltage changes observed during
the Calibration process give us a Hydration index (based on the free proton effect).

Thus there are definitely electrical values of each patient at multiple globally placed electrodes that make up a VARHOPE profile. These factors are most often controlled by life style behaviors and stress. Slight regulatory balancing from the guided electro-stimulation of the SCIO can also make changes.

Early Volt-Ammetry research noted a connection of body Voltage with the catecholamines of the body, and Amperage to the indolamines. The catecholamines are the hormones associated with the adrenal system, our fight flight system. Hypoadrenia is epidemic in our stress filled society. Stress unmanaged is weakening our adrenals and lessening our body Voltage. The indolamines are brain hormones associated with love and other high brain function.

Resistance measured in Ohms is perhaps the greatest variant. Normal skin resistance is 40 to 50 thousand Ohms. Our normal of 100 is based on there being not too much or too little Resistance. Inflammation diseases will makes Resistance go down and conductance go up. Degenerative diseases will make Resistance go up and conductance down. This is well documented in the literature. There are other things that effect Resistance that must be ruled out. But as we pass a current thru a limb or quadrant a decreased Resistance will reflect possible inflammation and an increased Resistance possible degeneration. Soft tissue will respond to lower frequencies below 100 and the bone to frequencies of 300 to 600. There can be degeneration and inflammation in the same quadrant. But the cybernetic pulse is designed to systematically thru stimulation measure and re-stimulation produce a guided auto-focusing pulse to treat any aberrant electrical profile. This is the SCIO.

Volts times Amps is Power. This is measured in Watts. The Volt-Ammetric research showed that giving catecholamines such as adrenalin made voltage go up. Giving indolamines like serotonin made Amperage go up. When body the body Amperage fails to low it signals the end of life. Adrenalin is associated with fear and anger. Serotonin is associated with love. We see reports of a small 100 pound mother picking up a car to save her child. An act of love. We do not hear reports of her picking up a car to throw at her husband. So love with indolamines power Amperage are more powerful. Increasing the Amperage of a circuit is more effective in power than Voltage. Glen Rein and others have reported seeing an increase of adrenalin with a stimulation of the body, and stress. Slight regulatory balancing from the guided electro-stimulation of the SCIO can also make changes.

Membrane potentials are defined relative to the exterior of the cell; thus, a potential of −70 mV is the Threshold Potential. The potential is generated by the sodium-potassium pump which utilizes energy of ATP to move Na+ inside the cell, and K+ outside the cell. The cost of 1 ATP molecule. There should be twice as much potassium as sodium in the healthy human body.

The sodium-potassium pump transports 2 potassium ions inside and 3 sodium ions outside at the cost of 1 ATP molecule. This takes the energy of ATP to operate the sodium pump. While the concentration gradient for sodium is directed into the cell, there is a need for a sodium pump to stabilize the life of the cell. The body uses ATP to stabilize the life of the cell. The body electric can divert the electrons to where they are needed. When body the body Amperage falls to low it signals the end of life. The next discussion is of the basic nature of electrical charge in biology.

Life must keep Potassium inside the cell and Sodium outside of the cell. The natural thermodynamic balance is for them to gravitate to be equal. So potassium has a natural pull to go out and sodium to go into a cell. Because the concentration gradient for potassium is directed out of the cell, while the concentration gradient for sodium is directed into the cell, there is a need for a sodium pump to stabilize the life of the cell. The sodium-potassium pump transports 2 potassium ions inside and 3 sodium ions outside at the cost of 1 ATP molecule. The body electric can divert the electrons to where they are needed.
Electrons never touch, so atoms never touch, molecules never touch. Not much ever touches anything. It is all an interaction of their fields. Research has shown that when we apply even a weak current or electro-potential across a cell, membranes become more osmotic. Osmosis increases with small electro-potential stimulation. The membranes shown above have different electro-potentials across them. The main factors of membrane potential are membrane consistency which is based on the quantity and quality of the fatty acids and minerals. Calcium is the best universal membranous mineral. So lifestyle, nutrition, and exercise are the first considerations and the SCIO approaches them first in the SOC inventory. The second factors of membrane potential are the existence of the free charges in the body. If the body is acid (as over 80% of our patients are) they crave electrons. The SCIO can supply electrons and electro-stimulation that will increase osmosis, increase membrane transport of nutrients in and toxins out, increasing hydration and oxidation. If there is an alkaline terrain the SCIO can ground out excess electrons and help to balance the body electric while still increasing osmosis.

Slight electro-stimulation is shown to not only increase osmosis, but to have pain reducing qualities (MENS), relaxation effects, mood stabilization (CES), and charge stability. When you charge your car battery you use a trickle tickle charger. It supplies a similar charge to the battery over a long period to tickle and trickle the needed electrons into the battery. The SCIO works this way as well. In the picture of the two cells we see that the sad cell has less electro-potential or is a weak battery. The SCIO sense the proper frequency the patient’s body electric responds to and the trickle ticles the charge into the cells. This increases osmosis and charges the cells back to proper cellular membrane potential.

Just like the trickle ticle battery charger, too much current will not be accepted. The body is especially designed to not accept large charges. A small charge that is much like the body’s own level of volts, amps resistance and oscillation resonance is best to use for charging the body’s cell membrane batteries. The SCIO having measured the body electric factors then applies a stimulus to charge or balance the system and monitors it’s progress with a feedback loop.

Our experimental research shows an increased VARHOPE score after the SCIO treatment proving it effectiveness and safety. The short term effects will be better and longer lasting if they are coupled with life style changes. REF STUDIES

**POTASSIUM AND SODIUM**

As we have said there should be twice as much potassium as sodium in the healthy human body. But people like salt and producers put more salt into foods to sell and satisfy customers. Potassium occurs mostly in fruit and vegetables. Potassium makes foods turn Orange. So oranges, pumpkin, paprika, squash etc have the most. Most people get too much sodium and too little potassium. This puts pressure on the potassium-sodium pump. This wastes ATP needed for other cellular functions and stress the body electric. The excess sodium makes the body go acid with excess positive charge. This drives the charge stability of the body to the acid state and is reflected in the measurements made from the SCIO. There are many other factors that can upset this electrical balance.

The electro-potential of the cell membrane must be kept inside some strict limits to assure proper electrical activity for life. The cell is an electrical dynamo needing energy for activity. This energy comes from hot electrons (high quantum state energy of electrons in food). The food has gotten...
it's energy from the sun's visible light photons energizing the electrons to higher quantum states. The quantum energy is broken down in Krebs cycle to make ATP. Photons of heat are released. The cells will have electrical activity that is of a tight range and thus electro-medicine will need to decipher the code of the types of variations in the body electric that hallmark disease states. The cell must fight thermodynamics to live.

The factors of mineral balance especially sodium to potassium is largely a nutritional issue. Too much sodium versus potassium is one of the greatest single health risks today. Oxygenation is also key. Smoking and lack of exercise is epidemic and killing millions. Over use and improper use of doctor prescribed medicines is also killing millions. Too much animal fat, trans-fatty acids, dextrose sugar, processed foods, food additives, environmental toxicity, mercury amalgams, and uncontrolled stress are life style factors that are killing millions of people. So the first place to start with health care is the behavior. Behavioral medicine is a ever growing issue of responsibility in health care. The SCIO devotes its first level of use and design to the education and possible correction of life style issues. It is important to point out the value and importance of correcting these issues for health.

Correlations between whole-body impedance measurements and various bio-conductor volumes, such as total body water and fat-free mass, are experimentally well established; we can measure many different factors of the body electric. First there is skin electro-potential. Each of these small little batteries we call cells blend in harmony to make the multi-cellular
organism we call the human. The hundred trillion cells in the human body act both in series and in parallel to make the electro-potentials of the human body. Most of these cells are surrounded by fluid (interstitial, lymph, blood etc.). These fluids are mostly water with lots of free protons, electrons and minerals which further enhance the electrical factors. The normal cell has a resting voltage potential across the membrane of 70 milli-volts (-70mv). The brain cell will fire at peak voltage of +30mv so as to create a difference of 100 milli-volts.

Thus the body has a measurable voltage and amperage while living. This electro-potential is oscillating and or pulsing. Cells charge and discharge electricity at varying speeds. Global measures reflect trends of the cells in the area to be measured. There are norms of these measures.

The amperage and voltage coming off of the body’s skin is of a range of zero to 5 milliamps and 1.5 volts. Zero is obvious as we all have seen the flat line in a movie telling us the person is dead. Normal people put off micro-amperage and milli-volts, the extreme can be seen at over a volt. The criteria of these potentials are derived from their location and oscillation.

The SCIO measures electro-potential at the 12 harness points in the clear, then applies a voltammetric signal into any or all of the points, then measures the harness points with the SCIO system, as with all biofeedback systems. The pattern or rhythm of the brain wave is from 4 hertz as delta waves, 4-8 Hz for theta, 8 to 20 for alpha, and 20 to 100 for beta waves. If we measure the electro potential of the skin and filter out these waves we can get the EEG.

If we measure on the forehead, wrists and ankles as in the case of the SCIO, we can measure the transcutaneous correlate of the activity of muscle cell activity between the points of measure. This is called EMG or electromyography. We can ascertain the muscle activity from the oscillation pattern. The pattern or rhythm of the muscle waves is from 2 to 20 normally with variant spindles up to 1000 Hz. If we measure the electro potential of the skin and filter in these waves we can get the EMG.

If we measure on the scalp or the forehead as in the case of the SCIO, we can measure the transcutaneous correlate of the activity of brain cells firing in the brain below the point of measure. This is called EEG or electroencephalography. We can ascertain the Brain wave from the oscillation pattern. The pattern or rhythm of the brain wave is from 4 hertz as delta waves, 4-8 Hz for theta, 8 to 20 for alpha, and 20 to 100 for beta waves. If we measure the electro potential of the skin and filter out these waves we can get the EEG.

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What causes this change in potential to occur? The stimulus causes the sodium gates (or channels) to open and, because there’s more sodium on the outside than the inside of the membrane, sodium then diffuses rapidly into the nerve cell. All these positively-charged sodium ions rushing in causes the membrane potential to become positive (the inside of the membrane is now positive relative to the outside). The sodium channels open only briefly, and then close again. This difference in causes the membrane potential to become positive (the inside of the membrane is now positive relative to the outside). The sodium channels open only briefly, and then close again. This difference

In the figure above, we see a threshold potential of +3 mV. This is a very rapid change in membrane potential that occurs when a nerve cell membrane is stimulated. Specifically, the membrane potential goes from the resting potential (typically -70 mV) to some positive value (typically about +30 mV) in a very short period of time (just a few milliseconds).

Smooth muscle performs many functions that are essential for the normal working of the human body. Changes in pH are thought to affect many aspects of smooth muscle. Despite this, until
A controlled study of the effects of EEG biofeedback on cognition and behavior of children with attention deficit disorder and learning disabilities

Michael Linden, Thomas Habib1 and Vesna Radojevic

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Abstract

Eighteen children with ADD/ADHD, some of whom were also LD, ranging in ages from 5 through 15 were randomly assigned to one of two conditions. The experimental condition consisted of 40 45-minute sessions of training in enhancing beta activity and suppressing theta activity, spaced over 6 months. The control condition, waiting list group, received no EEG biofeedback. No other psychological treatment or medication was administered to any subjects. All subjects were measured at pretreatment and at posttreatment on an IQ test and parent behavior rating scales. No other psychological treatment or medication was administered to any subjects. All subjects were measured at pretreatment and at posttreatment on an IQ test and parent behavior rating scales. Other psychological treatment or medication was administered to any subjects. All subjects were measured at pretreatment and at posttreatment on an IQ test and parent behavior rating scales. No other psychological treatment or medication was administered to any subjects. All subjects were measured at pretreatment and at posttreatment on an IQ test and parent behavior rating scales. Other psychological treatment or medication was administered to any subjects. All subjects were measured at pretreatment and at posttreatment on an IQ test and parent behavior rating scales.

List of just some articles that refer to voltage amplitude.

**Human EEG gamma oscillations in neuropsychiatric disorders**

C.Herrmann, T.Demiralp

**Abstract**

Due to their small amplitude, the importance of high-frequency EEG oscillations with respect to cognitive functions and disorders is often underestimated as compared to slower oscillations. This article reviews the literature on the alterations of gamma oscillations (about 30–80Hz) during the course of neuropsychiatric disorders and relates them to a model for the functional role of these oscillations for memory matching. The synchronous firing of neurons in the gamma-band has been proposed to bind multiple features of an object, which are coded in a distributed manner in the brain, and is modulated by cognitive processes such as attention and memory. In certain neuropsychiatric disorders the gamma activity shows significant changes. In schizophrenic patients, negative symptoms correlate with a decrease of gamma responses, whereas a significant increase in gamma amplitudes is observed during positive symptoms such as hallucinations. A reduction is also observed in Alzheimer’s Disease (AD), whereas an increase is found in epileptic patients, probably reflecting both cortical excitation and perceptual distortions such as déjà vu phenomena frequently observed in epilepsy. ADHD patients also exhibit increased gamma amplitudes. A hypothesis of a gamma axis of these disorders mainly based on the significance of gamma oscillations for memory matching is formulated.
Discourse on the development of EEG diagnostics and biofeedback for attention-deficit/hyperactivity disorders

Journal Editor: Applied Psychophysiology and Biofeedback
Publisher: Springer Netherlands
ISSN: 1050-0586 (Print) 1573-3270 (Online)
Volume 16, Number 3 / September, 1991
DOI: 10.1007/BF01000016
Pages: 201-225
Subject Collection: Behavioral Science
SpringerLink Date: Friday, January 21, 2005

Joel F. Lubar
University of Tennessee, 310 Austin Peay Building, 37996-0900 Knoxville, Tennessee

Abstract

This article presents a review of work that my colleagues and I have been doing during the past 15 years developing a rationale for the diagnosis of attention-deficit/hyperactivity disorder (ADHD) and treatment of ADHD employing EEG biofeedback techniques. The article first briefly reviews the history of research and theory for understanding ADHD and then deals with the development of EEG and event-related potential (ERP) assessment paradigms and treatment protocols for this disorder, including our work and that of others who have replicated our results. Illustrative material from our current research and child case studies is included. Suggestions for future experimental and clinical work in this area are presented and theoretical issues involving the understanding of the neurophysiological and neurological basis of ADHD are discussed.

This disorder is primarily found in boys (James and Taylor, 1990), with the ratio of boys ... (1992), in a study of children with ADHD, found an increase in absolute amplitude in the ... The ADHD children were found to have EEG frequency distributions that resembled profiles typical of

Physiological studies of the hyperkinetic child: I
JH Satterfield, DP Cantwell, LI Lesser ... - American Journal of ..., 1972 - Am Psychiatric Assoc

We feel that in the absence of known etiology or pathogenesis, as in the more common psychiatric disorders, marked differences in response to adequate trials of the same ... The mean resting EEG amplitude and the range of the mean resting EEG amplitudes were also computed

Event-related EEG/MEG synchronization and desynchronization: basic principles
G Pfurtscheller, FH Lopes da Silva - Clinical Neurophysiology, 1999 - Elsevier

... In addition it was also shown that visual stimuli can reduce the amplitude of the ongoing EEG amplitude ( Vijn et al., 1991), thus demonstrating that the model assuming that an ERP can be represented by a signal added to uncorrelated noise does not hold in general. ...

Brain and human pain: topographic EEG amplitude and coherence mapping
ACN Chen, P Rappelsberger - Brain Topography, 1994 - Springer

... awake states, sensory ac- tivation, cognitive processing, learning, stress and emotionality, mental disorders, effects of ... and pain, the tasks of this study were: (a) to employ both amplitude and coherence analysis in pain study, (b) to expand the EEG recording channels ...

... CT scan and sensorimotor EEG rhythms in patients with cerebrovascular disorders

... Fifty subjects with cerebrovascular disorders and motor deficits, all able to perform a voluntary ...

From the mu rhythm, the hemispheric asymmetry in amplitude and ERD during movement (ERD ...

Comparisons of CT scan data and EEG findings indicate a high correlation between ...

Cited by 23 - Related articles - All 2 versions
EEG biofeedback training and attention-deficit/hyperactivity disorder in an ...
DP Carmody, DC Radvanski, S Wadhwani ... - Journal of ..., 2000 - informaworld.com

... on the most frequent methods of treatment of Attention Deficit Hyperactivity Disorder (ADHD) over ... either by inhibiting high-ampli- tude theta activity or by rewarding high-amplitude beta activity.

For the participants who decreased their slow EEG activity, changes were found on a ...
Cited by 22 - Related articles - BL Direct
Evaluation of the effectiveness of EEG neurofeedback training for ADHD in a ...
JF Lubar, MO Swartwood, JN Swartwood, PH O' ... - Applied ..., 1995 - Springer

... aspect of the electrical activity of the brain such as the frequency, location, amplitude, or duration of ... or to enhance certain types of EEG activity and decrease other types of EEG activity when ...

above) and the inhibition of theta activity in the case of Attention Deficit Disorders or the ...
Cited by 182 - Related articles - BL Direct - All 7 versions
Sleep bruxism: an oromotor activity secondary to micro-arousal
sagepub.com [PDF]
T Kato, P Rompre, JY Montplaisir, BJ ... - Journal of Dental ..., 2001 - [dr.sagepub.com]

... frequent and the burst amplitudes are higher in SB patients than in normals ... abrupt change in the frequency of cortical EEG that is occasionally ... snoring, apnea, periodic leg movement syndrome, or insomnia) or medical disorders (eg, psychiatric, neurological, or movement ...

Cited by 57 - Related articles - BL Direct - All 4 versions

EEG and human psychopharmacology

M Fink - Annual review of pharmacology, 1969 - Annual Reviews

... In some rigorous EEG quantitative studies, threshold drug effects were observed when a simple reaction-time task was periodically introduced with the EEG frequency and amplitude changes measured immediately after correct performance of the task (46, 47, 50). ...

Cited by 128 - Related articles - All 3 versions

... EEG changes with benzodiazepine administration in generalized anxiety disorder

MS Buchsbaum, E Hazlett, N Sicotte, M Stein, J Wu, ... - Biological ..., 1985 - Elsevier

... Day 0 predrug minus day 0 Benzodiazepine EEG in Anxiety Disorder BIOL PSYCHIATRY 835 1985;20:832-842 postdrug (2 hr) and day 0 predrug minus day 14 group means and t-tests for the ... 1985 ;20:832-842 Figure 1. Change in EEG amplitude with drug administration. ...

Cited by 53 - Related articles - All 6 versions

The application of EEG sleep for the differential diagnosis of affective disorders

DJ Kupfer, FG Foster, P Coble, RJ ... - American Journal of ..., 1978 - Am Psychiatric Assoc

... Page 2. EEG SLEEP AND AFFECTIVE DISORDERS Am J Psychiatry 135:1, January 1978 70 ... schizo-affective disorder. All EEG sleep records were scored independently and without knowledge of the patient's clinical diagnosis. The sleep values for each of the 95 patients rep- ...

Cited by 123 - Related articles - All 3 versions

A cross-national EEG study of children with emotional and behavioral problems: A ...

M Matsuura, Y Okubo, M Toru, T Kojima, Y He, Y ... - Biological ..., 1993 - Elsevier

... 8.3 (1.0) 41 (36, 5) 8.6 (1.0) 26 (17, 9) 8.2 (1.6) 87 (55, 32) 8.1 (1.5) 29 (19, 10) 8.0 (1.9) aADHD: attention deficit disorder with hyperactivity. amplitude theta with 30 p,V or more, and consec utive

alpha with three or more waves). Calculation of Hypothetical EEG Maturation Material ...

Cited by 67 - Related articles - All 7 versions

Individual reliability of amplitude distribution in topographical mapping of EEG

A Burgess, J Gruzelier - Electroencephalography and Clinical ..., 1993 - Elsevier

... L., Ahn, H., Easton, P., Fridman, J. and Kaye, H. Neurometric evaluation of cognitive dysfunction and neurolog-ical disorders in children. ... Pollock, VE, Schneider, LS and Lyness, SA Reliability of topo- graphic quantitative EEG amplitude in healthy late-middle-aged and elderly ...

Cited by 27 - Related articles - BL Direct - All 2 versions
Large Scale Study of the Safety and Efficacy of the SCIO Device

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Abstract
A global and momentous research project was developed for the last two years. The SCIO device is a Universal ElectroPhysiological device used for stress reduction and patient treatment. Over 2,200 qualified biofeedback therapists joined our Ethics Committee study to evaluate how stress reduction using the SCIO device could help a wide variety of diseases.

The device and thus the study has insignificant risk. There was a staff of medical doctors who designed and supervised the study.

Over 98,000 patients gave informed consent and participated in the study. The study would conclusively prove safety and efficacy of the SCIO Device. With over 60% of these patients having multiple visits. There were over 275,000 patient visits. With a total record of the SCIO patient information, therapy parameters and reactivity data. No names of patients were recorded for confidentiality.

Two of the 2,200 plus therapists were given blank devices that were completely visually the same but were none functional. These two blind therapists were then given 35 patients each. This was to evaluate the double blind component of the placebo effect as compared to the device. Thus the studied groups were a placebo group, a subspace group, and a attached harness group.

This is just the first study in a long task of analysis in truly break down the data totally. This study verifies the safety and efficacy of the SCIO device. There were small effects seen in the placebo group, larger effects in the subspace, and astounding effects in the real harness group.

Introduction
This research is to study millions of people with a wide variety of diseases to see who gets or feels better while using the SCIO for stress reduction and patient monitoring. The SCIO is a evoked potential Universal ElectroPhysiological Medical apparatus that gauges how an individual reacts to miscellaneous homeopathic substances. The device is registered in Europe, America, Canada, S. Africa, S. America, Mexico and elsewhere. The traditional software is fully registered. Some additional functions where determined by the manufacturer to be worthy of evaluation. Thus a study was necessary to determine safety and efficacy.

An ethics committee was formed and governmental permission attained to do the insignificant risk study. Qualified registered and or licensed Biofeedback therapists where enlisted to perform the study. Therapists were enrolled from all over the world including N. America, Europe, Africa, Asia, and S. America. They were trained in the aspects of the study and how to attain informed consent and transmit the results to the ethics committee or IRB (Institutional Review Board).

2,256 therapists enlisted in the study. There were 95,832 patients. 69% had more than one visit. 43% had over two visits. There were over 250,000 patient visits recorded. The therapists were trained and supervised by medical staff. They were to perform the SCIO therapy and analysis. They were to report any medical suspected or confirmed diagnosis. Unlicenced personnel are not to diagnose. Then the therapist is to inquire on any reported changes during the meeting and on follow-ups any measured variations.

Part 1. The emphasis was on substantiating safety followed by efficacy of the SCIO.
Part 2. Proving the efficacy of the SCIO on diseases (emphasis on degenerative disease)
Methods and Materials:

**SCIO Device:**
The SCIO is a Universal Electro-Physiological Medical biofeedback device that measures how a person reacts to items. It is designed to measure reactions for allergy, homeopathy, nutrition, sarcodes, nosodes, vitamins, minerals, enzymes and many more items. Biofeedback is used for pre-diagnostic work and or therapy. The SCIO software will allow the unconscious of the patient to guide to repair electrical and vibrational aberrations in your body. For complete functional details and pictures, see appendix.

**Subspace Software:**
The SCIO software is designed for electro-physiological connection to the patient to allow reactivity testing and rectification of subtle abnormalities of the body electric. If a patient is not available a subspace or distance healing link has been designed for subspace therapeutics. Many reports of the success of the subspace have been reported and thus the effectiveness and the safety of the subspace link is part of this test. Many companies have tried to copy the subspace of Prof. Nelson and their counterfeit attempts have ended in failure.

**SOC Index:**
The SCIO interview opens with a behavioral medicine interview. This is called the SOC Index. Named after the work of Samuel Hahneman the father of homeopathy, he said that the body heals itself with it’s innate knowledge. But the patient can suppress or obstruct the healing process with some behavior. Hahneman said that the worst way to interfere with the healing natural process was allopathy or synthetic drugs. Theses upset the natural healing process by unnatural intervention and regulation disturbance. Other ways to Suppress or Obstruct the Cure are smoking, mercury amalgams, stress, lack of water, exercise and many others. This behavioral survey then gives an index of SOC.

The scores relate to the risk of Suppression and Obstruction to the natural Cure. The higher the scores the more the Suppression and or Obstruction. The scores of 100 or lower are ideal. A copy of the SOC index questions appear in the appendix.

**Study Technicians:**
The study technicians were educated and supervised by medical officers. The study technicians were to execute the SCIO therapy and analysis. All were trained to the standards of the International Medical University of Natural Education. Therapists from all over the world including N. America, Europe, Africa, Asia, S. America and elsewhere were enlisted to perform the study according to the Helsinki study ethics regulations.

They were to chronicle any medical suspected or confirmed diagnosis. Unlicenced personnel are not to diagnose. Then the study technician is to inquire on any disclosed observations during the test and on follow-ups report any measured changes.

To test the device as subspace against the placebo effect, two of the 2,200 + therapists were given placebo SCIO devices that were totally outwardly the same but were not functional. These two blind therapists were then assigned 35 patients each (only 63 showed). This was to assess the double blind factor of the placebo effect as compared to the device. Thus the studied groups were

A. placebo group,  B. subspace group,  and  C. attached harness group.

**Important Questions:** these are the key questions of the study
1. Define Diseases or Patient Concerns
2. Percentage of Improvement in Symptoms
3. Percentage of Improvement in Feeling Better
4. Percentage of Improvement Measured
5. Percentage of Improvement in Stress Reduction
6. Percentage of Improvement in SOC Behavior
7. What Measured=How
8. If Patient worsened please describe in detail involving SOC_

After the patient visit was complete the data was e-mailed to the Ethics Committee or IRB for storage and then analysis. This maneuver minimized the risk of data loss or tampering. Case studies were reported separately in the disease analysis.

**Part 1. Results:**
Before we review the direct disease improvement profiles, we need to review the overall results. The first most basic of question in the results is the basic feedback of the generic patient conditions. With over 96,000 patients and 256,800 patient visits we have direct evidence of the safety and efficacy.

1. Percentage of Improvement in Symptoms
2. Percentage of Improvement in Feeling Better
3. Percentage of Improvement Measured
4. Percentage of Improvement in Stress Reduction
5. Percentage of Improvement in SOC Behavior

The SOC index gives us great insight to this study. Each disease has a different cut off where the ability of the SCIO to help was compromised. As a general index scores of 200 + where much less successful.
OVERALL ASSESSMENT

A. Placebo Group- 63 cases with a Dbl Blind System and no Treatment
There were no cases of patients who reported a negative Improvement.
There were
19 cases reporting no improvement of Symptoms, 30% of group
12 cases reporting no improvement in feeling better, 19% of group
13 cases reporting no improvement in stress reduction, 20% of group
12%--- Percentage of Improvement in Symptoms
15%--- Percentage of Improvement in Feeling Better
2%--- Percentage of Improvement Measured
12%-- Percentage of Improvement in Stress Reduction
3%---- Percentage of Improvement in SOC Behavior

B. Subspace Treatment 75,688 patient visits
There were 45 cases of patients who reported a negative Improvement.
There were
433 cases reporting no improvement of Symptoms, .005% of group
567 cases reporting no improvement in feeling better,.007% of group
322 cases reporting no improvement in stress reduction.004% of group
35%--- Percentage of Improvement in Symptoms
46%--- Percentage of Improvement in Feeling Better
12%--- Percentage of Improvement Measured
49%-- Percentage of Improvement in Stress Reduction
14%---- Percentage of Improvement in SOC Behavior

C. SCIO Harness Treatment 190,312 patient visits
There were 65 cases of patients who reported a negative Improvement.
There were
532 cases reporting no improvement of Symptoms, .003% of group
759 cases reporting no improvement in feeling better,.004% of group
460 cases reporting no improvement in stress reduction.002% of group

Factors that influence the body voltage and membrane potential are fatty acids in the cell membrane, minerals, especially salts, hydration water, oxygenation, stress, toxins and life style.

The SCIO has been proven in tests to increase the electrical potential of the body. Increased cellular membrane potential makes osmosis increase, which increases detoxification, nutrient transfer and absorption, hydration, oxidation, and all cellular functions in general.
is THE Medical Concern

65%--- Percentage of Improvement in Symptoms
56%--- Percentage of Improvement in Feeling Better
24%--- Percentage of Improvement Measured
53%-- Percentage of Improvement in Stress Reduction
20%--- Percentage of Improvement in SOC Behavior

GROUPS B+C –SOC Index 150 or below = B, above = C

B. Subspace Treatment 35,621 patient visits SOC Index 150 or below
There were 25 cases of patients who reported a negative Improvement.
There were
123 cases reporting no improvement of Symptoms, .003% of group
211 cases reporting no improvement in feeling better, .004% of group
97 cases reporting no improvement in stress reduction, 0.004% of group
38%--- Percentage of Improvement in Symptoms
48%--- Percentage of Improvement in Feeling Better
20%--- Percentage of Improvement Measured
48%-- Percentage of Improvement in Stress Reduction
13%---- Percentage of Improvement in SOC Behavior

B. Subspace Treatment 40,067 patient visits, SOC Index above 150
There were 20 cases of patients who reported a negative Improvement.
There were
310 cases reporting no improvement of Symptoms, .008% of group
356 cases reporting no improvement in feeling better, 0.009% of group
225 cases reporting no improvement in stress reduction, 0.007% of group
38%--- Percentage of Improvement in Symptoms
48%--- Percentage of Improvement in Feeling Better
20%--- Percentage of Improvement Measured
48%-- Percentage of Improvement in Stress Reduction
13%---- Percentage of Improvement in SOC Behavior
C. SCIO Harness Treatment 101,832 patient visits SOC Index above 150
There were 45 cases of patients who reported a negative Improvement.
There were
213 cases reporting no improvement of Symptoms, .002% of group
230 cases reporting no improvement in feeling better, .006% of group
143 cases reporting no improvement in stress reduction, 0.005% of group
67%--- Percentage of Improvement in Symptoms
54%-- Percentage of Improvement in Feeling Better
28%--- Percentage of Improvement Measured
57%-- Percentage of Improvement in Stress Reduction
29%---- Percentage of Improvement in SOC Behavior

C. SCIO Harness Treatment 88,480 patient visits, SOC Index above 150
There were 45 cases of patients who reported a negative Improvement.
There were
213 cases reporting no improvement of Symptoms, .003% of group
529 cases reporting no improvement in feeling better, .004% of group
317 cases reporting no improvement in stress reduction, 0.002% of group
64%--- Percentage of Improvement in Symptoms
56%-- Percentage of Improvement in Feeling Better
22%--- Percentage of Improvement Measured
52%-- Percentage of Improvement in Stress Reduction
17%---- Percentage of Improvement in SOC Behavior

Discussion:
There are several quite apparent results from our study. First the safety of the device is firmly established as a minimal risk. There is an insignificant report of negative results and no reports of any significant problems.
Second the difference in the placebo group versus the subspace group is significant although minimal. This proves the efficacy of the subspace therapy. There is a large difference in the harness group. This notes the large effect of the harness versus the subspace.
Next there is a significant difference in the SOC Index. Patients below SOC Index 150 had significantly better results in all conditions. This points to value of behavioral medicine interview and the need to reduce suppression and obstruction of cure ability.
The major findings are the significant positive effect on healing the SOC Index and the harness have. Users should note this result.

The significant measured criteria of the diseases will take volumes in reporting. There are case studies and measured criteria that will be presented. This will be in a continuation of this study in part 2. A list appears in the Appendix.

APPENDIX

Informed Consent:
The SCIO Biofeedback Medical device is registered in the Europe, S Africa, Mexico, Australia etc. It is a Biofeedback device that measures how a person reacts to items. It is designed to measure reactions for allergy, homeopathy, nutrition, sarcoedes, nosodes, vitamins, minerals, enzymes and many more items. Biofeedback is used for pre-diagnostic or therapy. These functions are registered in all of the above regions. Maitreya manufactures the hardware.

At QX Ltd., we have written a software that uses the SCIO data This software offers no risk and is completely safe. We recognize that this new type of system needs to be tested experimentally. The USA allows us to develop an Institutional Review Board and operate an Investigational Device Exemption for this software as long as all proper FDA policies are adhered to. To use this software in the USA we need to get informed consent from the patients or persons who are tested. Non-Significant Risk informed consent must be signed, implied, or understood.

The registered SCIO software and hardware uses a micro current medically safe pulse applied to the wrists, ankles and forehead. We safely measure some of the electrical aspects of the body. A variant micro current is then adapted to the patient to feedback the signal. The SCIO software will use the same medically safe standards to develop a wider range of variant wave forms to the body. The patient will choose and direct the therapy by their unconscious electrical reactions. The SCIO software will allow the unconscious of the patient to guide to repair electrical and vibrational aberrations in your body.

The results of the studies are to be published on the International Journal of the Medical Science. These results are available in 2008 on the internet or through your therapist.

In short
1. This research is to study millions of people with a wide variety of diseases to see who gets or feels better while using the SCIO for stress reduction and patient monitoring.
2. the SCIO software will allow the unconscious of the patient to guide to repair electrical and vibrational aberrations in your body.
3. The device and the study is always voluntary, confidential and safe.
4. There are a wide amount of benefits already displayed by the thousands of users and millions of patients. A millions of people have already been helped.
5. Results of the study and answers to your questions are available.
Appendix SCIO device description

To Whom It May Concern:

Re: Proprietary Rights of Medical Device known as- SCIO

Ownership of all software rights to inventor William Nelson, all rights assigned to QX ltd

Basic SCIO System Description

The SCIO system is a Universal Electro-Physiological Patient Interface. It can measure changes of electrical nature such as electro-potential, micro-amperage, voltage, galvanic skin resistance. This allows inference of oscillations, frequency, capacitance, electrostatic potential, inductance, electromagnetic potential, susceptance, reactance, micro-wattage, resonant frequency, oxidation potential, hydration potential, and proton versus electron pressure.

A subspace component of the software allows for a distance patient link using an intent driven quantic subspace interface.

The basic science was generated by Prof. William Nelson. His book the PROMORPHEUS was registered in it’s first form by the Library of Congress USA in 1982. Thus book introduces the concepts of the SCIO.

The basic technology was developed in 1985 and was registered as the EPFX in America in 1989. The EPFX stands for the acronym Electro-Physiological Feedback Xrroid. A Xrroid is the rapid testing of homeopathic medicines by an electrical reactivity device. The reactions are of a ionic nature as they reflect electro-potential changes. The speed of ionic exchange in the human body is approximately one hundredth of a second. So a computer device was needed for such testing.

Analysis of the trivector field of a homeopathic is developed in this work and patented in Ireland in 1995. All substances have a particular volt-ametric or polography field. By description of the right hand rule all electrical activity takes place in three dimensions, Conductivity, Static, and Magnetic.

An advanced three dimensional field analysis device known as the QQC was made and patented by William Nelson.

Since the measure of galvanic skin resistance requires an applied current, the applied current could be of the trivector analysis variety. The applied current could also be used for electro-therapy. Aberrant electrical patterns of the patient could be corrected by application of electrodynamic theory. When electricity flows thru healthy tissue it has a known result. When it flows thru injured or diseased tissue it has a different result. Application of electrodynamic theory produces the ability of the SCIO device to treat and correct injured or diseased tissue. This process is known as rectification.

These trivector signatures could be computerized and duplicated by the computer. A quantic coherency test kit was coupled to the system to improve data. The SCIO was then able to measure before and after electro potential changes to determine reactivity and susceptibility. Providing a reactivity profile. When this is done at biological speeds of about one hundredth of a second it is called the Xrroid.

Thus the SCIO system could measure the basic elements of the body electric. Aberrant reactivity patterns could also be corrected using the principles of bioresonance in a process also known as rectification of electrical patterns.

The Electro-Physiological-Feedback-Xrroid / SCIO is also a biofeedback system. The definition of biofeedback is measuring a physiological response and feeding it back to the patient. Most of the devices feedback the information primarily to the conscious and thus then to the unconscious of the patient. The EPFX-SCIO system differs in that it feeds back the information or signal to the unconscious primarily and conscious secondarily. The unconscious should be directing these autonomic processes. So our device focuses on repairing the unconscious link directly.

Feedback of electro physiological processes are given as relaxation signals to the patient. The EPFX system measures a combination of the following physiological functions, voltage potential, current potential, skin resistance, Electro Physiological Reactance, Electro Physiological Susceptance, skin temperature and Frequency. These are the raw readings made at the extremities and the head harness. (see Diagram). The EPFX system applies a variant set of signals and then measures changes in the readings. The changes determine resonance, reactivity and coherency.

The QQC is a trademarked and proprietary process that does an analysis of the Polographic or voltametric three dimensional electrical pattern of a substance. This produces a substance electronic signature field. The Fields of these substances are sent into the patient via the harness. These variant patterns are of 0 Hz to mega Hz and of variant wave forms.

The total current is never over 5 milliamps. This represents a safe system rated as insignificant risk. All medical safety tests and quality control processes are applied.

The patient is evaluated before and after stimulation to measure any evoked potential changes that show patient reactivity. The type intensity and style of reactivity evoked potential offers insight into the patient health. Types of item reacting can be a link to therapy or deeper diagnosis.

The variant wave forms are trivector (voltametric signatures of the Acupuncture points, nosodes, sarcodes, allersodes, etc.) This allows Electro-Physiological-Reactivity measurements (EPR).

The evoked potential differences (EPR) are used to show a provocative allergy component. Provocative allergy tests show how a patient reacts electro physiologically to an item. Changes in histamine and other allergic reactions are preceded by electrical reactivity.

The EPFX measures the Electrophysiologic Reactivity intensity of the patient to thousands of QQC trivector patterns. These are patterns of reactions to Sarcodes, Nosodes, Allersodes, Isodes, Nutritional, Acupuncture points, Herbal, Imponderable and Classic Homeopathics. The reaction patterns or profiles can relate disturbances of the patient. Therapies can then be arranged to develop harmonic reactions, desensitizations, biological resonance or rectification processes. Biofeedback is the operation that allows for the cybernetic loop of systemic feedback. The loop of measured reaction and bio-varied resonance response allow for a true feedback for self corrective Electrophysiological therapy. Hence it is called the Electro Physiological Feedback Xrroid or as known in Europe SCIO.
Thus the SCIO device can perform the following functions:

1. Provocative Allergy Tests
2. Infection Reaction Testing and Immune Stimulation
3. Electro-Acupuncture
4. Neurological-Stimulation
5. Biofeedback-Psychological Interaction – Unconscious Interface
6. Muscle-Neurological Reducation
7. Homotoxicity and Homeopathy Scan
8. Injured or Diseased Tissue Detection and Repair
9. Dental Disease Detection and Repair
10. Superlearning
11. Electrophysiological Diagnosis and Therapy
12. Behavioral Management Profiles and Therapy
13. Chiropractic Analysis and Therapy
14. Biosonance
15. Brain wave detection and correction
16. Correction of aberrant body electric profiles such as proton pressure, electron pressure, reactivity patterns, oscillation disorders, trivector imbalance. Etc.
17. Report Development

FIELD OF THE INVENTION

The present invention relates to a method for preparing a homeopathic carrier solution for subsequent use in a homeopathic medicine for increasing the efficacy of the homeopathic medicine, and to a homeopathic carrier solution prepared according to the method. The method also relates to a homeopathic medicine comprising the homeopathic carrier solution, and to a method for preparing the homeopathic medicine.

BACKGROUND TO THE INVENTION

Homeopathic medicines are well known, and in general, are manufactured using the Materia Medica process. In general, the active homeopathic ingredient is dispersed in a carrier solution, generally a solution of water and alcohol or an alcohol mixture. Where the carrier solution is 50% water and 50% alcohol, the water is normally purified prior to mixing with the alcohol. The active homeopathic ingredient of the medicine is mixed with the carrier solution to the appropriate proportion to achieve the desired concentration of the active homeopathic ingredient in the carrier solution.

A 1x potency homeopathic medicine is a solution which comprises one part of active homeopathic ingredient to nine parts of carrier solution. A 2x potency homeopathic medicine is a solution which comprises one part of active homeopathic ingredient to thirty-six parts of carrier solution. A 3x potency homeopathic medicine is a solution which comprises one part of active homeopathic ingredient to one hundred and thirty-two parts of carrier solution. An Nx potency homeopathic medicine is a solution of one part of active homeopathic ingredient to (10^x – 1) parts of carrier solution. In general, the appropriate proportions of active homeopathic ingredient and carrier solution are added to a container and the active homeopathic ingredient is dispersed through the carrier solution by means of the container which resists the container on a blunt object one or more times.

OBJECTS OF THE INVENTION

One object of the invention is to provide a homeopathic carrier solution which when carrying an active ingredient in a homeopathic medicine significantly increases the efficacy of the homeopathic medicine. Another object of the invention is to provide a method for preparing such a homeopathic carrier solution. It is also an object of the invention to provide a method for preparing a homeopathic medicine with a relatively high efficacy, and in particular, an efficacy which is significantly improved over the efficacy of known homeopathic solutions. Additionally, it is an object of the invention to provide a method for preparing such a homeopathic carrier solution.

It has been surprisingly found that the efficacy of a homeopathic medicine may be increased by subjecting the homeopathic carrier solution to electrical treatments prior to the addition of the active homeopathic ingredient. It has also been found that the efficacy of the homeopathic medicine can be improved by adding sea water, brain hormone and biologically active enzymes (DNA) to the homeopathic carrier solution prior to adding the active homeopathic ingredient.
EPFX / SCIO USE AND CLAIMS FOR THE DEVICE

EPFX / SCIO use and claim: Professional Biofeedback for Stress Detection and Stress Reduction.

We need to make very clear the use and thus claims for the EPFX Electro_Physiological_Feedback_Xroid. The device has been legally FDA registered and marketed in America for twenty years.

The device is designed to measure and mend the body electric stress through a cybernetic biofeedback loop. It is designed and registered to send in a volt_ammetric electrical signal into the body, and then measure the reactivity or response to this signal. We measure the Volts, Amps, Oscillations of Volts and Amps, the Skin Resistance to the input signal, the Skin Temperature, and then calculate some virtual mathematical responses from the readings. All of this must happen at absolutely safe levels and adhere to stringent regulatory laws of the World government agencies. First do no harm is the primary law of medicine, It is our Prime Directive.

In other words we stimulate the body with a small safe electrical measure of the body electric, calculate the reaction, stimulate again, re_measure, calculate, re_stimulate, and on and on in a cybernetic biofeedback loop. A loop designed to give awareness feedback on stressors, and to reduce stress. Thus the simple use statement and claims are the device is designed for biofeedback stress detection and stress reduction. There are those who do not agree of the power of stress reduction, but their views do not change the claims for the EPFX. There is a vast amount of research showing the positive effects of stress reduction. Psycho-Somatic medicine has been proven for many decades. The Psycho-Neuro-Immuno link of the body is well documented. There is now the science of Psycho-Neuro-Immuno-Soma PNIS science, where the mind effects the neurology, the immunity, the body, and they all interact on each other.

The volt_ammetric signals are the volt_ammetric electro_chemical trivector signals calculated from the QQC device a registered medical device in Europe. The signals test homeopathic reactions to nosodes, sarcodes, allersodes, isodes, classical homeopathics, imponderables, hormones, enzymes, herbs, vitamins and other supplements. The skin resistance and electrical reactions to these compounds give us a Electro_Physiological_Reactivity (EPR) pattern. These reactions are not assuredly reliable, so please do not over react, but check any problem with more standard diagnostic means or refer to medical doctors who can.

Many many medical studies have shown that the EPFX / SCIO is helpful in treating a host of different diseases. The International Journal of the Medical Science of Homeopathy ISSN 14170876 has published over 100 such studies. The studies have proven the EPFX / SCIO therapy safe free from any significant risk. The studies have shown an Universal effectiveness, but the effect is from the original claim: Stress Detection (awareness) and Stress Reduction. Thus the EPFX device is designed for use on patients with some stress.

But even though the results are highly significant there is not enough evidence or need to readjust the original use and claims. Stress Detection and Stress Reduction are much more than enough. Even though Europe has allowed registration of many more claims, humbly we still maintain the simple, universal, unquestionable, and modest use and claim:

Stress Detection and Stress Reduction. Please do the same, offer no more claims than this.

BIBLIOGRAPHY

BOOKS

ARTICLES AND STUDIES
In the medicine of Hans Selye, it is seen that stressors are the paramount problem in health care. All diseases start with a stressor and thus Stress Detection and Stress Reduction are truly early intervention health care.

With the Selye stress pathway of disease, we can see a universal, safe, and very effective way of helping people. By combining the Selye Stress system and the energetic medicine of the body electric we have for over twenty years developed a safe effective and legal system of biofeedback stress reduction medicine. The EPFX / SCIO device is sold only to professionals and under the order of a licensed health care professional. The SCIO bioresonance - biofeedback therapists are rigorously trained to:
1. Use safe forms of Stress Detection and Stress Reduction
2. Do a behavioral assay of how the patient may be suppressing and or obstructing their own natural innate curative process.
3. To refer to the patient’s medical doctors, work with the system of medicine not to interfere with any doctors program.
4. Try to increase patient awareness, education, and enthusiasm.
5. This education is exactly supervised by the International Medical University of Natural Education. IMUNE

EPFX / SCIO use and claim: Professional Biofeedback for Stress Detection and Stress Reduction.

**Stress Selye and the FLOW OF DISEASE**

Disease starts when a stressor or blockage of flow causes a disruption in the flow. The ease is now dis-ease. Hans Selye outlined a medical system were disease comes into the body as some sort of stressor. This produces an ALARM reaction phase as that the body is trying to deal with the incoming stress. Thus the symptom is the ALARM reaction. If we fight the symptom not the cause we can interfere with healing. So when our child is exposed to a stress (like a bacteria from another child) a symptom presents, such as a sore throat. The symptom is sign of a disease in flow. The immune system needs help when it is burdened by stress. There is a proved Psycho-Immuno-Neuro link of the body that responds to any stress reduction.

As the stress continues the body acclimates and goes into the ADAPTATION phase. Here the symptom goes away from familiarization. But the disease progresses deeper. We now come to an ultra important conclusion that must change medicine forever. BEING SYMPTOM FREE IS NOT A SIGN OF HEALTH. In fact you can be symptom free and quite sick. Allopathy is for crisis intervention only.

If the stressor continues the body now progresses from the ADAPTATION phase to the EXHAUSTION phase. Here organs weaken. The first form is the FUNCTIONAL phase where organs dysfunction. They make less or excess hormones, enzymes, or others.

After a while they slip into the ORGANIC phase, where here the organs or organ will shrink (atrophy) or grow(hypertrophy).

There now is a physical disease. If the stressor continues the last phase results which is DEATH. Cellular death, organ death, organ system death, organism death. The next diagram relates the flow of disease. HEALTH

**STRESSOR (TOXIN ETC)------>----->>-----**

ADAPTATION
EXHAUSTION
FUNCTIONAL
ORGANIC
DEATH

The causes of disease or possible stressors are:

- LACK OF AWARENESS
- TOXICITY
- STRESSTRAUMA
- INJURY
- HEREDITY
- PATHOGENS
- ALLERGY
- PERVERSE ENERGY
- MENTAL FACTORS
- DEFIENCY OR EXCESS OF NUTRIENTS

When these enter the body they disrupt the ease of flow. This produces the Alarm symptom. Then the body adapts, symptoms go away, but if the cause continues the disease continues. Degeneration awaits.

BEING SYMPTOM FREE IS NOT A SIGN OF HEALTH.

The ability to restore or heal the body is based on how much life force the body has. This has an electrical component. The life force can be suppressed or obstructed by lifestyle or stress. This is the SOC index in the SCIO software.

With the advent of fractal and chaos theory we have seen the end of reductionism as a basis for medicine. The Selye system of medicine is all based on removing the stressors and thus their mutual interactions . Stress reduction combined with a behavioral component now form a basis for a new addition to the medical community. The reductionistic diagnosis is left to others and with stress reduction and behavioral advise a complementary system of medical intervention can be very helpful.
In Nelson Natural Medicine the flow of treatment is as follows:

1. Reduce or remove the cause of disease reduce the SOC index get the patient to take responsibility for their disease and their bodies, minds and spirits.
2. Try to naturally encourage repair the damaged organs resulting from the disease, via behavioral education and stress reduction.
3. Unblock the blockages to flow of energy in the body. Chiropractic, Acupuncture, Bioresonance, Biofeedback and other medical arts are dedicated to unblocking unbalances of flow.
4. Reduce the symptoms with natural methods and naturopathy, and never interfere with the doctors advise. Synthetic medicines are to be used when all natural methods fail.
5. Deal with the constitutional or metabolic typing, make up, or tendencies of the patient.

EPFX WELLNESS BIOFEEDBACK CONSULTATION WAIVER | EPFX / SCIO use and claim: Professional Biofeedback for Stress Detection and Stress Reduction.

1. I fully understand that the attending therapists are not allopathic doctors (M.D.’s) and do not pretend to be, but are wellness consultants and are biofeedback specialists.
2. I fully understand the difference between the practice of allopathic medicine, nutritional wellness consulting, and Biofeedback.
3. I fully understand that the services provided by the attending therapists are not allopathic, but are behavioral, educational or biofeedback in nature.
4. I fully understand that the attending therapists perform their services within the parameters of a natural health care and wellness system using biofeedback and stress reduction.
5. I fully understand that the attending therapists do not offer allopathic drugs, surgery or chemical stimulants or radiation therapy. I understand that illness is not being diagnosed nor treated and that my wellness and stress are being measured.
6. I have solicited the attending, biofeedback therapists services in good faith, exercising my free will and following the dictates of my own conscience which allows me to select what I understand is most beneficial to my health.

7. I agree to consult my family medical doctor for a consultation of any risk or contraindications from biofeedback. If a medical doctor is not available, a referral for such services can be arranged.
8. I presently seek counsel, advice, opinions, biofeedback or points of view and/or programs within the scope of the attending therapists wellness and stress reduction practice. I am aware and, release the biofeedback technician to do biofeedback tests and treatments.
9. Please no taping or recording of any interview without permission, we welcome taping but only with the permission of the therapist.

Signature of client or guardian
__________________________________________________ date ____________

Your Family or personal Doctor:
________________________________________

DISCLAIMER:

Electro Physiological Feedback Xroid System EPFX

This system is to be used as a Biofeedback multimedia system. It is designed for stress detection and stress reduction. The device does not diagnose any disease other than stress. Stress can come from many sources, this system uses many multimedia treatments to treat stress. This device also measures patients Electrophysiological reactivity, which is another representation of stress. Only a licensed practitioner can diagnose a patient.

This system is calibrated to measure the very fine and subtle electrical and subspace reactions to a group of biological and medical substances. The sensitivity is set so fine as to pick up the earliest sign of disease and distress. Thus the results might be below the client recognition. The readings should be evaluated by trained staff. Use additional tests or referrals for further clarity.

No claims other that Biofeedback Stress detection and treatment are made of the system or results.

For questions or comments e-mail Maitreya and or Eclosion
Allopathic Versus Holistic medicine

Allopathic medicincerefers to the practice of treating symptoms, and especially the practices now referred to asheriopic medicine. Today it means what is wrong with you and the Allopathic doctor focuses in on your complaint reduces you to it and tries to alleviate your symptom without considering your long term health. It was coined by Samuel Hahnemann(1755–1843) in 1810. It is wrong to think of Allopathic medicine and its short 150 year history as traditional, conventional or time honored when they are not. Modern conventional medicine is in a constant state of change and studies past 5 years old are rejected. This is an indication of the illogic of Allopathy for if there was a correct logical art it would survive the times. Natural medicine, acupuncture and many other forms of medicine are far older and much more pervasive in this world today than Allopathy.

Although allopathic medicine was rejected as a term by mainstream physicians it was accepted as a way of doing medicine, it was adopted by physicians withouc conventional trainingto referpejoratively to physicians who had undergone a more usual course of education.[1] Allopathic medicine often refers to “the broad category of medical practice that is sometimes called Western medicine, biomedicine, Reductionism Medicine, evidence-based medicine, or profit based medicine”.[2] with varying degrees of acceptance by medical professionals. In particular, the terms, allopathic medicine or allopathy, may be used to denote the practice of so-called conventional medicine by practitioners of traditional medicine such as Ayurveda, [3][4][5] as well as by those who practice alternative medicines such as homeopathy. However, many aspects of traditional medicine systems such as Ayurveda or Traditional Chinese Medicine are also considered allopathic in that their treatments can oppose the patient’s symptoms.[6] Allopathy as used in the United States refers to medical practitioners with the Doctor of Medicine degree rather than the Doctor of Osteopathic Medicine degree.[7][8] but these practitioners do not commonly apply this label to themselves.[9][10]

Allopathy wants results and money first. Safety is second. (See True Health Care Desiré Dubouneet)

Holistic medicine is considering the totality of the patient and trying to increase the patient’s health long term rather than just symptom control. If the patient is healthier there will be less future disease. Holistic medicine thus does not try to reduce the person to simple terms but will consider all possible disease causation and aggravation. Holistic medicine is thus not interested in direct short term evidence but long term success that is much more difficult to prove experimentally. Holistic medicine also expands their thoughts to open minded areas of health care. The key to holistic medicine is safety and health first.

In the stress reduction medicine of Dr Selye anything we do to reduce the stress and the stressor of the body will improve the health and make disease less of a threat. The holistic therapies we teach at IMUNE are designed to help reduce stress and lessen the causes of disease and thus improve health. True health care is the aim. We might use an allopathic but a safe form always and refer to a medical doctor for help in managing difficult cases.

Etymology

Allopathic medicine and allopathy (from the Greek prefix ἀλλός, állos, “other”, “different” + the suffix ἅπαθος, páthos, “suffering”) are terms coined in the early 19th century[11] by Samuel Hahnemann,[1][12] the founder of homeopathy, as a synonym for symptom driven medicine. Hahnemann thought allopaths were seeking medical solutions that were not of life and were different.

History

The practice of conventional medicine in both Europe and North America during the early 19th century is sometimes referred to as heroic medicine (because of the extreme measures such as bloodletting) sometimes employed in an effort to treat diseases.[citation needed] The termallopathwas used by Hahnemann and other early homeopathic doctors to highlight the difference they perceived between homeopathy, asepsiscience, and the conventional medicine of that time.

With the term allopathy (meaning “other than the disease”), Hahnemann intended to point out how physicians with conventional training employed therapeutic approaches that, in his view, merely treated symptoms and failed to address the disharmony produced by the underlying disease. [clarification needed] Homeopathic doctors saw such symptomatic treatments as “opposites treating opposites” and believed these conventional methods were harmful to patients.[1]

Practitioners of alternative medicine have used the term “allopathic medicine” to refer to the practice of conventional medicine in both Europe and the United States since the 19th century. The term allopathic was used throughout the 19th century as a derogatory term for the practitioners of heroic medicine,[13][14] a precursor to modern medicine that did not rely on evidence.

James Whorton discusses this historical pejorative usage:

One form of verbal warfare used in retaliation by irregulars was the word “allopathy.”...”Allopathy” and “allopathic” were liberally employed as pejoratives by all irregular physicians of the nineteenth century, and the terms were considered highly offensive by those at whom they were directed. The generally uncomplaining acceptance of [the term] “allopathic medicine” by today’s physicians is an indication of both a lack of awareness of the term’s historical use and the recent thawing of relations between irregulars and allopaths.[15]

The controversy surrounding the term can be traced to its original usage during a heated 19th-century debate between practitioners of homeopathy, and those they derisively referred to as “allopaths.”[16]

Hahnemann used allopathy to refer to what he saw as a system of medicine that combats disease by using remedies that produce effects in a healthy subject that are different (hence Greek root-allo- “different”) from the effects produced by the disease to be treated. The distinction comes from the use in homeopathy of substances that cause similar effects as the symptoms of a disease to treat patients (homeo- meaning similar).

Examples of Allopathy: If you have a pain you use a pain killer, if you have depression a serotonin reuptake blocker, if you have a fever an antipyretic, if you have constipation a laxative, and so on and so on. Almost all directed at the reverse or different to counteract the problem or symptom.

As used by homeopaths, the termallopathyas always referred to the principle of curing disease by administering substances that produce other symptoms (when given to a healthy human) than the symptoms produced by a disease. For example, part of an allopathic treatment for fever may include the use of a drug which reduces the fever, while also including a drug (such as an antibiotic)
that attacks the cause of the fever (such as a bacterial infection). A homeopathic treatment for fever, by contrast, is one that uses a diluted and succussed dosage of a substance that in an undiluted and unsuccussed form would induce fever in a healthy person. Hahnemann used this term to distinguish medicine as practiced in his time from his use of infinitesimally small doses of substances to treat the spiritual causes of illness. A naturopath will decide to use a herb such as a natural laxative. For a naturopath will sometimes use homeopathy, allopathy or other but always trying to be as natural as possible.

The Companion Encyclopedia of the History of Medicine states that "Hahnemann gave an all-embracing name to regular practice, calling it 'allopathy'. This term, however imprecise, was employed by his followers or other unorthodox movements to identify the prevailing methods as constituting nothing more than a competing 'school' of medicine, however dominant in terms of number of practitioner proponents and patients." In the nineteenth century, some pharmacies labeled their products with the terms allopathic or homeopathic.

Contrary to the present usage, Hahnemann reserved the term of "allopathic" medicine to the practice of treating diseases by means of drugs inducing symptoms unrelated (i.e. neither similar nor opposite) to those of the disease. He called instead "enanthiopathic" or "antipathic" the practice of treating diseases by means of drugs producing symptoms opposite to those of the patient (e.g. see Organon, VI edition, paragraphs 54-56). After Hahnemann's death the term "enanthiopathy" fell in disuse and the two concepts of allopathy and enantiopathy have been more or less unified.

Both, however, indicate what Hahnemann thought about contemporary conventional medicine, rather than the current ideas of his colleagues. Conventional physicians had never assumed that the therapeutic effects of drugs were necessarily related to the symptoms they caused in the healthy: e.g. James Lind in 1747 systematically tested several common substances and foods for their effect on scurvy and discovered that lemon juice was specifically active; he clearly did not select lemon juice because it caused symptoms in the healthy man, either similar or opposite to those of scurvy. Lind was practicing Naturopathy not homeopathy.

Jenner was a homeopath who thought that what caused to symptoms of pox in a milk maiden might cure the symptoms in another. So immunization was guided by homeopathic like thought.

Current

Use of the term remains common among homeopathic doctors, and has spread to other more mainstream parliance. The meaning implied by the label has never been accepted by conventional medicine, and is still considered pejorative by some.[17][18] More recently, some sources have used the term allopathic, particularly American sources wishing to distinguish between conventional medicine and, say, osteopathic.[14][15][19]William Jarvis, an expert on alternative medicine and public health,[20] states that "although many modern therapies can be construed to conform to an allopathic rationale (e.g. using a laxative to relieve constipation), standard medicine has never paid allegiance to an allopathic principle" and that the label "allopathic" was "considered highly derisive by regular medicine."[17]

However, many conventional medical treatments do not fit this definition of allopathy, as they seek to prevent illness, or remove the cause of an illness by acting on the etiology of disease.[10][21]

Allopathic Practice

The purpose of the allopath is to reduce the symptoms. Allopathy is not about making you healthier. There is no study showing that the patients are healthier. The total emphasis is symptom reduction. If the long term health is compromised it is not a problem to be considered.

The first step is a reductionistic diagnosis. Even though the diagnoses are much less than fifty percent right, it makes no matter. Without a diagnosis there is no insurance. And money makes the world go round. There is no or very little evaluation of diet, stress, lifestyle etc. the procedure is about reducing you to a single diagnosis, and then prescribing a drug for the problem. That if fails then an increase in dosage, followed by a different drug, and if still no results a surgical intervention will be done.

In Holistic medicine the entire body is considered and any improvements in lifestyle and total health are quite possible able to help the patient. The goal is complete consideration of the health of the patient. Not reducing him to a set of symptoms.

Nonallopathic Lesions

When there is a problem and the doctor feels that instead of focusing on a specific area for treatment he can helps by increasing the health of the total body (holistic healing), we can call this a Nonallopathic lesion and it is an unidentified problem. This is a vague term used by some Chiropractic doctors which suggests there may be a problem with the spine. In medical coding the #739 is a CPT diagnosis code for non allopathic lesions or not elsewhere classified. The term lesion is used by radiologists to define a mass or any abnormality involving tissues and organs.

Doctors Don’t know that they use Allopathy

The principle of allopathy is to only reduce and address symptoms. The question "What's Wrong with You?" is the key. The answer details the focused complaint and not a true access of health or welfare. When we combine this with pills made and tested for the symptom we get a medical system where the average visit is less than one minute of real concern. Consider the side effects and you get an ever expansive cascade of errors that cost our society vast amounts in terms of money and human suffering. Allopathy has failed as a medicine philosophy and it just takes time for all to realize it.

Many years ago in Denver a man approached me who was a salesman for a survey company. They sent out survey questionnaires to all kinds of professionals to find out more about marketing. He gave me 4 questions for free and they were mailed out to over 100,000 medical doctors. The first question was "would you use a Natural pharmaceutical over a synthetic one if you could?" 82% said yes. One of the questions was which of the following would you use in your practice? Acupuncture, biofeedback, nutrition, homeopathy, or allopathy. 55% said they would use biofeedback, it was technical and scientific. 45% said they would use nutrition. 35% said they would use acupuncture. 12% said they would use homeopathy, and 5% said they would use allopathy, even though these were allopathic doctors who use allopathy every minute. They do not know or understand the art of medicine they use. They do not know what it is or how unsound the philosophy is behind it. They are too busy learning what the drug companies want them to learn.
Surgery

Abraham Maslow once said “If the only tool you have is a hammer, you will treat everything as if it is a nail”. Surgeons have a surgical answer for everything, and nothing is more risky and costly than surgery. We need surgeons and surgery. But profit motives can put a burden on the health care system if we let rampant greed get out of control.

References


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Stress reduction as a New Medicine From the NeoMorpheus 2002

By Desiré D. Duboumet

Now as we learned in 5th grade everything is made mostly of electrons and protons. Photons are involved in all exchange of energy states. Now in some materials the electrons are tightly bound and are unwilling to allow electron exchange. In concrete the atoms are bound tightly and the electrons are not very conductive. In a metal like copper the electrons are quite willing to allow electron energy exchange and transport of electrons. So copper is a good conductor.

The organization of atoms and electrons determines the nature of the substance. Atoms seek to have a balanced outer level of electrons as per quantum law. This is the nature of atoms and it is calculated in the mendeleev table of elements. Atoms seek to find the balance of the noble elements. This is the lesson from 10th grade chemistry. It is a simple lesson that tells us just how all atoms combine to make molecules. This lesson is based in Quantum theory. Those to say that quantum theory is not relevant to biology are expressing a rather concerning ignorance.

Molecules can be very very complex. But all of them are made of electrons, protons, neutrons etc held by Quantic forces. These molecules all have a structure of their outer electrons that can be assayed by the voltammetric signature. Voltammetry is the science of electrodes checking the individual style of electron and proton interaction. This is how every substance reacts to another, the outer electrons never touch but the field interaction as determined by voltammetry is a definition of how they work.

Every atom or molecule can be balanced, positive charge, negative charge, or combination of both. This depends on the amount of protons and electrons. This is Basic grade school science.

The charged particles that travel make a current flow. The amount of charged particles in the amperage, the pressure or potential of the flow is the voltage, the resistance to the flow is the resistance. All organisms use this electrical flow of charged particles for each and every biological process.

The electron is the smallest charged particle to move, and most of electricity is of the traveling electron. But protons and ions range from the small to very large.

The outer electrons of a plant are taken to higher energy states thru the QED phenomena known as photosynthesis. These electrons are most often stored in carbohydrates and natural sugars. The body use them for energy, making ATP from the electrons.

Energy transfer in the body takes place in many voltammetric ways. Water has free protons and free electrons and thus it is essential for life. Water does not conduct electricity, unless there are some mineral salts or electrolytes in the water. But as in the salt water the body has lots of water and electrolytes. Thus the body electric can thrive. REF

Fish like the shark swim and thus live in an electrolyte conductive medium. They develop electrical sensing systems, and can detect foods by their voltammetric signatures. In other land creatures like humans this electro sense is transferred to the skin and nose. But still voltammetric sensing of items are the basis for life. REF
We have the sense of sight for photon sensing, hearing for sound vibration detection, feeling for movement, pressure, heat, cold, balance, and the alkaline balance of chemicals. Smell and taste are voltammetric shape receptors sensors. REF 2004 Nobel prize. And the electro sense. The largest gene family of our DNA is dedicated to the smell, over 3 in humans, 7% in some animals. All of our senses are electrical in action and transfer mechanism. Some of our sensory system is directed to our verbal or conscious mind and most to our non-verbal unconscious.

In the human body there is massive transfer of electrical signals. The flow of food entering the colon during digestion is based on static electrical attraction. Water facilitates the entire body electric. The body heat is photonic and also contributes to information transfer. If we look at the body human with today’s modern science of QED and electronic physics, a whole new science develops a world different than the synthetic drug and surgery medicine we have today. Today’s so called modern medicine is based on a 200 year old reductionism 17th century Newtonian antiquated physics. A true new modern medicine of the body electric opens the door to a more affordable, sophisticated, safer, and more efficient modern medicine. REF Body Electric

There is resistance to the flow of electricity. Louis Ampere discovered amperage, Volta discovered Volts, and Dr. Ohm put a law together to describe the relationship in terms of resistance. resistance is in Ohms and Ohms law states that voltage equals amperage times resistance. This is the first week of electronics class usually taught in 9th grade physics.

The right hand rule describes the fields around a flowing current. And it says that as a current flows like your outstretched right thumb, a magnetic field is made at 90 degrees like your out stretched fore finger, and a static field is made at 90 degrees like your outstretched middle finger. Thus the fields of electricity are described. This is the second week of electronics class usually taught in 10th grade physics. REF energetic medicine book

So all electrical action or flow of electricity generates a three dimensional field, at least. So we called the process of measuring this field the trivector. This is a type of 3-dimensional voltammetry.

Voltammetry is the science of understanding how a substance’s electro-magnetic field reacts with it’s environment. A hormone has electrons and protons and how they are placed in a 3 dimensional space will determine how it exchanges electron-magnetic action and this is measured by measuring the 3 dimensional effect of it voltammetric field. The amount of charged particles is the amperage, the pressure or potential of the charged particles is the volts. Basic 7th grade physics. Every compound having it’s own individual and distinct voltammetric signature field. REF Voltammetry

Volts times amps is a power index or what is known as Watts. Once we measure simple variables we can easily calculate a great variety of electrical forces. We can thus calculate volts, amps, ohms, reactance, susceptance, watts, capacitance, inductance, impedance, and other virtual mathematical calculations.

Knowing that reductionism has filed as a way to analyze the human body we can make more global measures of these energies of a human, compare them to norms, and then using safe micro-current stimulation change them.

We can detect and affect the body electric is safe and effective ways. The SCIIO system is designed and registered to do just this. To detect and affect, EEG, ECG, EMG, GSR, electro-osmosis, trauma tissue, wounds, pain, charge stability, acid alkaline balance, voltammetric reactance of substances, oxygenation, hydration, redox potentials, electro-acupuncture, bio-resonance, super-learning, and other bio-electric functions. All from simple basic science taught in our schools today. REF clinical evaluation

Only with the 40 years of experience to sharpen and perfect the precision of the art. The first studies of Dr. Nelson on the body electric were done in Youngstown, Ohio. This ever dedicated scientist has artfully perfected this art of energetic medicine. All designed as a truly modern medicine to safely assay and treat the people.

The human body is a complicated intricate electrical assembly. It has a reactive set of fields that are driven towards life giving things like oxygen food etc. It is electrically repelled from toxins. This electrical field is processing the qualities of life such as metabolism and reproduction. Thus a vast ever changing system of electrical fields, that are intricately interactive with the environment.

The human system is not a linear predictable or reduction type of system. It’s vast complex and elaborate functioning makes it a fractal complexity. As such it responds better to ever changing fractal stimulation not linear reductionistic simple stimulation.

So developing an electrical treatment needed some advances in technology. First a cybernetic loop of measuring, calculation, stimulation, measuring, calculation, stimulation, measurement, and so on. All at biological speeds. Then a reactive system that reacts to fractal stimulation and an auto-focusing self adjusting stimulation. The body electric treats itself beneath the human awareness of the limited word area of the brain. And thirdly a way to measure the trivector field of items and then to measure the reactance of a person. All technological achievements of Dr. Nelson and Dr. Nelson alone.

The body has a reactive trivector set of fields. An item not living has a stable unchanging field. So to measure the substances fields, and then the person’s reaction to these fields. A truly modern medicine is achieved, based on what we know of the body electric and basic high school physics.

**STRESS**

Towards a new Safe and Effective truly Modern Medicine

This is a new common sense method of modern medicine, that is Health motivated not just symptom control. We respect the complexity and the whole body, and respect the Natural process of health

Health is Ease of Flow, Stressors block Flow, Stress is more than Just personal stress.

Stress Reduction is the key to Medicine.

Major Stressors or Causes of Disease include:

- LACK OF AWARENESS OR LACK OF EDUCATION
- STRESS
- HEREDITY
- MENTAL FACTORS (Greed, anger, delusion arrogance ETC)
- ALLERGY
- BAD POSTURE
When the stressor or stressors weaken the defenses of the body, the weakest link of the body becomes the target of the stressor.

**1. Alarm Stage**
- Symptoms: The symptoms are the alarm, not the enemy.
- You can have no symptoms and be very sick.
- Being symptom free is not an indicator of health.

**2. Adaptation Stage**
- Symptoms: The symptoms go away as we adapt.
- The distress + disease penetrates deeper.
- You can have no symptoms and be very sick.

**3. Exhaustion Stage**
- Symptoms: The symptoms effect the weakest organs.
- The weak organs start to swell or shrink.

**4. Death**
- Cellular, organ, organ system, organism death.

**TRIGGERING FACTORS**
- Heat, cold, wind, dryness, radiation, magnetic ETC
- Stress, anger, lack of vitality
- PERVERSE ENERGY (Heat, cold, wind, dryness, radiation, magnetic ETC)
- DEFICIENCY OR EXCESS OF NUTRIENTS
- TOXINS (Micro-organisms, bacteria, fungi, viruses, prions, worms ETC)
- PATHOGENS (Bacteria, viruses, fungi, prions, worms ETC)
- VIRAL INVESTRATE (Heat, cold, wind, dryness, radiation, magnetic ETC)
- LACK OF AWARENESS OR LACK OF EDUCATION

**HEALTH IS TOP HOW**
- When the stressor or stressors weaken the defenses of the body, the weakest link of the body becomes the target of the stressor.
- Symptoms: The symptoms are the alarm, not the enemy.
- You can have no symptoms and be very sick.
- Being symptom free is not an indicator of health.

**STRESS**
- SENSITIVE ENERGY (Heat, cold, wind, dryness, radiation, magnetic ETC)
- STRESS REDUCTION (Stress, anger, lack of vitality)
- DEFICIENCY OR EXCESS OF NUTRIENTS

**THERAPIES**
- Homeopathy
- Diet and Nutrition
- Exercise
- Meditation
- Mind-Body Connection

**Nelson Method of Medicine**

**Stress Pathway of Disease**

**Selye Pathway of Disease**
1. Reduce the Causes of Disease, Change Behavior, get patients to Care, get the nail out of the
tire
2. Repair the organs weakened by the Causes. Restore Health. Fix the Tire
3. Unblock the Blockages to energy, nutrition, Oxygen, waste, Parana, acupuncture, nervous FLOW
4. Treat the symptoms with natural means before resorting to Synthetic. Use foods, exercise, herbas, homeopathics any and all natural means before resorting to Synthetics
5. Balance the metabolic typing or Constitutional Imbalances. Treat the patient as an Individual Whole

Since the body’s weakest link is prone to disease from the stressors, any disease will improve with
reduction of the stressors. If there is good nutrition and no excess or deficiency of nutrients, the
body’s repair system improves. With stress reduction the Para-Sympathetic system becomes free
to do its healing. But cellular repair will not work if the body will be involved. Thus stress reduction is
a universal therapy for all diseases. Reductionism of diseases via inaccurate and expensive current
medical diagnostic means, are archaic, inaccurate, overly complex, non-productive, expensive,
unsafe, risky and most often ineffective. Add to this the risk of side effects from SINthetic drugs
and we see the poor history of medicine. Nelson and Selye have plotted out a safe, inexpensive
and effective new more modern medicine.

Science has developed a basic understanding of electronics several centuries ago. Electronics
made a major boom in technology. It allowed us to understand so much of the world. But modern
medicine has resisted an electrical analysis of the body. Yes technology allows for tech measures
of the body, but there is little analysis of the body electric. Energetic medicine of Dr. Nelson defines
of the human body, but there is little analysis of the body electric. Energetic medicine of Dr. Nelson defines
"world as a machine," within which phenomena are to be understood by reducing them to their
parts. Reductionism worked for making cars, buildings and was so valuable to our society. But
reductionism fails in a complex situation.

Chaos theory gave us an enlightenment that reductionism does not work in complex systems like
the human body. Fractal dynamics teach us that the reductionistic model fails in biology.

In an overly complex closed system Fractal dynamics are unpredictable. Reductionism is completely
invalid.

The Rules of a Fractal System are 1. nothing ever repeats exactly as before, 2. small changes can prompt very large and dramatic effects, 3. observer effects and the mind can have effect on a
complex fractal system (prayer works). Reductionism is the process of taking a complex situation
and reducing it to simple terms. We reduce the weight of a building to a simple vector to calculate
the strength of a support wall. Reductionism has been responsible for allowing us to build cars,
boats, machines, etc. But reductionism fails in very complex situations. The human body has over
200,000,000,000 cells. Each cell is more complex that we can presently imagine in our verbal
minds. This complexity makes our bodies a fractal. Reductionism can not work for medical analysis.

When the drug companies wanted to test a blood pressure medication they reduce the patient
from the complexity of life to a simple variable, blood pressure. They test the blood pressure
before, the pre test. Give an intervention, the drug. and then test the blood pressure again, the
post test. They do not test the side effects. They observe them. This is important because they can
only observe gross side effects and still get by. If they would have tested the blood sugar, they
would have found out that all patients taking certain blood pressure medications get some degree
of diabetes every one of them. If they were to test all variables for side effects, it would cost too
much to do testing. And there are not enough people to do the test for statistical satisfaction,
There are not enough rats, There are not enough fruit flies. the statistics of total protection against
side effects are tremendous. These side effects are killing not hundreds of people, not thousands,
not tens of thousands, but millions of people every year.

Our society has rejected synthetic foods. We tried the synthetic experiment and it failed. The
synthetic foods made cancers and diseases. We will not choose them from a menu, we will not
buy them from the shelf. We know from the gourmet that the finest quality is always from the
natural. Thus is undoubtable. It is just a simple step of intellect to see that it is also true about our
medicines as well.

In the IJMSH of 2009 there is an entire issue of the failure of the FDA to protect people from these
side effects of synthetic drugs. I spell it SIINthetic. It is a sin to kill so many in the name of profit and
ignorance. Ignoring the benefits of natural medicine is ignorance at it’s ultimate ignorant best. All
justified by reductionism. A science not used today by anybody but medicine. The reductionistic
methods of drug testing are killing millions and wounding many many more. But big money is
hard to beat, especially when there is 30 billion spent by the drug companies on political lobbying
alone in America. Fractal non-linear science has stepped forward to help us understand medicine.

When it was developed in the 1920’s, quantum mechanics was viewed primarily as a way of making
sense of the host of anomalous observations at the level of molecules, atoms, and subatomic
particles that could not be explained in terms of older mechanical models. Now, in the 21st
century, most physicists are confident that quantum mechanics is a fundamental and general
description of the physical world. Indeed, quantum ideas are now being applied to understand
the workings of consciousness, environment, electromagnetic field interactions, low-dose healing
effects, non-local phenomena, and many other observable phenomena that are unexplainable
with an outdated mechanistic world view.

During the last century, traditional medical and philosophical practices, such as Traditional Chinese
Medicine, acupuncture, Qi Gong, Tai Chi, meditation, homeopathy, naturopathy, and mind-body
techniques considered “esoteric” by the scientific establishment, have been largely ignored while
the world’s attention was focused solely on drugs, surgery, radiation, genetics, and other drugs, surgery, radiation, genetics, and other invasive
and reductionist approaches. Approaches that make money for the synthetic chemical cartel.
But these synthetic therapies are failing. One by one the synthetic pharmaceuticals are being
discredited.

With massive public pressure to support research of safer Complementary and Alternative
Medicines (CAM), and with athletic communities seeking effective drugless performance
advantages, significant funds are moving in those directions. Quantum physics and non-linear
mathematics are providing scientists with better models for understanding complex systems and
subtle interactions, like mental, emotional, environmental, and electro-physiological interactions in the human body. With new ways of measuring and verifying energetic and quantum events and their effects on health, disease, and performance, scientists are re-igniting interest in traditional healing techniques, and the field of subtle-energy medicine is emerging.

One of the most exciting and promising fields of CAM involves bioelectromagnetics (BEM)—the study of electromagnetic fields (EMF’s) and their biological effects. Based largely on biofeedback principles, BEM diagnostic and healing devices are well entrenched in mainstream medicine already, but scientists are really only beginning to realize the practically limitless potentials that this field offers.

The purpose of this article is to introduce modern advanced biofeedback, one of the fastest growing areas within the field of BEM, and provide supportive evidence for its use with Olympic-level athletes. Focus is given to the most advanced biofeedback technology, the SCIO (Scientific Consciousness Information Operating System), which combines mind-body training with a methodology of applying micro-currents at various frequencies to the body, measuring feedback, and utilizing the resultant information for stress reduction, education, behavioral modification, and self-adjusting cybernetic correction (an historic innovation exclusive to the SCIO).

“Conventional” biofeedback, the use of devices to monitor physiological processes and enhance mind-body interactions, has been one of the most researched branches of CAM for over 60 years, and it provides the basis for this study and for claims made in athletic sport performance. “Quantum” biofeedback is the term adopted to describe advanced Quantum Electro-Dynamic Biofeedback capabilities performed with the SCIO system, which combines the benefits of both conventional and advanced methods.

PSYCHO-SOMATIC and SOMA-PSYCHO DISEASE

Medicine was shocked to see that there was indeed a set of diseases that were psycho-somatic. The mind can effect the body. The largest type is the stomach ulcer or other gastric disturbance. Here stress upsets the sympathetic nerval balance versus the parasympathetic. There are also soma-psycho diseases such as when hormonal disturbances produce mental abnormalities. Medicine was shocked at the proof of this. But this threatened pharmaceutical sales.

As time goes by the list of possible involvements from psycho-somatic and soma-psycho disease grows and grows. Till now there is overwhelming evidence that there is mental involvement in over 80% of disease.

Stress detection and stress reduction then become an integral component in disease care and thus health care. There is an overwhelming evidence for a Psych-Neuro-Immuno-Soma link this is so well documented as to be an irrefutable fact. But still some over fastidious small minded geeks will reject this truism. In the PNIS issue of the journal we see more collective evidence.

THE END OF DEGENERATIVE DISEASE

One of my jobs as the angel of God is to bring an end to degenerative disease as a predominant killer. To do so has taken a lifetime of dedication persecution and violent attacks from so many places. First we must confront the failure of the FDA to protect Americans from degenerative disease. Let’s review the largest killers.

What’s really killing people in the world today is number one: Tobacco. This is the number one killer. David Kessler was the head of the American FDA in the 1980’s. And when I met Kessler at an FDA meeting he was going to do his job to protect the public. I met him at a meeting in Salt Lake City, Utah and he said he wanted to go after the most major risk to health, smoking. That his job was to protect the American people, included that he should go after big tobacco and to clamp down and to make sure that the people were protected. He was denied that. He was stopped from doing that. He quit the FDA, unable to do his job, as he said. Big tobacco is killing over a million people a year.

The next leading killer is factors that is related to sugar, Big Sugar for it’s corporate name. As people who get bad sugars and bad oils, trans-fatty acids and cooked oils. Factors of bad nutrition in America are making people sick, producing blood sugar problems, producing obesity, cardiovascular problems, and many, many things that the FDA could also effect. Limiting trans-fatty acids, making good sugars (Left handed Fructose), rather than bad sugars(right handed Dextrose).

The body needs right handed sugar (Blood Glucose) to enter the cell for energy. Right handed sugars such as sugar cane, beet sugar, grape sugar, corn sugar are right handed and they enter the cells too fast. This produces fat more easily, hyperglycemia (mild addiction) and then hypoglycemia (mild depression). This puts a burden on the pancreas, the eye and other organs. There is also a well documented negative effect on the immune system from dextrose. If you use chemicals to strip a way vitamins and minerals to make the sugar white, and it gets even worse.

Fructose revolves to the left and needs to be converted to the right. A process that takes time and thus allows for a more smooth delivery of the glucose. Less fat, less stress on organs, less craving, less depression, less blood sugar fluctuations. More hormonal and enzyme production thus it is an anti-aging therapy. Use fresh fruits as a sweetener, it will change your life.

Crazy food additives that have not been fully tested add to the food and drug problems. The synthetic foods and drugs have failed. Our society has learned to avoid and mistrust synthetic foods. We will not order them on a menu or buy them of the shelf. We have learned to be chemiphobic. We know that synthetic foods create cancer and disease. Our society must learn that this is true of our medicines as well.

Our body needs good fatty acids. They make up the cell membrane of all of our cells. Stress sets them free. Cooking destroys most fatty acids. Meat and potatoes contain very little. In fact the fatty acids from an animal are saturated. Fresh and raw vegetable and unheated vegetable juice are the best source.

Bad food is a problem in degenerative disease. And this is also another industry the FDA is not attacking that the FDA is not doing their job to protect the human beings of America. Big Sugar and cholesterol are leading to diseases that are killing over a million people a year.

In the next category is allopathic doctor prescribed drugs. The medical doctor prescribed medicines
are the third largest killer. Big pharmaceuticals are killing in the neighborhood of some 600 – 700 thousand people a year. By all of these statistics, big tobacco, Big Sugar, Big fast food, and Big Pharma, collectively they are in the neighborhood of directly 3 million deaths a year in America alone and possibly 10 million complicating factors creating an incredible burden on the health care system.

We need to embody a new theory of health care. The Hans Selye theory tells us that the cause of disease is a stressor.

Major Stressors or Causes of Disease include:
LACK OF AWARENESS OR LACK OF EDUCATION
STRESS
HEREDITY
MENTAL FACTORS (Greed, anger, delusion arrogance ETC)
ALLERGY
BAD POSTURE

TOXICITY
TRAUMA INJURY
PATHOGENS (MICRO-ORGANISMS, Bacteria, fungus, virus, prions, worms ETC) PERVERSE ENERGY (Heat, cold, wind, dryness, radiation, magnetic ETC)
DEFICIENCY OR EXCESS OF NUTRIENTS

HEALTH THEN ENTER STRESSOR (TOXIN ETC)-enters
1. ALARM symptoms are the alarm
   if stressor continues then
2. ADAPTATION symptoms go away as we adapt. You can have no symptoms and be very very sick. Being symptom free is not an indicator of Health
   if stressor continues then
3. EXHAUSTION the stressors burden the organs
   if stressor continues then
   a. FUNCTIONAL first the stressors effect the organ function
   if stressor continues then
   b. ORGANIC then the organs start to swell or shrink
   if stressor continues then
4. DEATH cellular, organ, organ system, organism death

We can see the importance of stress detection and stress reduction. This form of medicine is a more true form of health care where now a days medicine is much more positioned at the end of this scale. In other words a heroic medicine, a disease care system designed to stop you from dying.

I have spent a life time trying to build an educational system and a program to make health care more available the Nelson Method of medicine is as follows.

1. Reduce the Causes of Disease, Change Behavior, get patients to Care get the nail out of the tire
2. Repair the organs weakened by the Causes. Restore Health. Fix the Tire
3. Unblock the Blockages to energy, nutrition, Oxygen, waste, parma, acupuncture, nervous FLOW
4. Treat the symptoms with natural means before resorting to Synthetic. Use foods, exercise, herbals, homeopathics any and all natural means before resulting to Synthetics
5. Balance the metabolic typing or Constitutional Imbalances. Treat the patient as an Individual Whole

The next step is to design a system to work with the body electric. A system to use the advances in science such as electronics, fractal chaos and Quantum Electro Dynamics. A new style of much more modern medicine. A device to find disease at the earliest level and reduce it.

I have been able to make such a machine in 1985, legalize it in 1989, sell it around the world in compliance fashion. It is completely tested, safe, completely tested, and effective. It works and it helps people in many different ways. There have been over one hundred studies published on the Device the EPFX / SCIO.

The frustration of lack of education and the lack of opportunity it conveys, leads many of the poor children to resorting to drugs and crime. Addiction develops and spreads. Equal Economic Education will also help the society reduce degenerative disease and the costs it incurs. As well as when there is better education there will be more intelligent selection of foods and the ability to resist drugs.

I have dedicated my life to helping reduce degenerative disease. If we can see the problems of Big Tobacco, Big Sugar, Big Pharma and just how the medical community fights any change. I have dedicated my life and intellect to make a new system of medicine and the tools to do it with a system that is safe and effective. But instead of me being applauded for the work that I have done, I am attacked. I am vilified.

As you read the EPFX / SCIO testimonials you will see incredible results. As you read these testimonials, these stories, recognize that this is the tip of the iceberg. Is that we have been hearing these stories for 20 years. The wondrous stories of how people’s lives have been changed.
So to end degenerative disease we must

1. Make Big Tobacco pay for the damages they incur
2. Make Big Sugar pay for the damages they incur
3. Make Big Pharma pay for the damages they incur
4. End Allopathic philosophy and develop a new stressor reducing based medicine
5. Avoid Bad sugars white processed. Eat Good Sugars from fresh fruit, Avoid bad oils cooked or saturated. Eat good oils from fresh and raw vegetable and uncooked low temperature made oils.
6. Equal Economic Education- and a new medical education based on natural
7. Safe forms of early intervention medicine such as energetic biofeedback

With these social changes degenerative disease could be so greatly reduced to allow for an inexpensive medicine.
DOCTORATE IN WELLNESS COURSE IS BASED ON A HOLISTIC MODEL

MIND

As a man thinks, so is he. Desi was one of the first credentialed graduates of NLF and she was a licensed psychological counselor in Ohio. She teaches how to help anyone with any disease to improve in this wellness course.

BODY

You are what you eat. We need to intake more healthy vegetables and fruits (E£) and use lots of juices, drink lots of water. Eat good cold processed vegetable oils. No cooked oils or long cooking with oils. Eat good non-processed fruitouse fruit sugars. No bad processed dessert sugars. Exercise, love, kindness, caring and respect are nutrients. Get them and give them daily.

ENVIRONMENTAL

We are social beings that need networking feedback to help us grow and mature. We need to foster compassion, cooperation, connection, and care. We all share it. We need to share care.

SOCIAL

The mind of God fills the universe with subspaces. We need to be able to recognize the more subtle aspects than us and with reference and respect for all things actively cooperate with the Great Spirit. We need to listen to the Positive Force and resist the Negative Forces. It is an illusion that we are separate.

We need to expand our circle of compassion to include all things in the Universe.

The Body Electric has many global important measures. These include Volts, Amps, Resistance, Hydration, Oxidation, and Proton and Electron pressure. There are oscillatory norms of these values as well. The electrical vital signs. These are all easily measured and very easily corrected in a cybernetic biofeedback loop. By interfacing with the body electric them stimuli, response, correction and re-stimulation, we can try to normalize and stabilize the body electric. If we can reduce the causes of disease with behavioural medicine, provide good nutrition to supply needed homoeostasis, repair the damage to organs, and unblock the blockages to energy flow, we have the start of a good truly modern medicine. Selye has proved that by reducing stress and the stressors we can advert the early progression of disease, and dramatically reduce degenerative disease. But this is drugless and threatening to the profits of the drug companies. We need to prefer people over profit. We need to become aware of the science and look through the sensational tabloid press to make an informed choice.

The overemphasis on drugs (SINthetic drugs) and surgery and the underemphasis on lifestyle has created a monster. The regulatory bodies, FDA, let Big Tobacco, Big Sugar, Big Pharma, run rampant while spending time and money on attacking safe, scientific, tested and effective natural medicines. This is a tragedy of modern times and profit corporations out of control.
THE General Adaptation Syndrome

STRESS AND THE GENERAL ADAPTATION SYNDROME

BY HANS SELYE, M.D., Ph.D., D.Sc., F.R.S.C.

Professor and Director of the Institute of Experimental Medicine and Surgery, L'Hôtel-Dieu, Montreal, Canada

With the concept of the general adaptation syndrome, we have attempted to integrate a number of separate observations concerning the physiological response to various stresses. In the normal human being, I would draw attention briefly to the work of Claude Bernard, who showed how important it is to maintain the constancy of the "milieu interne". Cooley's concept of "homeostasis" and Frank Hirst's "general influence" theory of the outcome; Dashi's observations on the "correlation of the patients", the "correlated diseases", the "organic action of fever, after partum, and other "non-specific therapeutic agents" the "physiological trend" of medicine; and to the "Goldblatt claim" for the production of experimental renal hypertension.

At first sight it would seem that all these observations have little in common, and that there is no reason to attempt their integration into a unified system of physiological and pathological events. Yet most of my research work has been directed to the construction of bridges between these and many additional facts, since I was intrigued by the wish to understand the reactions of nature. Through the cooperation of our colleagues we hope to learn how to use these better for the understanding of life and the treatment of disease.

The keynote of this unification was the level that all living organisms respond to stress as such, and that the way they react to stress environments is always the same, irrespective of the species and of the agent used to produce stress. We call this response the general adaptation syndrome, and its development the disease of adaptation.

Anything that causes stress endangers life, since it is a "physiological reaction". This is an incomplete, inadequate and inappropriate response to stress, which is always the same, irrespective of the species and of the agent used to produce stress. We call this the "general adaptation syndrome" and its development the disease of adaptation.

The concept of the general adaptation syndrome is based on the idea that the organism reacts to stress by a physiological change, which is characterized by a series of changes in the body, which includes the adrenal cortex, the thyroid gland, the pituitary gland, and the sympathetic nervous system. These changes are characterized by an increase in the activity of the sympathoadrenal system, which results in an increase in the production of stress hormones, such as cortisol and adrenaline, which act on the body to protect it from stress.

In the general adaptation syndrome the manifestations of the disease are clearly delineated and differentiate from those of normal life. This is an acute physiological alteration of the stress which affects the general adaptation syndrome.
June 17, 1956

STRESS AND THE GENERAL ADAPTATION SYNDROME

By Hans Selye

Stress is evident in many forms of disease, ranging from the common cold to the most serious chronic ailments. In this respect stress can be considered as a fundamental cause of illness. The effects of stress are mediated through the body's defense mechanisms, which are systematically activated when the organism perceives a threat. These mechanisms include the hypothalamic-pituitary-adrenal axis, the immune system, and the cardiovascular system. The general adaptation syndrome (GAS) is a triad of fight-or-flight, resistance, and exhaustion phases. The GAS is triggered by a stressor, which activates the hypothalamus to release corticotropin-releasing hormone (CRH), stimulating the anterior pituitary to secrete adrenocorticotropic hormone (ACTH). ACTH then stimulates the adrenal cortex to produce corticosteroids, such as cortisol, which have anti-inflammatory and anti-stress effects. This immediate response is followed by a second phase, the resistance phase, where the body adapts to the stressor. If the stressor persists, the body enters the exhaustion phase, where the stress response becomes impaired. The GAS is a fundamental process in the body's attempt to maintain homeostasis and can be disrupted by prolonged stress, leading to pathological conditions. The GAS provides a framework for understanding the biological responses to stress, which can be targeted for therapeutic interventions to improve health outcomes.
We have attempted to demonstrate that the polymorphism of the general adaptation syndrome symptomatology is due to two principal reasons. First, every stressor has an effect on all the individual's functional systems, thereby modifying the stressor's ability. The former modify the response caused by stress as such; hence, the general adaptation syndrome manifestations can be due to specific effects of the respective stressors.

The following discussion will illustrate this point. In all three figures the solid arrow represents stress, the other the "contaminating" specific stimuli. Obviously, the end result of the interactions of the three agents cannot be the same.

This type of "conditioning" may also be illustrated by an example taken from everyday life. Acids have many properties in common, yet the reactions of each member in this group are essentially different. The characteristics that disallow them are the specific reactions of the individual's acid function. For instance, the stressor effect is what the drugs have in common, their chemical properties, but the pharmacological actions differ. Both in chemistry and in pharmacology the specific properties condition the non-specific feature, and here we have the Acid Adaptation. Hence no two acids—and no two stressors—act exactly alike. This may help in conditioning the stress reaction of specific properties of the stressor.

We have seen, however, that even exposure to the same stressor agent may result in qualitatively different responses from individual to individual. The general adaptation syndrome manifestations use to selective conditioning by factors of personality and by environment. This is the psychological conditioning, or, may occur at the various intermediate stations of the general adaptation syndrome or of the target organs, thereby modifying the effects which individual organ effects can be obtained with the same electric current. Having an alternative source of energy in your community. This current will always be of the same quality and it will always travel along the same path, although it may vary slightly from time to time. This current can be used to produce mechanical work, sound, light or any other device that needs it. It is not only the electric current. This current can also be used to produce mechanical work, sound, light or any other device that needs it.
Discharge, or separately through other channels of the general adaptation syndrome (e.g., the nervous system or cardiovascular system), is not always advantageous.

There is a striking paradigm between the disease—empirically shown to respond to non-specific therapy and thereby to change the natural history of A.C.H. and cortisone (e.g., help for rheumatoid arthritis, various inflammatory conditions of the eye, allergic). Through the use of cortisone and cortisone hormones we are on the threshold of developing a modern version of non-specific therapy which is much more effective than the older and tends itself to a scientific analysis of its mechanism.

**Treatment of Cardiovascular and Renal Diseases.**—Recent studies and clinical trials on the use of cortisone and related compounds in the therapy of cardiovascular and renal diseases have shown striking effects with a number of patients suffering from these diseases. In cardiovascular disease, it is possible to produce a significant decrease in the severity of symptoms and in the incidence of complications. In renal disease, it is possible to achieve a significant improvement in renal function and a decrease in the severity of symptoms. These results suggest that cortisone and related compounds may have a role in the treatment of cardiovascular and renal diseases. Further research is needed to fully understand the mechanisms of action and to establish the optimal use of these compounds in these diseases.
is THE Medical Concern

117. stress

118. stress

119. stress

Diet consists of two components—damage and defense. As regards damage, the hippocampus limited itself to vague advice as the vermin of estate, wholebrain food. etc. A study of the general-adaptation syndrome (GAS) suggests that the hippocampus is the most vagabonded of all the mental defense mechanisms. The hippocampus is a more effective mode of adapting to non-specific stress or systemic infection or illness. It would probably be the general adaptation syndrome even though this is a simplification.


The annual "Hebephrenic Rezoned" was conducted by Professor C. Pox, president of the University of Paris, at the John Cochran in May. The President, Dr. Zebrins's, cousin and his associates presented papers and short papers on the disease and mental mechanics presented to the Faculty. The reports, however late, were of interest to the listener in general, and also for the reason that they were published in 1955, 1947, 1949, 1952, 1954, and 1956.

Lique International Conference on the Incidence and Treatment, and the effects of the Central Nervous System. These led to a symposium on the subject of the brain and its functions, and to a symposium on the subject of the brain and its functions in general. Dr. Delbarre then showed a film illustrating the effects of the various drugs, in which all the cases were examined, and read a paper which she reviewed all cases of endocrinology dates during the past three years. Other reports were given by Dr. J. P. Maturin in his book on the effects of pituitary operations. Professor M. R. Maturin, also the author of the book, reviewed the operations of the pituitary gland in his book. The large amount of pituitary gland operations performed is the result of a study of the drug and its metabolism, and is significant for the period of study.
LETTER TO THE EDITOR

A STUDY TO COMPARE THE EFFECTIVENESS OF GSR BIOFEEDBACK TRAINING AND PROGRESSIVE MUSCLE RELAXATION TRAINING IN REDUCING BLOOD PRESSURE AND RESPIRATORY RATE AMONG HIGHLY STRESSED INDIVIDUALS

Sir,

(Received on March 5, 2007)

Stress is a state of physiological or psychological strain caused by adverse stimuli, physical, mental or emotional; internal or external that tends to disturb the functioning of an individual. It may manifest in the form of anger, depression, guilt, frustration as well as physiological responses such as muscular tension and increased heart rate. In recent years, various relaxation techniques have been recommended to alleviate stress and anxiety. These techniques have also been used successfully in the field of sports primarily to enhance recovery from training and competition, to manage anxiety and improve performance (1). They have been suggested to act by increasing the concentration, enhancing the motor skills and improving the ability to handle arousal and stress (2). Of these techniques, biofeedback training as well as Progressive Muscle Relaxation (PMR) has gained popularity as an effective tool in various health conditions, ranging from hypertension to epilepsy (3). Biofeedback training enables the subject to control his body responses such as heart rate and galvanic skin resistance (GSR). Paran and Yaniv observed an improvement in the ability to handle arousal and stress (2). They have been suggested to act by increasing the concentration, enhancing the motor skills and improving the ability to handle arousal and stress (3).

Progressive muscle relaxation is a popular technique, known for its muscle tension relieving effects. It consists of a series of exercises involving tensing and relaxing various muscle groups in the body. In the present study, we evaluated the effect of PMR training and GSR biofeedback training in reducing the blood pressure and respiratory rate of stressed female students of age group 18–27 yrs. Their stress level was assessed using Comprehensive Anxiety Test questionnaire.

Comprehensive Anxiety Test (CAT) questionnaire (National Psychological Corporation, Bharagava Bhavan, 4/230, Kacheri Ghat, Agra) was administered to about 120 females (undergraduate, post graduate, graduate and research scholars) from Guru Nanak Dev University, Amritsar, India. The questionnaire had 90 questions to be answered as yes or no. Out of the 120 females, only those whose anxiety scores were greater than 40 (i.e. 40 questions answered as yes) and percentile greater than 40 (i.e. 40 questions answered as yes) and percentile greater than 70 were selected for the study. Ultimately, 30 highly stressed females with high anxiety scores, who were free from any ailments and not undergoing any kind of medication treatment were chosen for the study. Of these subjects, 20 were randomly assigned to one of the two training groups: GSR biofeedback training (n = 10) and PMR training (n = 10). The remaining 10 subjects were taken as control.

The training was provided for 20 min daily for 10 consecutive days. The entire training session was conducted at the Sports Psychology Lab, Department of Sports Medicine and Physiotherapy, Guru Nanak Dev University, Amritsar, India. Informed written consent for participating in the study was taken from all the subjects. Unpaired t-test was applied for analyzing the pre and post session results. Unpaired t-test was used to find the difference in readings of the subjects of two training groups versus control group and also for the differences between the readings of subjects of two training groups.

In the GSR biofeedback training group (group 1), before the commencement of training, the subject was made to sit comfortably on a chair, placed in front of GSR machine (GSR Biofeedback 'Biotrainer' GBF-2000, Medicaid systems, 389, Industrial Area, Phase II, Chandigarh). The electrodes were fixed on the index and ring finger using velcro tape and the subject was instructed to relax voluntarily using visual feedback from the machine. Blood pressure was measured using sphygmomanometer (Novaphon-300, DSIDC, Shed No. 5, Jhilim Industrial Area, Delhi-110095) with conventional method and respiratory rate was recorded by observing the movement of chest wall for one minute.

Progressive Muscle Relaxation training is a systematic technique used for achieving a deep state of relaxation. Technique developed by Dr. Edmund Jacobson (5) was used for the study. In this group, (group 2), the subject was made to lie comfortably on a couch with her eyes closed. She was instructed to listen and follow the instructions carefully. Training involved tensioning the specific muscle groups of body for 7–10 sec., followed by releasing them for 15–20 sec. In control group (group 3), subject was just made to sit quietly for 20 min. Blood pressure and respiratory rate were recorded in all three groups before and after 20 min session, on day 1 and 10.

TABLE 1: Post training mean values for all the three groups on day 1 and day 10

<table>
<thead>
<tr>
<th></th>
<th>Group 1</th>
<th>Group 2</th>
<th>Group 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Day 1</td>
<td>Day 10</td>
<td>Day 10</td>
<td>Day 10</td>
</tr>
<tr>
<td>SBP</td>
<td>112.2±9.81</td>
<td>114.2±6.93</td>
<td>113.5±10.49</td>
</tr>
<tr>
<td>DBP</td>
<td>68.2±9.01</td>
<td>63.6±4.40</td>
<td>73.6±8.63</td>
</tr>
<tr>
<td>RR</td>
<td>18.4±5.57</td>
<td>15.4±3.53*</td>
<td>16.1±3.34</td>
</tr>
</tbody>
</table>

aData are expressed as mean±S.D.

SBP = Systolic blood pressure, DBP = Diastolic blood pressure, RR = Respiratory Rate.

*P<0.05, **P<0.001
shows pre and post session values of SBP, DBP, and respiratory rate for all three groups on day 1 and day 10 respectively. Intragroup and intergroup comparisons were analyzed using paired t-test and unrelated t-test respectively. One way ANOVA and post hoc tests were done for results on day 1 and day 10.

The present study aimed at evaluating the effect of two training techniques on blood pressure and respiratory rate of the stressed individuals. Since no significant results were found for pre training sessions in all three groups on day 1 and day 10, comparisons were done between pre and post session as well as post training values of parameters on day 1 and day 10.

Comparison of post training values of blood pressure on day 1 with day 10 indicated that PMR group (group 2) showed significant differences for SBP (P<0.05) and DBP (P<0.001). Other two groups failed to show any significant results for post training values of blood pressure on day 1 and day 10 (Table I). Pre and post session comparison of blood pressure values of GSR biofeedback group (group 1) on day 1 revealed significant reduction in SBP values (P<0.05) while no effect was observed for DBP while on day 10, both SBP and DBP values showed significant differences in pre and post session values. Results indicate the effectiveness of GSR biofeedback in reducing blood pressure after training session. PMR group showed significant reduction in pre-post session values of SBP and DBP on day 10 only. Control group (group 3) did not show significant results on both day 1 and day 10 (Table II and Table III).

Comparison of post training values of blood pressure on day 1 with day 10

Only group 1 showed significant reduction in post training values of respiratory rate on day 10 as compared to day 1 (Table I). Significant reduction in pre-post session values of respiratory rate was observed in group 1 and group 2 on both day 1 (P<0.001) and day 10 (P<0.001). Control group did not show any significant changes. Statistically significant differences were observed on intergroup comparison between GSR biofeedback and control group (t = 2.79, P<0.05) and between PMR and control group (t = 3.19, P<0.05).

The present study shows that PMR training resulted in significant improvement in both SBP and DBP and GSR biofeedback training led to a reduction in post training values of respiratory rate after 10 days of training. These results are also supported by their pre and post session comparisons. No significant changes were observed in control group. During stressed conditions, repeated hypothalamic stimulation by emotional stimuli leads to an increase in blood pressure, respiratory rate and anxiety. These relaxation methods led to a reduction in sympathetic nervous system activity and reduced stress and anxiety. Previous studies have also supported these results. PMR training has shown improvement in blood pressure, heart rate, and anger in pregnant women with bronchial asthma (6). Significant decrease was observed in respiratory rate of 54 college students when administered with PMR training of 30 minutes over 20 sessions (7). Various methods of biofeedback assisted relaxation have been perceived well in treatment or management of several health conditions such as cardiovascular diseases (8), insomnia (9), migraine (10, 11). Yogi relaxation in combination with GSR biofeedback has shown a reduction in systolic and diastolic blood pressure, after training of 30 minutes over a period of two months (12).

The present study has shown PMR training to result in significant decrease in blood pressure whereas GSR biofeedback training showed a decrease in respiratory rate. Both techniques are simple and easy to use. These can be well adopted by people who face stressful work conditions. The limitation of this study includes its relatively short duration and lack of follow up to assess the long term effects of these techniques. These techniques can be combined with other therapeutic interventions for treating other clinical conditions.

TABLE III: Pre-Post session comparison of mean values on day 10

<table>
<thead>
<tr>
<th>Group 1</th>
<th>Group 2</th>
<th>Group 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>SBP</td>
<td>DBP</td>
<td>RR</td>
</tr>
<tr>
<td>Pre session</td>
<td>Post session</td>
<td>Pre session</td>
</tr>
<tr>
<td>22.6±2.17</td>
<td>18.4±1.37**</td>
<td>20.7±4.05</td>
</tr>
<tr>
<td>71.4±9.43</td>
<td>68.2±9.01</td>
<td>72.8±10.84</td>
</tr>
<tr>
<td>114.8±8.75</td>
<td>112.2±9.81</td>
<td>116.4±11.46</td>
</tr>
</tbody>
</table>

*Data are expressed as mean±S.D.  
P<0.05, **P<0.001  
SBP = Systolic blood pressure, DBP = Diastolic blood pressure, RR = Respiratory Rate.
Acute emotional stress and cardiac arrhythmias.

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Episodes of acute emotional stress can have significant adverse effects on the heart. Acute emotional stress can produce left ventricular contractile dysfunction, myocardial ischemia, or disturbances of cardiac rhythm. Although these abnormalities are often only transient, their consequences can be gravely damaging and sometimes fatal. Despite the many descriptions of catastrophic cardiovascular events in the setting of acute emotional stress, the anatomical substrate and physiological pathways by which emotional stress triggers cardiovascular events are only now being characterized, aided by the advent of functional neuroimaging. Recent evidence indicates that asymmetric brain activity is particularly important in making the heart more susceptible to ventricular arrhythmias. Lateralization of cerebral activity during emotional stress may stimulate the heart asymmetrically and produce areas of inhomogeneous repolarization that create electrical instability and facilitate the development of cardiac arrhythmias. Patients with ischemic heart disease who survive an episode of sudden cardiac death in the setting of acute emotional stress should receive a beta-blocker. Nonpharmacological approaches to manage emotional stress in patients with and without coronary artery disease, including social support, relaxation therapy, yoga, meditation, controlled slow breathing, and biofeedback, are also appropriate to consider and merit additional investigation in randomized trials.

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Acute Emotional Stress and the Heart

Janet M. Torpy; Alison E. Burke; Richard M. Glass

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Acute Emotional Stress and Cardiac Arrhythmias

E XPERIENCING emotional or physical stress causes an increase in heart rate, elevation of blood pressure, and release of stress hormones. All these result in a greater workload for the heart, which can be dangerous. Stress can cause a heart attack, sudden cardiac death, heart failure, or arrhythmias (abnormal heart rhythms) in persons who may not even know they have heart disease. Individuals with congestive heart failure, coronary heart disease, known arrhythmias, or other heart or blood vessel diseases should avoid emotional stress whenever possible and learn to manage the effects of stress. Excessive physical exertion and emotional stress may cause problems in both men and women, but women seem to be particularly susceptible to developing heart problems in the face of emotional stress. Ask your doctor about any limitations on physical activity or vigorous exercise if you have heart disease.

The July 18, 2007, issue of JAMA includes an article about acute emotional stress and its effects on the heart.

EFFECTS OF STRESS ON THE HEART

• Increased heart rate
• Increased blood pressure
• Release of catecholamines (stress hormones, including epinephrine, which is also known as adrenaline) from the adrenal glands
• Increased oxygen demand on the body (temporarily higher metabolic rate)

• Lower threshold for abnormal heart rhythms including ventricular tachycardia, ventricular fibrillation, and atrial fibrillation. Electrical instability in the heart makes it easier for these abnormal heart rhythms to occur.
• Spasm of coronary (heart) blood vessels, leading to ischemia (inadequate blood flow to the heart)

PREVENTING AND MANAGING STRESS

• Avoid situations that you know will cause stress.
• Incorporate some type of exercise into each day.
• Eat a healthful diet rich in fruits, vegetables, and whole grains.
• Do not smoke.
• Use alcohol only in moderation.
• Quiet time, meditation, prayer, reading, yoga, and relaxation techniques (including biofeedback) can help in stress management.
• Family and friends can provide needed support. Talking about problems can help to reduce conflict and express feelings.
• If you have heart disease, your doctor may prescribe a beta-blocker, a type of medication to help lower the heart rate and control abnormal heart rhythms.
• Beta-blocker, a type of medication to help lower the heart rate and control abnormal heart rhythms.

INFORM YOURSELF

• American Heart Association
www.americanheart.org
• National Heart, Lung, and Blood Institute
www.nhlbi.nih.gov

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Sources: American Heart Association; National Heart, Lung, and Blood Institute

The JAMA Patient Page is a public service of JAMA. The information and recommendations appearing on this page are appropriate in most instances, but they are not a substitute for medical judgment. The specific information concerning your personal medical condition should be discussed with your health care provider. Neither JAMA nor any of its contributors shall be liable for any damages incurred as a result of using this information.

Janet M. Torpy, MD, Writer
Alison E. Burke, MA, Illustrator
Richard M. Glass, MD, Editor

The July 18, 2007, issue of JAMA includes an article about acute emotional stress and its effects on the heart.
Aging and Inflammation

• Causes of Age-Related Inflammation

Chronic systemic inflammation is an underlying cause of many seemingly unrelated, age-related diseases. As humans grow older, systemic inflammation can inflict devastating degenerative effects throughout the body (Ward 1995; McCarty 1999; Brod 2000). This fact is often overlooked by the medical establishment, yet persuasive scientific evidence exists that correcting a chronic inflammatory disorder will enable many of the infirmities of aging to be prevented or reversed.

The pathological consequences of inflammation are well-documented in the medical literature (Willard et al. 1999; Hogan et al. 2001). Regrettably, the dangers of systemic inflammation continue to be ignored, even though proven ways exist to reverse this process. By following specific prevention protocols suggested by the Life Extension Foundation, the inflammatory cascade can be significantly reduced.

The Causes of Age-Related Inflammation

Ageing results in an increase of inflammatory cytokines (destructive cell-signaling chemicals) that contribute to the progression of many degenerative diseases (Van der Meide et al. 1996; Licinio et al. 1999). Rheumatoid arthritis is a classic autoimmune disorder in which excess levels of cytokines such as tumor necrosis factor-alpha (TNF-a), interleukin-6 (IL-6), interleukin 1b [IL-1(b)], and/or interleukin-8 (IL-8) are known to cause or contribute to the inflammatory syndrome (Deon et al. 1999). Rheumatoid arthritis is also involved in diseases as diverse as atherosclerosis, cancer, heart valve dysfunction, obesity, diabetes, congestive heart failure, digestive system diseases, and Alzheimer’s disease (Brouqui et al. 1994; Devaux et al. 1997; De Keyser et al. 1998). In aged people with multiple degenerative diseases, the inflammatory marker, C-reactive protein, is often sharply elevated, indicating the presence of an underlying inflammatory disorder (Invitti 2002; Lee et al. 2002; Santoro et al. 2002; Sitzer et al. 2002). When a cytokine blood profile is conducted on people in a weakened condition, an excess level of one or more of the inflammatory cytokines, e.g., TNF-a, IL-6, IL-1b, or IL-8, is usually found (Santorro et al. 2002). (See the Suggested Reading reference list for additional citations.)

Protecting Against Inflammatory-Related Disease

The New England Journal of Medicine published several studies in the year 2000 showing that the blood indicators of inflammation are strong predictive factors for determining who will suffer a heart attack (Lindahl et al. 2000; Packard et al. 2000; Rader 2000). The January 2001 issue of Life Extension Magazine described these studies and explained how individuals could protect themselves against these inflammatory markers (such as C-reactive protein, homocysteine, and fibrinogen).

A growing consensus among scientists is that common disorders such as atherosclerosis, colon cancer, and Alzheimer’s disease are all caused in part by a chronic inflammatory syndrome.

Seemingly unrelated diseases have a common link. People who have multiple degenerative disorders often exhibit excess levels of pro-inflammatory markers in their blood. Here is a partial list of common medical conditions that are associated with chronic inflammation:

<table>
<thead>
<tr>
<th>Diseases Related To Chronic Inflammation</th>
<th>Mechanism</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disease</td>
<td></td>
</tr>
<tr>
<td>Allergy</td>
<td>Inflammatory cytokines induce autoimmune reactions</td>
</tr>
<tr>
<td>Alzheimer’s</td>
<td>Chronic inflammation destroys brain cells</td>
</tr>
<tr>
<td>Anemia</td>
<td>Inflammatory cytokines destroy joint cartilage and synovial fluid</td>
</tr>
<tr>
<td>Aortic valve stenosis</td>
<td>Chronic inflammation damages heart valves</td>
</tr>
<tr>
<td>Arthritis</td>
<td>Inflammatory cytokines attack erythroid coeloten production</td>
</tr>
<tr>
<td>Cancer</td>
<td>Chronic inflammation causes many cancers</td>
</tr>
<tr>
<td>Congestive heart failure</td>
<td>Chronic inflammation contributes to heart muscle wasting</td>
</tr>
<tr>
<td>Fibromyalgia</td>
<td>Inflammatory cytokines are elevated</td>
</tr>
<tr>
<td>Fibrosis</td>
<td>Inflammatory cytokines attack traumatised tissue</td>
</tr>
<tr>
<td>Heart attack</td>
<td>Chronic inflammation contributes to coronary atherosclerosis</td>
</tr>
<tr>
<td>Kidney failure</td>
<td>Inflammatory cytokines restrict circulation and damage nephrons</td>
</tr>
<tr>
<td>Lupus</td>
<td>Inflammatory cytokines induce an autoimmune attack</td>
</tr>
<tr>
<td>Pancreatitis</td>
<td>Inflammatory cytokines induce pancreatic cellular injury</td>
</tr>
<tr>
<td>Psoriasis</td>
<td>Inflammatory cytokines induce dermatitis</td>
</tr>
<tr>
<td>Stroke</td>
<td>Chronic inflammation promoted thromboembolic events</td>
</tr>
<tr>
<td>Surgical complications</td>
<td>Inflammatory cytokines prevent healing</td>
</tr>
</tbody>
</table>

A critical inflammatory marker is C-reactive protein. This marker indicates an increased risk for destabilized atherosclerotic plaque and abnormal arterial clotting. When arterial plaque becomes destabilized, it can burst open and block the flow of blood through a coronary artery, resulting in an acute heart attack. One of the New England Journal of Medicine studies showed that people with high levels of C-reactive protein were almost three times as likely to die from a heart attack (Ridker et al. 1997).

The Life Extension Foundation long ago advised members to have an annual C-reactive protein blood test to detect systemic inflammation that could increase the risk of heart attack, stroke, cancer and a host of age-related diseases. In fact, on January 28, 2003, the American Heart Association and Centers for Disease Control & Prevention (CDC) jointly endorsed the C-reactive protein test to screen for coronary-artery inflammation to identify those at risk for heart attack.

What Causes Elevated C-reactive Protein?

• Elevated C-Reactive Protein and Interleukin-6 Predict Type II Diabetes

While some doctors are finally catching on to the fact that elevated C-reactive protein increases heart attack and stroke risk, they still know little about its other dangers. Even fewer practicing physicians understand that pro-inflammatory cytokines are an underlying cause of systemic inflammation that is indicated by excess C-reactive protein in the blood.

In an abstract published in the March 6, 2002 issue of the Journal of the American College of Cardiology (JACC), tumor necrosis factor-alpha (TNF-a) levels were measured in a group of people with high blood pressure and a group with normal blood pressure (Verdecchia et al. 2002). The objective of this study was to ascertain if arterial flow mediated dilation was affected by hypertension and chronic inflammation as evidenced by high levels of the pro-inflammatory cytokine TNF-a.

The hypertensive subjects taking anti-hypertensive medications had about the same blood pressure as the healthy test subjects. Arterial flow mediated dilation, however, was significantly impaired in the hypertensives and this group also showed higher levels of TNF-a, indicating persistent inflammation despite blood pressure control. This study showed that even when blood
pressure is under control, hypertensives still suffer from continuous damage to the inner lining of the arterial wall (endothelial dysfunction) caused by a chronic inflammatory insult. The doctors who conducted this study concluded by stating:

“Antihypertensive therapy alone may be insufficient to improve endothelial dysfunction in hypertensives with high plasma levels of inflammatory markers. Additional therapy to target inflammation may be necessary to improve endothelial function and to prevent progression of coronary atherosclerosis in high-risk hypertensives with subclinical inflammations.”

A sensitive index to evaluate how much endothelial damage is occurring is the measurement of TPA (tissue-type plasminogen activator), a clot-dissolving enzyme found in the blood. This same study showed elevated TPA levels in hypertensives, indicating continued endothelial damage despite blood pressure reduction. These findings indicate that hypertensives should have their blood tested for both TNF-a and TPA to assess how much inner wall (endothelial) arterial damage is occurring (Vardecchia et al. 2002). If TNF-a and/or TPA levels are high, aggressive therapies to suppress the inflammatory cascade should be considered.

Elevated C-Reactive Protein and Interleukin-6 Predict Type II Diabetes

In a study published in the July 18, 2001 issue of the Journal of the American Medical Association, a group from the famous Women’s Health Study was evaluated to ascertain what risk factors could predict future development of Type II diabetes (Pradhan et al. 2001). The findings showed that baseline levels of C-reactive protein and interleukin-6 (IL-6) were significantly higher among those who subsequently developed diabetes compared to those who did not.

When comparing the highest versus lowest quartile, women with the higher IL-6 levels were 7.5 times more likely to develop diabetes while those in the higher C-reactive protein ranges were 15.7 times more likely to become diabetic. After adjusting for all other known risk factors, women with the highest IL-6 levels were 2.3 times at greater risk, while those with the highest C-reactive protein levels were 4.2 times more likely to become diabetic. It should be noted that these other diabetic risk factors (such as obesity, estrogen replacement therapy and smoking) all sharply increase inflammatory markers in the blood. The doctors who conducted this study concluded by stating:

“Elevated C-reactive protein and IL-6 predict the development of Type II diabetes mellitus. These data support a possible role for inflammation in diabetogenesis.”

C-Reactive Protein and IL-6 Predict Death

•Frailty in Elderly Linked to Inflammation

It is well established the elevated C-reactive protein, IL-6 and other inflammatory cytokines indicate significantly greater risks of contracting or dying from specific diseases (heart attack, stroke, Alzheimer’s disease, etc.).

A group of doctors wanted to ascertain if C-reactive protein and IL-6 could also predict the risks of all-cause mortality. In a study published in the American Journal of Medicine, a sample of 1,293 healthy elderly people were followed for a period of 4.6 years (Harris et al. 1999). Higher IL-6 levels were associated with a twofold greater risk of death. Higher C-reactive protein was also associated with a greater risk of death, but to a lesser extent than elevated IL-6. Subjects with both high C-reactive protein and IL-6 were 2.6 times more likely to die during follow up than those with low levels of both of these measurements of inflammation. These results were independent of all other mortality risk factors. The doctors concluded by stating:

“These measurements (C-reactive protein and IL-6) may be useful for identification of high-risk subgroups for anti-inflammatory interventions.”

Frailty in Elderly Linked to Inflammation

In a study of almost 5,000 elderly people, scientists discovered that frail seniors were more likely to have signs of increased inflammation than their more active counterparts. This study was published in the Archives of Internal Medicine (Walston et al. 2002) and showed that these frail seniors with elevated blood inflammatory markers also tended to show more clotting activity, muscle weakness, fatigue and disability than active elderly people.

Findings from these studies should motivate every health conscious individual to have their blood tested for C-reactive protein. If it is elevated, then the Inflammatory Cytokine Test Panel is highly recommended. Those who suffer from any type of chronic disease may also consider the Inflammatory Cytokine Test Panel in order to identify the specific inflammatory mediator that is causing or contributing to their problem.

Glycation’s Role in Inflammation

•Cooking and Aging Have Similar Biological Properties

Eating high temperature cooked food is another contributor in the production of inflammatory cytokines. In fact, it has been shown that eating high temperature cooked food leads to the formation of advanced glycation end (AGE) products. Glycation can be described as the binding of a protein molecule to a glucose molecule resulting in the formation of damaged protein structures. Many age-related diseases such as arterial stiffening, cataract and neurological impairment are at least partially attributable to glycation. These destructive glycation reactions render proteins in the body cross-linked and barely functional. As these degraded proteins accumulate, they cause cells to emit signals that induce the production of inflammatory cytokines.

The glycation process is presently irreversible, though an important study indicates a drug in clinical trials may be partially effective. According to a Proceedings of the National Academy of Sciences study, consuming foods cooked at high temperature accelerates the glycation process, and the subsequent formation of advanced glycation end products.

A more succinct descriptive term for „advanced glycation end products” is „glycotoxin,” since „advanced glycation end products” are toxic to the body. We will use the word „glycotoxin” from here on to describe the term „advanced glycation end products.”

Inflammation: Chronic

Cooking and Aging Have Similar Biological Properties

•Fire and Aging Have Similar Biological Properties
The Dangerous Pro-Inflammatory Cytokines

- Reducing Inflammation
- Lowering Elevated C-Reactive Protein
- Blood Testing
- The Importance of Cytokine Testing
- Pentoxifylline Studies
- When to Avoid PTX and Other Anti-Inflammatories
- Sources of Pentoxifylline
- Diet and Inflammation

The following acronyms represent the most dangerous pro-inflammatory cytokines. Health-conscious persons should become familiar with these terms because excess levels of these cytokines cause or contribute to many diseases states:

- TNF-a tumor necrosis factor-alpha
- IL-6 interleukin-6
- IL-1(b) interleukin-1 beta
- IL-8 interleukin-6

Reducing Inflammation

Scientists have identified dietary supplements and prescription drugs that can reduce levels of the pro-inflammatory cytokines. The docosahexaenoic acid (DHA) fraction of fish oil is the best documented supplement to suppress TNF-a, IL-6, IL-1(b), and IL-8 (Jeyarajah et al. 1999; James et al. 2000; Watanabe et al. 2000; Yano et al. 2000). A study on healthy humans and those with rheumatoid disease shows that fish oil suppresses these dangerous cytokines by up to 90% (James et al. 2000). Other cytokine-lowering supplements are DHEA (Casson et al. 1993), vitamin K (Reddi et al. 1995;
Weber 1997), GLA (gamma linolenic acid) (Purasiri et al. 1994), and nettle leaf extract (Teucher et al. 1996). Antioxidants, such as vitamin E (Devaraj et al. 2000) and N-acetyl-cysteine (Gosset et al. 1999), may also lower pro-inflammatory cytokines and protect against their toxic effects.

Prescription drugs like Enbrel ($10,000 a year) directly bind to TNF-a and block its interaction with TNF cell surface receptors. Enbrel has demonstrated significant clinical improvement in rheumatoid arthritis patients, as have high-dose fish oil supplements (Kremer 2000). High levels of TNF-a may persist even in people receiving Enbrel drug therapy. Even if Enbrel brings TNF-a down to a safe range, other inflammatory cytokines such as IL-6 and IL-1(b) may continue to wreak havoc throughout the body. High levels of tumor necrosis factor (TNF-a) are destructive to many vital tissues such as joint cartilage (e.g., rheumatoid arthritis) and heart muscle (e.g., congestive heart failure).

Excess IL-6 and other inflammatory cytokines attack bone and promote the formation of fibrinogen that can induce a heart attack or stroke (di Minno et al. 1992). To prevent and treat the multiple diseases of aging, it is critical to keep these destructive immune chemicals (cytokines) in safe ranges.

Methods of Lowering Elevated C-Reactive Protein

Those who are in relative good health, but have elevated C-reactive protein, can try to lower it using a variety of diet modifications, supplements and/or drugs. Supplements such as vitamin E, borage oil, fish oil, DHEA, vitamin K and nettle leaf extract can lower C-reactive protein. Diets low in arachidonic acid, omega-6 fatty acids, saturated fats, high-glycemic food and overcooked food can suppress inflammatory factors in the body.

If diet and supplements fail, drugs such as ibuprofen, aspirin, pentoxifylline or one of the statins (such as Pravachol®) should be tried. If the modified diet, nutrients and/or drugs lower C-reactive protein to below 1.3 (mg/L) of blood, then this is an indication that the underlying inflammatory fire has been extinguished. (The high-sensitivity C-reactive protein blood test is recommended to measure this indicator.)

For those whose blood tests reveal persistently high inflammatory cytokine levels despite taking the supplements mentioned above, a low-cost prescription drug may be of enormous benefit.

The generic name of this low-cost prescription drug is pentoxifylline (PTX); the brand name is Trental. This drug was first used in Europe in 1972 and long ago was removed from patent status (meaning it is not cost-prohibitive). PTX is prescribed to improve blood flow properties by decreasing its viscosity. It works by improving red blood cell flexibility, decreasing platelet aggregation, and reducing fibrinogen levels (de la Cruz et al 1993; Gara 1993; Gaur et al. 1993). PTX has fallen from favor because no drug company has the economic incentive to market it to physicians. PTX is primarily prescribed to patients with peripheral artery disease, although it may have potential efficacy in treating a wide range of diseases relating to chronic inflammation.

Numerous studies show that pentoxifylline (PTX) is a potent inhibitor of TNF-a, IL-1(b), IL-6, and other pro-inflammatory cytokines (Neuner et al. 1994, Noel et al. 2000; Pollice et al. 2001; Ventura et al. 2001). Similarly, studies also show that DHA fish oil suppresses these same cytokines (Das 2000; Yano et al. 2000). In people who have a chronic disease involving elevated levels of the inflammatory cytokines, the daily administration of 400-800 mg of PTX and/or 1000-2000 mg of DHA fish oil could be of enormous benefit.

Individuals with chronic disease sometimes find it difficult to suppress C-reactive protein. In these cases, it is important to identify the specific inflammatory cytokines that are responsible for the destructive inflammatory processes that is causing or contributing to the underlying disease state. This enables a custom tailored program to be implemented, and its success measured by suppressing the pro-inflammatory cytokine culprits. For instance, if levels of TNF-a levels are elevated, and natural approaches fail to lower it, the prescription drug Enbrel should be considered.

Inflammatory Cytokine Blood Testing

People suffering from chronic disease often have elevated levels of C-reactive protein in their blood. C-reactive protein indicates an inflammatory process is going on in the body, but does not identify the specific pro-inflammatory cytokine that may be the underlying cause.

Testing for pro-inflammatory cytokines has been prohibitively expensive because there has been so little demand for it. The Life Extension Foundation offers an inflammatory cytokine profile at an affordable price. Below is the cytokine panel for this test along with the optimal anti-inflammatory ranges:

<table>
<thead>
<tr>
<th>Pro-Inflammatory Cytokine</th>
<th>Optimal Anti-Inflammatory Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tumor necrosis factor alpha (TNF-a)</td>
<td>0-25 pg/mL</td>
</tr>
<tr>
<td>Interleukin-1 beta (IL-1b)</td>
<td>0-150 pg/mL</td>
</tr>
<tr>
<td>Interleukin-6 (IL-6)</td>
<td>2-29 pg/mL</td>
</tr>
</tbody>
</table>
Interleukin-8 (IL-8)

- 10-80 pg/mL
- <32.0 pg/mL

Note: Quest and LabCorp are blood testing facilities. Other blood testing laboratory methods may have different ranges.

As stated earlier in this chapter, an inexpensive C-reactive protein (high-sensitivity) blood test (CRP-hs) can help reveal if you have systemic inflammation. If your C-reactive protein level is over 1.3 (mg/L), this is an indication that you have an inflammatory event occurring in your body. Those with elevated CRP-hs levels (and who have a disease associated with chronic inflammation) should consider using a supplement protocol and/or prescription drugs known to suppress elevated pro-inflammatory cytokines.

The Importance of Cytokine Testing for Those Suffering From Chronic Illness

There are many chronic disease states that can now be managed by the proper utilization of the Inflammatory Cytokine Blood Panel. If you are elderly, or suffer from any serious disorder, these cytokine tests can enable your doctor to prescribe therapies that specifically target the inflammatory cytokine responsible for your poor state of health.

From a practical standpoint, if you suffer from congestive heart failure, and your levels of TNF-a remain persistently high, you may ask your doctor to prescribe the drug Enbrel®, which specifically counteracts the destructive effects of TNF-a.

If you suffer from cancer and your levels of IL-6 remain persistently high, you may consider high dose DHEA or asking your doctor to prescribe a bisphosphonate drug (such as Zometa®) that protects against bone destruction that releases excess IL-6 into the body. Those with prostate, certain types of breast cancer, and other hormonally driven cancer should consider other IL-6 lowering therapies (such as high dose DHA fish oil extract) in lieu of DHEA.

Some cancer and patients display elevated levels of IL-8, which induces cancer cells to express growth factors that fuel their propagation. In hepatitis C, elevated IL-8 signals interferon drug resistance. An IL-8 suppressing therapy will soon be available to Americans (it is already used in Japan).

Those with systemic inflammatory disease often manifest high levels of IL-1β. If diet, the anti-inflammatory supplements (fish oil, borage oil, DHEA, etc.) and cytokine-suppressing drugs (pentoxifylline, 400 mg twice a day) fail to suppress this destructive cytokine, then ask your doctor to prescribe the drug Arava (leflunomide), starting at the low dose of 10 mg a day.

In addition to toxic cytokines, there are other inflammatory pathways that can be mediated via diet modification. A common problem involves overproduction of pro-inflammatory hormone-like "messengers" (such as prostaglandin E2) and underproduction of anti-inflammatory "messengers" (such as prostaglandin E1 and E3).

The good news is that omega-3 fatty acids found in fish oil help to suppress the formation of undesirable prostaglandin E2 and promote synthesis of beneficial prostaglandin E3 (Kelley et al. 1985; Watanabe et al. 2000). Gamma - linolenic acid (GLA) induces production of the anti-inflammatory prostaglandin E1 (Das et al. 1989; Fan et al. 1997). What you eat can significantly affect whether you have more of the beneficial prostaglandins (E1 and E3) as opposed to the pro-inflammatory prostaglandin E2.

Because prostaglandin E2 is a culprit in inflammation, reducing the consumption of foods that are high in omega-6 fatty acids and increasing the consumption of omega-3 rich foods, such as salmon and other fish, can be beneficial. Limiting foods that convert to arachidonic acid can help reduce inflammation. Arachidonic acid is a precursor to both prostaglandin E2 and the pro-inflammatory cytokine leukotriene B4(Brock et al. 1999). Another dietary factor that can lead to high levels of arachidonic acid is the overconsumption of high-glycemic index carbohydrates that cause excess production of insulin (Kreisberg et al. 1983). These quickly digestible foods include fruit juices or rice cakes. Food heavy in polysaturated fats or saturated fats can also increase prostaglandin E2.

Additionally, a study of elderly patients with heart disease requiring elective surgery (Tepaske et al. 2001) found that nutritional supplements containing omega-3 polysaturated fatty acids (as well as yeast and L-arginine) improved the outlook for high-risk patients when given a minimum of 5 days prior to surgery.

The number of inflammatory-related diseases that could be successfully treated with cytokine-lowering therapy is staggering. PTX and supplements such as fish oil, nettle leaf, DHEA, and vitamin K possess mechanisms of suppressing inflammatory cytokines. Unfortunately, there are no side-by-side comparisons to enable us to categorically state whether PTX or natural agents (such as DHA fish oil) work better.

Foods cooked at high temperatures can produce a browning effect in which glycoltoxins are formed from the reaction of sugars and oxidized fats with protein. Glycoltoxins may contribute to low-grade chronic inflammation. High glycemic foods may also contribute to the inflammatory process. Dietary modifications to reduce inflammation should include elimination of foods and cooking processes that contribute to a chronic state.

For those who have multiple degenerative diseases, the cytokine profile blood test and the C-reactive protein blood test are highly recommended. This may be done through your own physician or the Life Extension Foundation. If your cytokine test reveals excess levels of cytokines such as TNF-a, IL-1β, or both, nutritional supplementation, dietary modifications, and low-cost prescription medications such as PTX are advised.

The following supplements are suggested:

- The docosahexaenoic acid (DHA) fraction of fish oil may be the most effective nonprescription supplement to suppress pro-inflammatory cytokines. Gamma-linolenic acid (GLA) is a precursor of PGE1, a potent anti-inflammatory agent. A product called Super EPA/DHA provides 1400 mg of EPA
and 1000 mg of DHA in 4 capsules.

DHEA is a hormone that decreases with age. DHEA has been shown to suppress IL-6, an inflammatory cytokine that often increases as people age. Typical doses of DHEA are 25-50 mg daily, although some people take 100 mg daily. Refer to the DHEA Replacement protocol for suggested blood tests to safely and optimally use DHEA.

Nettle leaf has been shown to suppress the proinflammatory cytokine TNF-α. Take 1000 mg daily.

Vitamin E and N-acetyl-cysteine (NAC) are protective antioxidants with anti-inflammatory properties. Vitamin E that contains gamma-tocopherol and tocotrienols provides the most broad-spectrum protection. Take 1 capsule daily of Gamma E Tocopherols with Sesame Lignans and Tocotrienols with Sesame Lignans. NAC is an amino acid with antiviral and liver protectant properties. One 600 mg capsule daily is recommended.

Vitamin K helps reduce levels of IL-6, a pro-inflammatory messenger. Vitamin K also helps in the treatment of osteoporosis by regulating calcium and promoting bone calcification. One 10 mg capsule daily is recommended for prevention purposes. Do not take vitamin K if you are taking Coumadin or some other type of anticoagulant medicine.

Consuming at least 1000 mg per day of carnosine and/or 300 mg of the European drug aminoguanidine can inhibit pathological glycation reactions in the body.

An outpatient program in behavioral medicine for chronic pain patients based on the practice of mindfulness meditation: theoretical considerations and preliminary results.
Kabat-Zinn J.
The practice of mindfulness meditation was used in a 10-week Stress Reduction and Relaxation Program to train chronic pain patients in self-regulation. The meditation facilitates an attentional stance towards proprioception known as detached observation. This appears to cause an "uncoupling", of the sensory dimension of the pain experience from the affective/evaluative alarm reaction and reduce the experience of suffering via cognitive reappraisal. Data are presented on 51 chronic pain patients who had not improved with traditional medical care. The dominant pain categories were low back, neck and shoulder, and headache. Facial pain, angina pectoris, noncoronary chest pain, and GI pain were also represented. At 10 weeks, 65% of the patients showed a reduction of greater than or equal to 33% in the mean total Pain Rating Index (Melzack) and 50% showed a reduction of greater than or equal to 50%. Similar decreases were recorded on other pain indices and in the number of medical symptoms reported. Large and significant reductions in mood disturbance and psychiatric symptomatology accompanied these changes and were relatively stable on follow-up. These improvements were independent of the pain category. We conclude that this form of meditation can be used as the basis for an effective behavioral program in self-regulation for chronic pain patients. Key features of the program structure, and the limitations of the present uncontrolled study are discussed.
PMID: 7042457 [PubMed - indexed for MEDLINE]
Anxiety, Shyness May Be Long-Lasting Traits

Brain mechanism present early in life predisposes people to worry, study finds

URL of this page: http://www.nlm.nih.gov/medlineplus/news/fullstory_66610.html (**this news item will not be available after 10/02/2008)

FRIDAY, July 4 (HealthDay News) -- The brains of people who suffer from anxiety and severe shyness may respond more strongly to stress and show signs of being anxious even in situations considered safe by others, say researchers at the University of Wisconsin School of Medicine and Public Health.

They studied brain activity, anxious behavior and stress hormones in adolescent rhesus monkeys. Those with the most anxious temperaments showed higher activity in a part of the brain called the amygdala, which regulates emotion and triggers reactions to anxiety.

The anxious monkeys had more activity in the amygdala in both secure and threatening situations, the study found. When the monkeys were tested again 18 months later, the results were the same.

"The brain machinery underlying the stress response seems to be always on in these individuals, even in situations that others perceive as safe and secure," Dr. Ned Kalin, chairman of the department of psychiatry and HealthEmotions Research Institute, said in a prepared statement.

It has long been known that children with an anxious temperament are at increased risk for developing anxiety disorders, depression and substance abuse. The findings indicate a brain mechanism that's present early in life predisposes people to anxious temperament, and that it's difficult for someone with this temperament to be calm because their brain is wired in a way that keeps them tense and anxious.

The study was published July 2 in the online journal PLoS One.
Autism and the Immune Connection

Infantile autism begins early in life, usually before the child is 30 months of age. While "in the past" a rare condition with a "disputed" incidence of just 2-5 in 10,000 live births, it is seen as a devastating handicap on psychologic and neurologic development, with potentially long-term serious consequences. As described in the past, Autistic infants did not demand attention, they did not enjoy being picked up, nor did they cuddle or cling when someone held them. They rarely smile at other people or look directly at them. In fact they often appear to be the happiest when they are left alone. Mothers of autistic children have noted an understandable lessened pleasure in their maternal efforts. They complain that they feel they are caring for an "object" rather than a person. Sometimes this condition is not noticed at first, because physical development generally appears normal in the autistic infant. These infants are often viewed as "placid" babies. These children begin to display various abnormal behaviors in the preschool years often including:
1. A need to preserve sameness
2. Marked language abnormalities
3. Indexes of developmental disorder - strange body movements, posturing and "soft" signs of neurological impairment

Etiology
With several different etiologies or biological cause's, autism is considered a syndrome rather than a disease. Some researchers have proposed genetic causes, viral causes, and immunological ties, to be the cause. An increased incidence of two or more miscarriages and infertility, as well as pre eclampsia and bleeding during pregnancy, have been shown to occur in mothers of autistic children. Perhaps the disorders occurring in pregnancy are affecting the fetus and showing up as autism in the children. Studies have also been done comparing the maternal antibodies of mothers with their autistic children. These findings suggest that abnormal maternal immunity may be associated with autism because plasma reactivity against lymphocytes was found in several of the mothers. Antibodies reactive with lymphocytes of the father were also found, suggesting the target antigen of the reactivity was a parental antigen inherited from the father. Assuming maternal antibodies may be associated with the development of autism, McConnachie and McIntyre suggested maternal antibodies of mothers with repeated pregnancy losses caused fetal demise, causing immunopathy by reacting with antigens expressed on the trophoblastic extraembryonic tissues of the developing embryo. It has been shown by some researchers that antigens on the trophoblast cross-react with antigens found on lymphocytes.

Conceivably, maternal antibodies could react with trophoblastic tissue, causing a transitory obstruction of blood flow to the fetus resulting in nonlethal brain damage. Equally, the abnormal behavior seen in autism might be caused by the immunopathological damage done to the developing neural tissue of the fetus by the maternal antibodies. While the literature has speculated regarding the above hypothesis and many others, at this time there appears to be an enlarging group of children, whose origin seems linked to the concept of an Immune-Dysregulatory phenomenon. Whether due to an underlying viral, retro-viral, other related entity, a likely underlying genetic disposition, and/or other "environmental" changes, the number of children affected seems to be rapidly increasing. Many of these children do not fit classic autistic profiles, but are frequently labeled high functioning autistic, atypical autistic, PDD, etc.

PATHOPHYSIOLOGY:
Similarities between behavioral deficits reported in animals with hippocampal lesions and autistic behavior have been noted by Boucher and Warrington. They found memory deficits in infantile autism similar to the memory deficits found in the amnestic syndrome. Medial temporal lobe damage on pneumoencephalograms has previously been reported in a subset of autistic children. These findings were particularly evident on the left side. Damasio and Mauer have also proposed that "the syndrome results from dysfunction in a system of bilateral neural structures that includes the ring of mesolimbic cortex located in the mesial frontal and temporal lobes, the neostriatum, and the anterior and medial nuclear groups of the thalamus." (Noteworthy is that much emphasis is put on the medial temporal lobe).

By definition, autism has an early onset before 30 months of age, while disorders appearing later in life have been thought to be symptomatically different from autistic handicap conditions. Publications over the last 13 years have cast some doubt on these relationships. While the rationale for an age limit for the onset of autism has been discussed, it has been pointed out that there is no firm evidence that similar or identical syndromes might not develop in older children. Autism can be associated with a variety of disorders affecting the central nervous system including encephalitis. In 1981, DeLong, Bean, and Brown described three children between 5 and 11 years of age who developed autistic features while having an encephalitic illness. While these autistic features resolved after clinical recovery, one patient had high serum herpes simplex titers, and a CT scan revealing a lesion of the temporal lobes, mainly on the left side. The other two patients had normal CT scans. Gillberg in 1986 described the case of a 14-year old girl who developed a "typical" autistic syndrome after an attack of herpes simplex encephalitis. Widespread bilateral destruction of the brain parenchyma and the temporal lobes was found on CT; there was also some involvement of the lower parts of the parietal lobes. The autistic symptoms persisted long after the acute phase of the encephalitic illness. This case contributes circumstantial evidence that a full blown autistic syndrome may be produced by temporal (and parietal lobe) damage. (This author would note that this is consistent with the areas of decreased function being seen on NeuroSPECT scans with Dr. Ismael...
Mena - clinical research in progress.) It also furthers the evidence that herpes simplex encephalitis can cause an autistic syndrome. In 1975 an article was published in Cortex describing a syndrome similar to autism in adult psychiatry, involving loss of emotional significance of objects, inability to adopt in social relationships, loss of recognition of the significance of persons, and absence of sustained purposeful activity after temporal lobe damage. In 1989 an article appeared in the Journal of Autism and Developmental Disorders describing a 14-year-old boy, with a normal history until the second grade, when he was admitted to the hospital with herpes simplex encephalitis. Later he developed significant language, social, and memory deficits. The research group commented on the cognitive and behavioral deficits caused by temporal lobe damage in herpes encephalitis. While other studies have also implicated the temporal lobes in the pathogenesis of autism, this does not prove a common association between temporal lobe pathology and autism. Research has found a variety of lesions in the brain, particularly the cerebellum. Confusion and differences may be due to the heterogeneity (differences) in possible etiologies or time/duration effects within this varied syndrome we label “autistic”. However, since Herpes virus has a predilection for the temporal lobes it is possible to hypothesize that there is an association between temporal lobes and autism, but not necessarily a direct cause and effect relationship. It is equally important to note that failure of development in temporal lobes early in life may produce different symptoms from those arising out of a later destruction of previously normal lobes.

NeuroSPECT scans are becoming extremely informative, as they show blood flow through areas of the brain. Blood flow implies function/activity. As noted, the Autistic children that I have been able to obtain NeuroSPECT scans on (limited by age and affordability), have shown a decrease in blood flow in the temporal (and parietal) areas. Consistent with the reports of temporal lobe dysfunction in Autistic kids, this is a very logical finding. Surprisingly, and without good explanation, is the finding of increased blood flow in the frontal lobes which is consistent with ADD on the hyperactivity end. (Note: While this may explain occasional success in the usage of Ritalin with some autistic children, Ritalin has the effect of decreasing blood flow on the whole brain. Therefore, while helping the child if there is too much flow in the frontal area, you may not be helping “over all” if you are cutting low in areas that are already low, such as in the temporal or parietal areas).

It is also interesting to note that in my working with Chronic Fatigue Syndrome, “Immune Dysregulation” for the past 12 years, in a recent study (pending publication) we have observed a significant diminution of blood flow in children suffering from CFS/CFIDS in both temporal and, to a lesser degree, the parietal lobes. It is this researcher’s opinion that there is a strong connection between various immune dysfunctional/dysregulatory states appearing over the last 12 - 13 years and the emergence of an onslaught of “atypical” autism.

From the Journal of Clinical Immunology and Immunopathology, Singh et al. hypothesized that autoimmunity secondary to a virus infection may best explain autism in some children. Congenital rubella virus and congenital cytomegalovirus have been indirectly involved as causative factors in autism. Researchers found evidence for autoimmunity as a possible mechanism to explain autism, based on a cellular immune response to myelin basic protein, antibodies against putative brain serotonin receptors, and neuron-axon filament proteins of the nerve cell. About 67% of the autistic sera contained antibodies to NAFP. They were present in almost all patients with abnormal cell-mediated immunity (CMI). An interesting observation was that the sera from household contacts was also positive for anti-NAFP (46% of the siblings or 55% of the parents). Antibodies to NAFP have been previously reported in neurotropic “slow virus” diseases (Kuru and Creutzfeld-Jacob disease) in man. Other studies of household contacts of patients with degenerative disorders of the brain have revealed t-NAFP to be highly prevalent., suggesting an association of an infectious agent (i.e. slow virus) in the etiology of these diseases. With this hypothesis, eight patients (six with abnormal CMI and two without the defect) were placed on immunomodulant therapy. In six patients, parameters in T-cell function and defects in AMLR were partially corrected. Improvement was noted in terms of clinical status, speech, sleep, and attention. After 8 weeks they could speak more than one command; after 16 weeks they were able to write a complete sentence; and all had increased attention span and or ability to sleep. The two patients without abnormal CMI were nonresponders. This research has also shown a significant depression of CD4+ T helper cells and their suppressor-inducer subset, with an increased frequency of the null allele at the complement C4B locus in children with autism. As similar changes have been known to occur in other autoimmune diseases., these researchers postulate that the increase of serum concentrations of sIL-2 (soluble interleukin 2) and sT8 antigens indicates immune activation of a T-cell subpopulation that may be important in the etiology of the disorder in some children with autism. In a fashion similarly proposed for Alzheimer's disease, it is possible that an anatomical alteration in the brain, particularly the hypothalamus (because of its role in controlling emotions and behaviors) of autistic children, may result in a functional disturbance of the neuroendocrine-immune axis. Further investigation is necessary. Many of the Autistic children I have been evaluating have shown very high T-4 and T-8 counts. While reactions to MMR (measles/mumps/rubella) vaccine are in general mild, cases of meningoencephalitis occurring in the third and fourth week post-vaccination have been reported in the UK and elsewhere., Including the area where I live. A “by the book” reaction defined as occurring within six weeks of MMR vaccination. Reactions they were asked to look for included neck stiffness (or sign of meningism), extreme irritability, convulsions, altered consciousness, unexplained screaming attacks, motor or sensory deficit, visual disturbance, visual deficit or speech disturbance. In some of these cases mumps virus was cultured from cerebrospinal fluid (CSF).

Nucleotide sequencing of virus isolates has enabled strains of vaccine origin to be separated from wild strains. Definite cases of a vaccine-like strain of mumps virus were cultured from CSF. While there was no sex differences in the cases reported overall, an excess of males (2:1) were reported in the definite or probable categories. Even though mumps occurs equally in both sexes, complications of meningoencephalitis following both mumps vaccination or wild infection has been reported more frequently among males than the males,. with ratios ranging from 3:1 to 5:1. One must bear in mind that the natural occurrence of meningoencephalitis following mumps infection is estimated to be 1 in 400 cases. Before the MMR vaccine was introduced in the UK, mumps was
is THE Medical Concern

Role of food allergens/sensitivities:

From the Department of Biochemistry, Birmingham University, United Kingdom, Dr. R.H. Waring, along with B.A. O'Reilly, coordinator of the Allergy-induced Autism Support and Self-Help Group is doing some exciting work (pending pub.). They are currently carrying out studies to see if children with known food/chemical sensitivities, along with autism, have a deficiency of phenolsulphotransferase-P enzyme and/or a low capability to oxidize sulfur compounds. From the results they have obtained so far, all 18 children showed to have a low enzyme level, and some had little capacity to oxidize sulfur compounds. Now, after 40 children have been tested, the results show the enzyme is low in every child. This enzyme is necessary to metabolize amines and phenols. So it makes sense that with a reduced level children will not be capable to fully metabolize chemicals and foods that contain phenol. Autistic children typically have adverse reactions to many medications. Sedatives keep children awake, antibiotics won behavior even anesthesia may be a problem. Equally, a build-up of substances such as dopamine, serotonin, and noradrenaline is possible as amines are also metabolized with the same enzyme. As it is well documented that high serotonin levels are found in both its mumps component and Rubella, there is much skepticism regarding the "true" incidence of mumps meningoencephalitis as reported above, as mumps vaccine risk remains very doubtful, if existent at all. This country has not experienced or reported any significant problems with the MMR vaccine. While there may be a possible "triggering" factor with Rubella and an immune active state, this remains an unlikely cause of Autism. Unless further research creates a stronger connection, it remains safer to vaccinate a child than not. Consistent with the question of whether there is a peculiar or unusual immune reactivity when a child is younger, waiting till a child is 3 or 4 could not be faulted, but with ongoing measles outbreaks occurring at times, it is not something easy to recommend routinely at this time.

Another difficult position to address, is the possible role of fungi in the pathophysiology of Autistic dysfunction. Candida albicans is arguably the single most important fungal pathogen. Because it is a commensal organism present in virtually all human beings from birth, it is ideally positioned to take immediate advantage of any weakness or debility in the host, and probably has few equals in the variety and severity of the infections for which it is responsible. Clinically, there is abundant inferential evidence that both mucocutaneous and systemic candidiasis are typically associated with defects or weaknesses in the cell-mediated immune response. They may reflect specific deficiencies in this context, such as in chronic vaginal candidiasis, or chronic mucocutaneous candidiasis. (One must note, that while one might anticipate neurocognitive dysfunction in these states, it is not a primary focus of discussion. Significantly, these states do not account for or induce an "Autistic" state of CNS dysfunction, seemingly due to negate many metabolic theories that abnormal metabolic products, seen in exceptionally high volume in these type of patients, induce Autism.) Epidemiological studies of C. albicans have been hampered by the lack of precise and reproducible methods for identifying isolates. Whatever the ultimate role and pathogenesis of Candida, there seems to be no doubt that it can play a role in many pathologic conditions. Yeast is certainly a potential pathogen in any immune dysfunction/dysregulated state. Yeast may be seen as a secondary phenomenon due to a generalized immune dysfunctional state. A yeast "overgrowth" in the GI tract can interfere with nutrient absorption, altering Amino Acid and protein metabolism and thereby altering multiple body functions. I do believe that it is logical, if you are in an immune dysregulatory state, you may get an overgrowth in the G.I. tract. It is likely Candida may play a role in what is referred to as the "leaky-gut" phenomenon. Some physicians believe you actually have a toxin released by the yeast and absorbed into the body, affecting the nervous system.

Clinical Manifestations

Typical characteristics include:

- a) nondeveloped or poorly developed verbal and nonverbal communication skills
- b) abnormalities in speech patterns
- c) impaired ability to sustain a conversation
- d) abnormal social play
- e) lack of empathy
- f) an inability to make friends

Also frequent seen are:

- g) stereotypic body movements
- h) a marked need for sameness
- i) very narrow interests
- j) preoccupation with parts of the body
- k) changes handness or becomes ambidextrous, as they turn autistic.

Role of food allergens/sensitivities:

- From the Department of Biochemistry, Birmingham University, United Kingdom, Dr. R.H. Waring, along with B.A. O'Reilly, coordinator of the Allergy-induced Autism Support and Self-Help Group is doing some exciting work (pending pub.). They are currently carrying out studies to see if children with known food/chemical sensitivities, along with autism, have a deficiency of phenolsulphotransferase-P enzyme and/or a low capability to oxidize sulfur compounds. From the results they have obtained so far, all 18 children showed to have a low enzyme level, and some had little capacity to oxidize sulfur compounds. Now, after 40 children have been tested, the results show the enzyme is low in every child. This enzyme is necessary to metabolize amines and phenols. So it makes sense that with a reduced level children will not be capable to fully metabolize chemicals and foods that contain phenol. Autistic children typically have adverse reactions to many medications. Sedatives keep children awake, antibiotics won behavior even anesthesia may be a problem. Equally, a build-up of substances such as dopamine, serotonin, and noradrenaline is possible as amines are also metabolized with the same enzyme. As it is well documented that high serotonin levels are found in dementia, Alzheimer's, and Parkinson's disease, this remains an unlikely cause of Autism. Unless further research creates a stronger connection, it remains safer to vaccinate a child than not. Consistent with the question of whether there is a peculiar or unusual immune reactivity when a child is younger, waiting till a child is 3 or 4 could not be faulted, but with ongoing measles outbreaks occurring at times, it is not something easy to recommend routinely at this time.

Another difficult position to address, is the possible role of fungi in the pathophysiology of Autistic dysfunction. Candida albicans is arguably the single most important fungal pathogen. Because it is a commensal organism present in virtually all human beings from birth, it is ideally positioned to take immediate advantage of any weakness or debility in the host, and probably has few equals in the variety and severity of the infections for which it is responsible. Clinically, there is abundant inferential evidence that both mucocutaneous and systemic candidiasis are typically associated with defects or weaknesses in the cell-mediated immune response. They may reflect specific deficiencies in this context, such as in chronic vaginal candidiasis, or chronic mucocutaneous candidiasis. (One must note, that while one might anticipate neurocognitive dysfunction in these states, it is not a primary focus of discussion. Significantly, these states do not account for or induce an "Autistic" state of CNS dysfunction, seemingly due to negate many metabolic theories that abnormal metabolic products, seen in exceptionally high volume in these type of patients, induce Autism.) Epidemiological studies of C. albicans have been hampered by the lack of precise and reproducible methods for identifying isolates. Whatever the ultimate role and pathogenesis of Candida, there seems to be no doubt that it can play a role in many pathologic conditions. Yeast is certainly a potential pathogen in any immune dysfunction/dysregulated state. Yeast may be seen as a secondary phenomenon due to a generalized immune dysfunctional state. A yeast "overgrowth" in the GI tract can interfere with nutrient absorption, altering Amino Acid and protein metabolism and thereby altering multiple body functions. I do believe that it is logical, if you are in an immune dysregulatory state, you may get an overgrowth in the G.I. tract. It is likely Candida may play a role in what is referred to as the "leaky-gut" phenomenon. Some physicians believe you actually have a toxin released by the yeast and absorbed into the body, affecting the nervous system.

Clinical Manifestations

Typical characteristics include:

- a) nondeveloped or poorly developed verbal and nonverbal communication skills
- b) abnormalities in speech patterns
- c) impaired ability to sustain a conversation
- d) abnormal social play
- e) lack of empathy
- f) an inability to make friends

Also frequent seen are:

- g) stereotypic body movements
- h) a marked need for sameness
- i) very narrow interests
- j) preoccupation with parts of the body
- k) changes handness or becomes ambidextrous, as they turn autistic.
the very thing that does them damage. They do this not only with foods, but also non-
food items they ingest, mouth suck or chew (e.g. metal, plastic, perfume, soap, plastic,
etc.). Nearly all autistic children become picky eaters at the time they "change," eating
only a few different foods and both craving some and avoiding some. Some autistic
children begin to eat non-foods items with notable immoderation. There has been
speculated that diet may effect other factors of the body. In a double blind placebo
controlled trial children were put on a restricted diet for a period of three to four weeks.
The foods allowed were two meats, two carbohydrate sources, two fruits, a range of
green and root vegetables, bottled water, sunflower oil, and milk free margarine. The
child’s preference was taken into consideration, and suspect foods or foods the child
craved were avoided. Worsening of behavior was connected to all relapses with
reintroduction of foods, except for four relapses caused by cow’s milk and two by
cheese, which produced physical symptoms only. This trial proved diet can contribute to
behavior disorders in children, and that their parents were able to report on a behavior
change caused by food that could be reproduced in a placebo controlled trial. Although
the way in which the diet works is not clear, allergic, toxic or pharmacological
mechanisms may be involved. It is possible that diet (foods) ght induce changes in brain
perfusion similar to those found by Lou et al. reporting on attention deficit disorder.
Many parents have commented after just the initial food/dietary phase, that their
children had become more manageable and more amenable to reason. Some to the
extreme of beginning to talk, that did not talk before. One should not underestimate or
ignore the potential reactivity of the immune system, and various foods, proteins,
peptides, or other sensitivities. If a parent notices a good effect from a diet elimination,
effort should be made to support the family in their search for other “logical” exclusions.
Again, unlessthere is another significant jump, “extremes” are usually not necessary or
expected. (Note: My experience thus far has shown inconsistent/scattered levels, with
illness. While the levels of the autistic children were high, they were not as high as
expected. (Note: My experience thus far has shown inconsistent/scattered levels, with
infants and children with autism frequently have an
impaired immune function: high levels of INF could impair the immune function.
Also, children with autism have higher pain thresholds,
and elevated endorphins in their cerebral spinal fluid. INF can activate endorphin
receptors and is a potent analgesic. In addition, INF has been reported to contribute to
autoimmune disorders and allergies. An increased incidence of antinuclear antibodies
has also been reported in these children. Children with autism frequently have an
impaired immune function: high levels of INF could impair the immune function.
In a preliminary study, 10 autistic children were tested for their level of serum INF. All 10
children with autism had a higher incidence of serum INF than the control adults.
Normally, levels of INF are not detectable unless one had an infectious disease or
illness. While the levels of the autistic children were high, they were not as high as
expected. (Note: My experience thus far has shown inconsistent/scattered levels, with
some autistic children being high, while others are low or normal. Interferon could
possibly be a potential marker to distinguish different groups, but is routinely subject to
multiple influences.) Other preliminary evidence suggests that a subgroup of autistic
children have elevated levels of other cytokines (INF is considered a cytokine, a soluble
substance that is secreted by cells that affects other cell functions). It is this author’s
opinion, that the "true" pathophysiology lies in these other cytokines, rather than alpha
interferon. Research is urgently needed to sort these factors out and open new doors
for potentially dramatic therapeutic changes within the next year or two, longer if not
pursued urgently and correctly now.
William Shaw, Ph.D., presented Organic Acid testing which showed abnormal
metabolites in the urine of autistic children. Closely resembling normal products of
metabolism, these metabolites are presumably toxic and may interfere with normal
cellular energy production. Also, an increase in the yeast-specific sugars arabinose and
arabinitol has been found. Several explanations are possible:

a) These metabolites are due to a metabolic block caused by a new inborn error in

symptoms may be caused by a serotonergic defect involving the basal ganglia. Several
drugs which either enhance or block the action of neurotransmitters have been looked at
in Autism and other neuro-processing disorders. Haloperidol (Haldol) is a
dopaminergic blocking agent Diphenylbutylpiperidene (Pimozide or Orap) is a dopamine
antagonist Methylphenidate (Ritalin) may enhance CNS catecholamine (dopamine and
norepinephrine) release from sympathetic nerve terminals and cause inhibition of re-
uptake in the caudate nucleus Clonatre (Catapres) is a alpha-adrenergic agonist
Trycyclic antidepressants inhibit the uptake of neurotransmitters at adrenergic nerve
terminals - this results in an increase of monoamine neurotransmission. Clomipramine
(Anafranil) and Fluoxetine (Prozac) are selective inhibitors of serotonin re-uptake in the
CNS Naltrexone - an opiate antagonist

Also at the Las Vegas conference, Dr. E. Gene Stubbs hypothesized that interferon
alpha (INF), a product of many cells, but especially cells of the immune system, may be
a major factor in the cause of autism. When INF is given in large doses to children
"true" pathophysiology lies in these other cytokines, rather than alpha
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metabolism, these metabolites are presumably toxic and may interfere with normal
cellular energy production. Also, an increase in the yeast-specific sugars arabinose and
arabinitol has been found. Several explanations are possible:

a) These metabolites are due to a metabolic block caused by a new inborn error in
metabolism analogous to PKU.
b) These abnormal metabolites are produced by systemic or gastrointestinal yeast in the human host due to yeasts overgrowth caused by a deficiency in cellular immunity and/or extensive antibiotic use. If so:
  1. These metabolites are toxic and may be involved in causing autism and/or worsening some of its manifestations.
  2. These abnormal metabolites are produced by yeasts in the host but are non-toxic and their presence is insignificant.
c) The abnormal metabolites are fake due to yeast or microbial contamination of urine. (This last possibility is not very plausible because the normal children only excreted very minute quantities of these compounds in their urine.)

Dr. Shaw's test may prove valuable in the diagnosis and/or treatment choices in autism. THIS AUTHOR'S CURRENT POSITION ON AUTISM: It has been my direction to "backdoor" into working with Autistic children (and other learning disorders). While ADHD (Attention Deficit Disorder) caught my interest in medical school and during my Pediatric training in the mid-seventies, we had very few answers, and very little objective data to make decisions on within the field. Therapy was very "symptomatic" with little understanding or knowledge of the physiologic events occurring within the brain. During this time, Autism was considered a psychiatric disorder, with most children assumed to be "untrainable" or "barely" trainable, to have low IQ's, and little reason, if any, for optimism in the future.

In 1983 my wife came down with an undefined illness, marked by recurrent flu symptoms, fatigue, sore throat, cervical lymph glands, and, as was ultimately noted by researchers studying my wife and other adults with this disorder, cognitive dysfunction, characterized by short-term memory loss and decreased "processing" ability. While desperately trying to figure out how to help my spouse, and by that time other "mothers" and children within my practice, I took a strong look at the principle of nutritional supplementation and amino acid metabolism. During this time, some Autistic children were referred in from West LA. To my surprise, upon testing they had "Candidate" users higher than most patients I was evaluating at the time, and Amino Acid profiles with many similarities to those I was seeing in other patients, with this "mysterious" new phenomena. As I was already beginning to view this phenomena as "immune system" related, it made no sense based on all previous teaching, What did Autism have to do with these answers to emerge, and then years longer for testing of potential agents to develop/occur and gain approval; thanks to research of the last 10-12 years there are agents developed as "immune-modulators" which can "adjust" various cytokine levels and other factors. However, these newer, generally extremely safe pharmaceutical agents, cannot be used without first establishing a "justified" population to try them with. While the literature and my personal experience and observations supports without question the concept of an "Immune Dysregulatory" dysfunction within Autism, there exists no solid, medically valid publication, showing "controlled" differences in Autistic Syndrome children. Within my own practice, in running a series of tests including Immune markers and general function, viral titers/exposure, general chemistry and metabolic markers, one sees informally the branching of this group of children labeled "autistic" into at least 3 patterns, maybe more. It is important to define appropriate metabolic and immunologic markers/parameters, so that we might better separate and understand children's different response to therapy, etc.

In reality, most "anecdotal" reports of "successful" therapies for autistic children can be understood through the concept of a dysregulatory immune System and/or altered metabolic sensitivities and dysfunction. In fact, I would dare say that the only unanswered question in this concept is whether one will be able to correct all neuro and metabolic abnormalities via "Immune-Modulator Therapies", or whether there will be a need for combined Immune and Metabolic approaches over time. Seeing children make dramatic cognitive progress on modified Elimination diets, anti-fungal therapies, and anti-viral/immune active therapy heightens the urgency to move forward into controlled trials with definable markers. With the recent recognition of the fact that if the brain "misses" certain stages of development, you may never make that up fully in the future, the urgency of helping these children can not be overstated. As noted above, we can "accelerate" the medical/therapeutic process greatly, but only if approached with the correct resources and manner. In the meantime, there is some logic worth following in approaching a child therapeutically at this time. To start with, it's always best to start with the concept of removing "negatives", clearing away "debris". In that position, removing potential food sensitizing agents makes sense, is any agent/protein stimulating a negative immune reaction in the body will create more CNS dysfunction, via the Neuro-Immune pathways. It is logical to attempt to normalize a

In addition to the articles noted above, there are many papers already in the literature, noting various immune abnormalities or potential markers. With each passing day, there is less reason to doubt the potential significance of this for "Autistic" syndrome children (?? all or some) and probably other cognitive learning disorders. While metabolic factors certainly play a role in these children, and need to be approached and understood far better than they are now, it is extremely unlikely that the origin of this dysfunction lies in a metabolic/genetic defect as we currently understand them. At this time I would propose that these metabolic abnormalities are secondary to a dysfunctional body. A process affecting the mitochondria (energy factories) of potentially all cells in the body. It seems likely that the linkage here is a dysregulated immune system, and the effects created by "out of control" cytokines. As noted above, the ultimate origin or etiology may lie anywhere from genetic factors, a "genetic disposition", to viral, retro-viral, or "other" environmental factors. The good news is that patients do not need to wait years for these answers to emerge, and then years longer for testing of potential agents to develop/occur and gain approval; thanks to research of the last 10 -12 years there are agents developed as "immune-modulators" which can "adjust" various cytokine levels and other factors. However, these newer, generally extremely safe pharmaceutical agents, cannot be used without first establishing a "justified" population to try them with. While the literature and my personal experience and observations supports without question the concept of an "Immune Dysregulatory" dysfunction within Autism, there exists no solid, medically valid publication, showing "controlled" differences in Autistic Syndrome children. Within my own practice, in running a series of tests including Immune markers and general function, viral titers/exposure, general chemistry and metabolic markers, one sees informally the branching of this group of children labeled "autistic" into at least 3 patterns, maybe more. It is important to define appropriate metabolic and immunologic markers/parameters, so that we might better separate and understand children's different response to therapy, etc.

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As a pediatrician, I feel it is very important and logical to provide and replenish the body's basic nutrients. However, at present, parents must approach this area with skepticism and caution. There are no controlled trials showing appropriate dosing or long-term safety of many "harmless" agents. While there is logic in the concept of nutritional, "supportive" approaches, there are dangers and there are product concerns (re absorption, purity, over-dosage, etc.). Any nutritional manipulation in children is open to dangers or new-induced metabolic problems, vs. potential gains. It has been this author's experience that megadosages usually seem to provide little if any gain vs. risk, and that any "extreme" is subject to many problems in children. Basic replenishment certainly includes a good basic vitamin / mineral / fluoride supplement, additional Iron, Ca++, Mg++, Zinc++, as indicated, a diet high in protein (the source of natural amino acids, the "building" blocks of the body), low in sugar, good nutritional value, but for the concerns of allergy reactions or sensitivities, best to avoid whole wheat, whole grains, "health-food" store eating. A product such as Nu-Thera, nutritional value, but for the concerns of allergy reactions or sensitivities, best to avoid a "negative" if one expects to adequately evaluate "positives". While there have been many "metabolic" approaches and remedies discussed over the years, there must be a far greater effort at controlled trials before any "special" approach or product can be endorsed. If a parent can be sure of no harm, then cautiously trying some of the products or supplements out there may be useful, but must be evaluated closely on an individual basis.

As diet plays a large role in the control of Candida, reducing sugars, wheat products, and other yeast promoting foods is logical within reason. In general, I do not see enough clinical gain to justify "extreme" approaches via diet. There are some children in which "extreme" diet eliminations or adjustments may be logical. Once basic diet needs are met, there seems good logic, although again very little "hard" medical data, in looking at some type of anti-fungal/anti-Candida approach. (Tests that are being developed may help monitor therapy progress with quantifiable markers in the future.) I prefer a trial of Nizoral (Ketoconazole), using as indicated Diffucan, oral Amphoterocin B, and occasionally Nystatin. While logical to continue if clinically successful, care must be taken to monitor these medicines appropriately, and likely "rotate" around, not stay on any individual medication for too long a time period. Along with medication, it is obviously beneficial to avoid sugar loads (e.g., fruit, fruit drinks, candies, sugar containing soda, etc.), but, as noted, I do not believe it is necessary or overall beneficial to go to "extreme" diets. Again, follow an approach of common sense. Solving the "yeast" problem is not the answer to Autism, and yet in some children it may be very helpful. Therefore, a therapeutic trialchanging one variable or treatment approach at a time - a critical concept for all therapeutic changes or steps for any child) is justified per the above discussion.

Until "controlled" groups are identified and therapies evaluated, any therapy is antedotal. I encourage each parent to look upon their child as their own control. It is critical to be patient and allow enough time to thoroughly evaluate an agent for "gains" or "losses" (to this author, one should not continue using any agent which introduce "negative" and should avoid or approach with great caution, any agent with potential negatives). With the appropriate urgency to help these children, it is nevertheless a great mistake not to "organize" your approach and proceed logically, with time for appropriate judgments along the way. I would again stress the need to remove identifiable "negatives" if one expects to adequately evaluate "positives". While there have been many "metabolic" approaches and remedies discussed over the years, there must be a far greater effort at controlled trials before any "special" approach or product can be endorsed. If a parent can be sure of no harm, then cautiously trying some of the products or supplements out there may be useful, but must be evaluated closely on an individual basis.

I have great hope for the possibility of what are called "immune-modulators". The antedotal reports of success with DMG (an apparently good product at "low" dosing) and Isoprinosine (?? Success) are examples of agents working via the immune system. Zovirax, an anti-viral agent I have used with some children positive for Herpes viral titers, may be successful via an anti-viral effect, or an unrecognized immune-modulatory effect. As noted, most successful antedotal therapies are explainable or understandable through the immune system. With acceleration of efforts, it is this author's hope that "controlled" trials with newer, medically developed "immune modulators" might be possible in the near future. Until that point, an overall approach, looking at maximizing the health and function of any individual patient, remains helpful to many children. While always feeling the overall approach is far more constructive by eliminating negatives, and "positively" helping the body via supplement or immune modulators, once one has done the best possible at present with what is available and useful, there are existing "medications" that may offer help, some of them perhaps even "positive" metabolically.

As controversial a term as it might be, Prozac, at low dosages, may have a very beneficial effect on cognitive functioning and sleep cycle (off in so many of these children) via its serotonin mediated effects and by increasing blood flow, particularly in the temporal lobe/limbic system areas. Paxil and Zoloft are in this class of SSRI's (Serotonin Re-uptake Inhibitors) which may be particularly useful in the child who seems to space out a lot, loose focus. On the other hand, the child who comes across as very hyper, if continuing to be so after dietary trials and therapy approaches noted above, may do very well with the help of Catapres (preferably via the patch rather than tablets), or the older children with a low dose of Cyfert. Opioid blockers such as Naltrexone may play a constructive role in some patients, but have not been investigated or pursued much by this author to date. While the goal must be "normalization" of the body by directed therapy, some of these agents can be useful if used judiciously and appropriately.
It has been my privilege and pleasure to see many children improve substantially by the above measures. This has only increased and emphasized the need to take these approaches into controlled trials, and to hopefully make possible the introduction of new agents in a very short time. In the meantime, work with a physician or therapist that will work with you and your child. Go slowly, with a concept that when things are better, it takes time for the brain and body to change physiologically. Look for combining and building upon safe approaches and your child’s “positive” clinical responses, being careful not to create “negative” effects or to act too quickly to document changes. Any parent’s anxiety and desire “to find the answer for their child” is understandable and commendable, but at this point, slow/progressive clinical observation and trial is the best probability of success, while we hopefully speed up the day of new therapy’s and understanding. I might add that this is not a “pipe” dream or need be 5 - 10 years off. Agents exist now that may have tremendous potential to help. They can become available for trial, as soon as medically credible protocols and justification exist. There are a lot of us trying to make this happen.

We all know it is time, we all know it should happen. We need to make it happen, for all of you as parents, physicians, and children.

Michael J. Goldberg, M.D.

Addendum:

Literally, as each day and month passes, we are losing children who by all recent indications, are both “savable”, and likely “recoverable” if dealt with soon enough. At a critical time like this, there is a general slowness in approach, with debate raging louder between Immune and Metabolic schools of thought, and the “no” medical problem thinking of most of “Academics” still. Sadly, much of the accelerated attempt of funding patients are fighting for, will be spent pursuing “more of the same” rather than looking at the new possibilities for the future. At a time like this, with technology and new biomedical advances at our disposal, there is only one way to succeed (I define “succeed” as make advances in therapy for “autistic” syndrome children). If we do not make use of tools and techniques that have evolved in the last five to seven years appropriately, and at academic, peer-reviewable levels, we will never succeed in changing the pace of therapy for these children. Happily, as I know word is beginning to circulate, I am attempting to initiate a controlled cytokine project, in an attempt to open the door for major therapeutic change within twelve to eighteen months (sooner if resources mobilize faster).

There are many advances possible now, but they will NOT occur/succeed unless data and studies are done at a peer-reviewable level (clinically designed and coordinated to speed up the emergence of new ideas, new concepts). Any other efforts will ultimately be more “spinning of wheels”.

At the DANN conference in Dallas, January 1995, there was a wonderful coming together of ideas and exciting new directions, but a sad split between “metabolic” and “immune” camps. Also evident was the absolute “distaste” for the mention of academics. I stand strongly behind the convictions expressed above. I would politely challenge anyone to produce a model that has succeeded for any disease in the past, without ultimate evolution and definition by defined studies, acceptable at Academic levels.

Without objectivity, no therapy can be appropriately evaluated, nor will new therapies (already in existence) become accessible. While metabolic vs. immune discussions are interesting, the only major change on the near horizon, will be if the idea of immune-modulators (agents already in existence, but for which we must provide an objective basis to open the doors to their usage) can be tried, and is optimistically successful (many researchers I have been involved with over the last five to ten years, believe success is likely, but remain skeptical till proven). While we “debate” other ideas and options, I believe it is urgent to accelerate efforts to make possible testing of these agents in autistic syndrome children as soon as possible! As noted, with increased discussions already appearing relating to “auto-immune”, “inflammatory”, origins for “sub-populations” of children, I would propose without hesitation, that “immune-modulating” agents if effective, will be far safer than steroids or other agents nodiscussed, and needless to say, a better alternative than discussing surgery or severe behavior therapies for these dysfunctional children.

Examining the last ten to twelve years, it has become obvious we are looking at new patterns of disease and illness, that do not fit previously described syndromes, etc. Attending conferences over the last 7 years, being exposed to many “cutting edge” technologies and ideas, one trend emerges. We are looking at a process, appearing to decrease flow/function in the temporal lobe of the brain (other areas may be affected, but the temporal lobe I would propose is the key and common denominator in this process) affecting individuals differently based on their age, and maturation of their immune system.

The common denominator making sense through these discussions has been the immune system and a state of “dysregulation”.

I would propose to all of you, that while many metabolic and other phenomena, make sense when thought of in a state of or propensity for immune activation/dysregulation, no known pediatric or adults metabolic process makes sense as a model for a “primary” metabolic defect in these children and related patients. Therefore, while we may to some degree help the body metabolically, develop new markers, and even answer some very interesting questions over the next ten years, we are unlikely to make major medical changes or even approach a cure while focusing on and dealing with what appears to be “secondary” metabolic phenomena, explainable fully by altered cellular metabolism (a fact brought out in many respectable articles over the last 5 years, and accepted at NIH/Academic levels, etc.). This is a dysfunction that is logical secondary to altered cellular mitochondria and immune reactive phenomena. In this light, why are many physicians and researchers trying to “reinvent the wheel”, when there are models and evolving technologies explaining all we are discussing logically and with more and more factual physiology. Because, there are still gaps in the above physiologic...
understanding, basic science will still take (if left alone) probably five to ten years to get into any meaningful therapy discussions. These children do not have "years" to wait. Dr. Gupta and Dr. Nancy Klimas (Univ. of Miami), are ready to finish and proceed with a protocol to do a controlled study of cytokine levels in "Autistic" syndrome children. These are professors, who if the study is successful, would be unchallenged at the NIH, Academic levels, many have come to disdain. And yet, as I tried to say at the DANN conference and in many other discussions, if we do not move at "Academic" levels, few will listen, and little will really be done. If we do not unite as physicians and patients to speed up funding for at least the basic cytokine project, we are as guilty as the "establishment" at slowing up, rather than speeding up this process.

Potentially worse, as this "epi-phenomena" has grown, there are more and more desperate parents and suffering patients. As noted above, sadly, while there is the potential to bring into play safe, essentially non-toxic medical agents, physicians and researchers are turning to "old" ideas, (i.e. steroids and other potentially toxic metabolic agents) instead of looking at newer and safer ways to treat this phenomena in children (and adults). In addition, while agents like Prozac and Paxil have the ability to actually help the brain if used physiologically (at low dose they can increase temporal blood flow, and work as very mild immune modulators), physicians, as has been done in the past, are using medications at non-physiologic dosages and accepting multiple side effects or partial results, because something seems like a good idea. As much as I have become an advocate of Prozac and Paxil, this has come only after understanding that they could serve a role in normalizing CNS function, and were very safe class agents if continued. However, I do not believe this or any other currently available agent is going to be successful without an "overall" sound metabolic, nutritional, and immune approach prior to its usage. Likewise, even with the potential emergence of immune modulating agents for therapy, I am not sure whether they will be effective by themselves (as implied by some) or need to be used in a "combined" approach, something that could be designed into controlled trials, if we have the right input and "control" (this is not the usual way Academic's or Drug companies have wanted to design or fund trials in the past).

Watching this "epi-phenomena for the last ten to twelve years, other factors are obvious. If patients are not appropriately identified by scientifically validated markers, we will never sort out or be able to understand the reasons why different patients respond to different agents (pharmaceutical, nutritional, metabolic, etc.). The truth is what we call Autism, ADHD, CFIDS, etc. are all "heterogeneous" populations, in which any drug or therapy trial appears doomed to frustration and failure, without newer, appropriate "objective" markers. At the Dann conference, the idea that we needed to pursue Academically acceptable studies at peer-reviewable levels, was met with very mixed feelings, and some open hostility. Without this approach, I challenge anyone to tell me how we are going to have significant impact for patients on the medical establishment. In fact, unlike the past, the situation with "restricted" medicine and "fixed guidelines" by HMO and insurance companies, is going to deny care to these children and unless we all help prove the system wrong. Unlike the past, there are ways to do that now that did not exist.

As noted, parents are desperate, reaching for straws, and may be directed or advised into long-term negatives, rather than gain. A metabolic dysfunction by altered cellular metabolism and immune dysfunction, is not likely to correct by any excess of agents introduced to the serum of the bodies. A backup of these agents, may, as noted, be in itself toxic. Along with others, I have been looking at the idea of an agent called Trental. In theory, it could be an excellent temporary agent, but I have yet to be able to get an answer, regarding long term safety for children. Any therapy proposed must be safe without a doubt. Many of the physicians at the DANN conference had questions with respect to some current therapy usage, and many of us are aware that while some agents may be helpful, some can be toxic, even those called nutritional or metabolic.

To all of you reading this, I apologize for the "personalized" emotion of this last entry, but it has become obvious that with time, many of the negatives expressed above are happening to children, and if appropriate steps do not begin, the future remains ominous for most of these children. While much of "mainstream" medicine remains convinced that many of these children are retarded, it has become evident that at least currently, most of these children are very bright, and their dysfunction is likely a medical problem, unlike any routine disease process in the past, but just as logical, and optimistically, just as treatable.
AUTONOMIC NERVOUS SYSTEM AND ENERGETIC MEDICINE

Bioenergetic and Psychosomatic Causes for Health and Illness


Translation by Christine Genrich

1. INTRODUCTION

This talk evolved from another one I held in January of 1991. Back then; I was wondering what special contribution towards body therapy I had to make, based on my daily work as a medical doctor with Reich’s method. Case studies, emotional discharge techniques, theoretical concepts of the work - it all seemed right, just not my subject. Thus, I tried to recall how I had “come to Reich”.

I was in the middle of medical school and for years had been learning all sorts of illnesses and symptoms by heart. But the question of how illness actually develops was never raised in my studies. We only dealt with the “damage” and how best to repair it - almost like with a broken car, which won’t run any more because the individual parts were just not built very well. With many diseases, I came across remarks like “etiology unknown” or “auto immune disease”. The big questions - what exactly is the meaning behind the term “auto immune disease”, where does cancer originate, how does cardiovascular disease develop - remained unanswered. And at first glance, alternative medicine did not seem too convincing either - instead of pills they used the acupuncture needle, the homeopathic drugs or healing herbs, all too often administered within a doctor’s general practice without sufficient knowledge of the system of thought behind it. Once again they were just putting together the symptoms (with somewhat less dangerous means) instead of searching for the cause. Psychosomatic medicine became excluded as some sort of marginal science, and referred everything only to the psyche, without offering a holistic concept for the body and mind.

That I only found when studying Wilhelm Reich’s writings. He spoke of unobstructed pulsation, the meaning of sexuality, functional identity of body and mind. I became “hooked on Reich”, one concept which saw a person within his social context, and which offered a radical psycho-somatic model without reducing body to psyche or vice versa.

Therefore, I do not want to speak too much about body therapy itself, but rather about Reich’s concept of health and illness, with health meaning not merely the absence of physical symptoms, but also mental well-being. I’d like to explain what orthodox medical concepts Reich’s model is based on, and especially elaborate on the function of the autonomic nervous system. I will then elucidate Reich’s understanding of health as unobstructed pulsation, as well as the term “biopathy”. With regard to individual diseases, I will then describe impairments of the autonomic nervous system, and illustrate which techniques we use in body therapy to exert influence upon the autonomic nervous system, the morphological basis of pulsation, in order to stimulate and support the healthy functioning of the whole human organism.

2. AUTONOMIC NERVOUS SYSTEM

2.1. Definition of the Autonomic Nervous System (ANS)

In context with his works on sex-economy in 1934 through 1938, Wilhelm Reich researched the biological basis for sexuality and anxiety. Doing so, he recognized the ANS’ central importance as an interface for bodily and emotional processes: on the one hand, it is closely connected to the functions of internal organs; on the other hand, it serves as a messenger for emotional perception via blood and plasma streams, and is linked to the cerebral areas which represent emotion through connections in the central nervous system. According to Reich, body therapy involves working with the somatic and the psychological systems simultaneously. The emotional energies are released from the character and muscular “armor”, as he called it.

Due to the ANS’ great importance, I would like to elaborate a little further now upon what it actually is, how it works, and its relevance regarding health and disease.

The autonomic nervous system is part of the human central nervous system (CNS). The CNS is basically made up of three sections, the functions of which closely interact. One part manages voluntary movement, the muscle system’s response to various stimuli from the environment; this part is called motor nervous system. Another part processes information from the sense-organs, such as eye, nose, or sense of touch, into conscious perception; it is called sensory nervous system.

The central nervous system’s third section - the ANS - coordinates the internal organs’ functions. It originates from the brainstem and the spinal cord and includes the nerves, which innervate the smooth muscles of the internal organs, heart and glands. The regulative cycles of the autonomic nervous system are tightly entwined with those of the other two sections, causing numerous interdependencies between the individual systems.

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fig. 1: structure of the nervous system

There are two substructures within the autonomic nervous system, the sympathetic and the parasympathetic, which originate from different areas in the brainstem and spinal cord, and also respond to different biochemical transmitter substances. They both regulate the internal organs by stimulating or inhibiting their activity in a co-ordinated fashion.

The autonomic nervous system can virtually not be controlled consciously; hence the name. We cannot consciously manipulate our internal organs, such as altering the heart rate intentionally.
2.2. Function of the ANS

Most internal organs receive innervation from sympathetic as well as from parasympathetic nerves. Both portions of the ANS are active at the same time, but to a different extent. Their combined influence upon an organ is of opposing, but balancing antagonistic nature, meaning that the predominance of one system can inhibit a certain function, whereas that of the other system would stimulate the same function. Increased activity in one of the two autonomic systems inevitably causes an activity decrease in the other, but without ever completely disabling it. It is therefore impossible for an organ to be under maximal sympathetic and maximal parasympathetic influence at the same time, one can only dominate at the expense of the other. This is the equivalent of the interdependency of the organs’ so-called Yin and Yang states in Chinese medicine.

Let us have a closer look at autonomic nervous activity with regard to the smooth muscles of some internal organs: sympathetic innervation of the heart, for instance, results in an increase in frequency, whereas predominantly parasympathetic stimulation decreases it. This example clearly shows that the heart cannot be equally stimulated by sympathetic and parasympathetic impulses, because that would mean it had to beat fast and slow at the same time. But the options are not just “heart racing” or “cardiac arrest” either. The frequency increases or decreases according to the prevalence of one or the other influence: the inputs of both systems are balanced with each other.

With the intestines, parasympathetic innervation causes the intestinal muscles to move more, sympathetic innervation slows down their activity. The bronchial muscles contract with parasympathetic stimulation and relax with sympathetic stimulation. In the eye, sympathetic activity results in the pupil’s dilation by sending impulses to the respective intrinsic eye muscles, and parasympathetic innervation causes the pupil to constrict.

Thus the functional condition of an organ that is innervated both sympathetically and parasympathetically always depends on the balance of activity between both. The determining factor, however, is the predominance of the stimulating or the inhibiting aspect of the autonomic nervous system with regard to that particular organ.

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+ Activation; – Inhibition; Ø no effect

fig. 2: origins and distribution of peripheral autonomic nerves[1]

| tab. 1: effects of sympathetic and parasympathetic activation[2] |
2.3. Effect of the ANS on the Organism in General

So far, we have dealt with the ANS’ effects on individual organs. But we can also characterize an entire organism in terms of sympathetic or parasympathetic disposition. Here, the organs are not examined individually, but in their entirety. Depending on the organism’s needs, they are activated to achieve a certain task together; they all cooperate in order to fulfill that demand.

Exposed to outside stress, for instance, the body shifts into a “defense mode”, maximally activating its sympathetic system. Respiration increases, the pupils become dilated, and in animals bristling of the hair on the nape of their necks can be observed as well. Blood pressure, circulation in the muscles, and heart rate increase, while intestinal circulation and motility as well as skin circulation are reduced. Everything is focused outwards here. Triggered by that outward stimulus, the whole organism shifts into a mode of gathering all energies inside in order to prepare for attack or flight (therefore also called “fight or flight reaction”). It contracts and is in an overall state of tension. W. Cannon calls this “emergency reaction”. It can happen, for instance, when you are having an argument with your boss: in situations like that, your sympathetic system is maximally activated.

In contrast to defense behavior, there is feeding behavior. After the ingestion of food - as we all know from experience with ample meals - parasympathetic impulses prevail. Attention is withdrawn from the surroundings, we become sleepy, intestinal activity increases, and the abdomen with its digestive organs receives more blood. Circulation in the skeletal muscles decreases, as do blood pressure and heart rate, the pupils constrict. Here, the organism does not contract, but expands energetically outwards and is in a state of relaxation. On the other hand, attention is directed inwards.

Reich’s definition of health is based on a creature’s ability for rhythmical oscillation between those two modes, its contact with the environment and the focusing on the inner state of being. Reich calls this basic function “Pulsation of the Living”. Thus, he does not define health as the absence of symptoms, disease or impairments, but rather as a function of the correlation between inner and outer world. In other words, an organism’s ever-changing, pulsing confrontation with itself and its surrounding world.[3]

The oscillation between the two modes of the autonomic nervous system also exerts a crucial influence upon the body’s hormonal and emotional wellbeing. Via constriction and dilatation of blood vessels, sympathetic and parasympathetic activity has great influence on the movements of fluids and plasma within the body, which to Reich are the basis for emotional perception. The flow of liquids can either be from the center to the outside (expansion), or from the periphery towards the inside (contraction). The feeling of pleasure is functionally identical with unobstructed pulsation, the feeling of anxiety with impaired pulsation of the autonomic nervous system.

The ANS is also tightly interwoven with the “muscular armoring”. Chronic muscular tension impedes the stream of body fluids, and impaired pulsation of the ANS manifests itself in chronically tense muscles.

The two constantly interacting systems of sympathetic and parasympathetic activity cannot be functionally separated; only their cooperation renders possible a harmonic functioning of the whole organism[4]. “The life process takes place in a constant alternation of expansion and contraction”[5], i.e. pulsation.

“If this biological state is disturbed in one or the other direction, that is, if either the function of expansion or that of contraction predominates, than a disturbance of the biological equilibrium in general is inevitable. Long continuation in a state of expansion is synonymous with general parasympathicotonia; conversely, long continuation in a state of anxious contraction is synonymous with sympathicotonia.”[6] W. Cannon calls the equilibrium between both conditions “homeostasis”.

3. BIOPATHIES

In traditional medicine, we often regard illness as if the symptom develops out of the blue in an otherwise healthy body. The doctor becomes a bio-technician who repairs the damage. Reich’s understanding is that illness develops when the whole organism’s natural pulsation is disturbed. But, in our understanding, it is the whole person who is ill, not only one of his parts.

This does not imply orthodox medicine is worthless, but its value depends upon certain conditions. With many diseases, orthodox medicine today cannot offer a valid explanation as to why and where they originated. This is reflected in the fact that terms like “essential”, “ideopathic”, “endogenous”, “genuine”, or “etiological unknown” are attributed to those diseases.

In Reich’s understanding disease develops whenever the whole organism’s natural pulsation is disturbed. Reich calls such a process affecting the autonomic vital structures a BIOPATHY. Thus, biopathy is a fundamental dysfunction of the autonomic nervous system. At first, it is a purely functional defect which concerns the entire body. Once in progress, however, it later on may manifest morphologically in various syndromes. Far advanced processes can cause „shrinking biopathy”, and subsequently cancer.

“The biopathy can result in a carcinoma, but also in angina pectoris, asthma, cardiovascular hypertension, epilepsy, catatonia, paranoid schizophrenia, anxiety neurosis, multiple sclerosis,
Huntington’s disease, chronic alcoholism and so on.”[7]

Accidents and typical infectious diseases are therefore not associated with a state of biopathy, since they are not based on irregularities in the autonomic vital structures, are limited and impair biological pulsation only secondarily. In the case of a disturbance of pulsation, the biopathy can „take the form of an emotional disorder of the psychological apparatus, i.e. neurosis or psychosis. But it can also directly affect the functioning of the organs and result in somatic illness.”[8] The functional disturbance of pulsation precedes the organic manifestation here. Thus, strong abdominal cramps may exist without detectible organic cause at first, but over time lead to morphological changes in the organ. Only then „illness” in the traditional sense becomes detectable.

The condition of impaired pulsation of the ANS is closely linked to impaired capability of sexual sensation. Obstacles in the process of bio-sexual stimulation cause disturbances in biological functioning. The organism’s ability to energetically charge and discharge is a basic function of living, which can primarily be observed in sexuality and the opportunity of discharge through orgasm. The quality of sexual pleasure is functionally identical with full autonomic responsiveness. If that ability is restricted, for instance by repressive sexual education during childhood, it can lead to impaired pulsation through a diminished possibility of the organism to charge and discharge. In sexual context, this means less arousal and limited orgasm capability. With regard to the whole organism, it results in impaired pulsation as a foundation for a biopathy.

A chronic sympathetictonus leads to the unpleasant subjective sensations as described by Reich: the body goes into some kind of inner “readiness for fight”, triggered by external or also internal stress or anxiety. But since there is neither fight nor giving the all-clear, the organism is trapped in this state; pulsation as described above cannot take place any more.

The chronic persistence of parasympathetic activity, however, does not necessarily feel any better: the organism is in a state of extreme relaxation, resulting in heavy fatigue, floppiness, and lack of energy. Digestive activity is high, causing diarrhea or stomach cramps. The bronchial muscles become spastic, leading to the sensation of not getting enough air, which in the extreme can result in a fatal asthma attack. So here, instead of readiness for fight, we have resignation and regression, internal surrender.

According to Reich, biopathy always starts with a chronic prevalence of contraction and inhibition of extension of the autonomic nervous system. In his clinical studies, he discovered that an organism’s chronic persistence in a sympathetically dominated mode, where per definition no more pulsation can take place, is perceived subjectively as unpleasant, as anxiety. This condition according to Reich equals a retreat from the world, as in fright. As described with “defense behavior” above, the skin grows pale and cold, the heart rate increases, as does blood pressure, the pupils dilate, the skeletal muscles are paralyzed or extremely tense.

Parasympathetic disposition, on the other hand, according to Reich emphasizes life’s pleasant sides, the “flowing towards the world”. With parasympathetic activity, the skin is warm and rosy, the heartbeat slow and strong, blood pressure reduced, the pupils small and the muscles relaxed, digestive activity stimulated, as described above with “feeding behavior”.

In my opinion, this definition of biopathy, as first described by Reich in "The Bioelectrical Investigation of Sexuality and Anxiety", is insufficient. The parasympathetic state appears as “good”; the sympathetic as “bad”. Anybody who ever suffered an asthma attack or migraine, both characterized by extremely parasympatheticotonic predominance, will hardly agree: they would have experienced those conditions as unpleasant, as being trapped inside themselves and filled with anxiety, not at all a pleasurable flowing towards the world.

This apparent contradiction in Reich’s findings can be dissolved by distinguishing the state of natural pulsation, with the organism fluctuating between parasympathetic/sympathetic activity according to time of day or outer necessities, from the state of being chronically stuck in either of the extremes. There are outer circumstances which make strong sympathetic activity by all means desirable: a cat catching mice, for instance, will surely have its attention focused on the outside, not at all relaxed, but not really unpleasantly contracted either. The same will be true of a racing driver during a race, or of a scientist doing exciting research. As soon as the external conditions change, the autonomic system will automatically shift into parasympathetic mode: the cat sleeps after its successful hunt, the racing driver and the scientist recover after having done their jobs and relax. We distinguish that kind of natural pulsation from chronic persistence in either mode.

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Accordingly, pulsation can be stuck at any place. More important than in which phase (sympathetic or parasympathetic) the pulsation has stalled is the fact that it has.

At their core, sympathetic and parasympathetic activity are functionally identical: the foundation for both is autonomic excitability. Reich also refers to this towards the end of his book “Sexuality and Anxiety”:

“The vegetative” (autonomic) “nervous system has the ability to contract and expand. From the middle position of vegetative” (autonomic) “equilibrium, it is able to move in the direction toward the world, (i.e., to stretch), or to retreat into itself, (i.e., to contract). It can also swing from one direction to the other or remain fixed in either of the extreme states. Putting it in somewhat simplified terms, the state of vegetative equilibrium” (autonomic balance) “is one where neither expansion positions nor contraction positions have become established.”[9]

There is another remarkable particularity about the ANS: not only can it fluctuate rhythmically between sympathetic and parasympathetic disposition, but the respective extremes can also blend into one another. An extreme and chronic sympatheticotous can turn into an extreme and chronic parasympatheticotous and vice versa. This is the reason why in situations of extreme sympathetic activity, like agitation before an exam, stress-induced diarrhea can occur (which actually indicates strong parasympathetic stimulation). Accordingly, one could say that permanent readiness for fight can turn into resignation, but also regression can turn into readiness for fight under increasing stress. This mechanism explains why an illness can be induced not only by persistence of one chronic state, but also by an irregular, uncoordinated “furious back and forth” between sympatheticotonic and parasympatheticotonic conditions.

In my opinion, a “healthy tension” is crucial for physical and psychological well-being. A state of balance is necessary within which the oscillation between the sympathetic and parasympathetic mode can go on unobstructedly from a centered position of the autonomic equilibrium. Unfortunately, due to stress and sex-economy-related reasons, we find rather a shifting from the neutral state towards the sympathetic, so that the relaxing function of parasympathetic energy cannot sufficiently come to fruition.

The American physician Robert A. Dew points out the fact that the biopathies can lead to non-locatable changes in the organism as a whole, such as hypertension, atherosclerosis or diabetes, but can also show up as clearly defined organic manifestations, such as gall stones or peptic ulcers. Dew developed a classification of biopathies in terms of increasing severity, based on the organism’s decreasing autonomic responsiveness[10]:

- health
- inflammatory diseases
- cardio-vascular diseases due to hypertension
- diabetes
- leukemia
- cancer

fig. 4: classification of biopathies

Following Reich, Dew views all diseases as primarily sympathetically induced (sympatheticotonia could almost be called a characteristic of our civilization). To Dew, parasympathetic symptoms are the autonomic system’s struggle to free itself from stagnation. If energy cannot be freely discharged through pulsation, it can cause different kinds of “break-throughs” (phases of exacerbation of illness) in the organism. If even these break-throughs cannot happen any longer, the organism responds with resignation or shrinking. Considering this, the exacerbation of illnesses can represent a sub-optimal attempt of the body to maintain at least some kind of pulsation of the ANS. It is the best possible try under the present circumstances.

Later on, we will go into more detail regarding the impact of chronically impaired pulsation on individual organs. Here, I would just like to point out once more that disease is created the moment pulsation is impeded or interrupted.

4. INFLUENCING PULSATION
4.1. Technique

Over the years, lots of different schools with different priorities and techniques have developed from Reich’s initial work. I will mention just a few techniques here, which are of relevance for my work.

The most basic technique in body therapy as developed by Reich is the stimulation of respiration. When breathing deeply and consciously, the body’s energetic charge is enhanced, over-tensed
muscles become more palpable and can thus be brought to awareness and worked upon. Depth of respiration also bears directly stimulating effects on the ANS' centers. Under stress, breathing is shallow and restrained, in relaxation deep and full.

In order to stimulate pulsation, we use immediate activation of the chronically contracted muscles. On the physical level, we act upon the autonomic oscillation through the activation of muscles. On the psychological level we analogically make withheld emotions conscious.

First, the patient must learn to feel his tension. Then it can be dissolved through various techniques. In order to achieve this, the muscular tension can be intentionally increased - for instance by exaggerating the respective facial expression, or by taking up stress positions developed by Alexander Lowen in Bioenergetics. By doing this, the sympathetic activity in that area is increased even more. The voluntary contraction of the muscles is to be maintained as long as possible, since the muscles' slackening results in a switch in autonomic activity. When the muscles in that area do relax, the blood runs warmly through them, and a sensation of relaxation sets in that can be accompanied by a feeling of inner flowing or unintentional muscle twitching.

Another possibility for stimulating pulsation is the immediate treatment of muscles and connective tissue by the therapist, as for instance in the Points and Positions Technique developed by Will Davis. Here, the dissolution of tension takes place by means of light pressure applied to the muscle insertions, tendons, fascia and the connective tissue, dissolving the status quo in favor of enhanced or deepened pulsation by influencing the connective tissue's substance ("Points technique"). Tension is also released by "going with the contraction of the muscle", holding the muscle in order to soften it rather than stretching it ("Positioning")[11].

Muscles may also be activated by means of movement. The shoulder muscles, for instance, can be well loosened by beating movements, the chin muscles by biting movements, the pelvic muscles by kicking. The patient can also be encouraged to "feel into the tension" himself, and find out what motor impulse is held back in there.

4.2. Expression and Emotion

The mere mechanical stimulation of muscular activity can only be successful in the long run if pulsation on the autonomic level is also maximally stimulated once more. This is related to increased blood flow on the one hand (increased circulation in muscle and skin) and to the dissolution of emotional blocks on the other hand.

Through their tension, muscles impair the flow of blood and body fluids. Upon dissolution of muscular armoring, one of the three biological basic excitations, as described by Reich, occur: anxiety, anger, or pleasure. Anxiety here arises from the withdrawal of energy into the body's interior, anger from the disturbance of the energy's pleasant streaming towards the outside, and pleasure from unobstructed flowing of the fluids with unobstructed pulsation. Therefore, by liberating the energy tied up in the muscles, cathartic experiences can occur with childhood memories and a renewed experiencing of early childhood emotions. During therapy, the unpleasant emotions will surface first, such as anxiety, anger and pain. But after living through these feelings, the capacity for pleasant sensations like joy, pleasure and surrender will improve.

5. EXAMPLES OF IMPAIRED PULSATION

I would now like to introduce five syndromes on behalf of many other somatic diseases. I will point out the respective underlying autonomic disorder that leads to that particular symptom. Following, I will explain the psychological characteristics displayed by patients suffering from that disorder, what kind of expressive movement can hide behind the symptom, and have a look at clues as offered by popular use of language. Finally, I will deal with therapy.

When the biopathy finds manifestation in localized organic disease, the question of the selection criteria that led to that specific symptom comes up. The reason for this is definitely a combination of various trigger factors. Genetic elements, intra-uterine development, the basic level of energetic charge, and character structure all figure into it. Character structure corresponds to a certain pattern of muscular armoring and emotional suppression.

The correlation between illness, autonomic disturbance, and a psychological component are known in orthodox medicine as well. There however, therapy usually means the prescription of medication which either only battles the symptom, or which influences the autonomic nervous system artificially and, unfortunately, only temporarily without restoring natural pulsation.

5.1. Hypertension

5.1.1. Causes

Hypertension is among the most frequent diseases in humans, and particularly widespread in industrialized countries. Its percentage growing with increasing age, it usually manifests at the age of 30 - 60 and accounts for 25% of all deaths after age 40. In the USA, hypertension and its consequences are the number one cause of death. A person's life expectancy clearly decreases with the rise of his average blood pressure.

Hypertension is defined by blood pressure rates above 165 mm hg syst. and 95 mm hg diast. (Measuring the arterial blood vessels' tension during the heart's contraction/relaxation). It usually does not cause any subjective complaints and is often detected only accidentally upon visiting the doctor. Hypertension is defined by blood pressure rates above 165 mm hg syst. and 95 mm hg diast. (Measuring the arterial blood vessels' tension during the heart's contraction/relaxation). It usually does not cause any subjective complaints and is often detected only accidentally upon visiting the doctor.
In animals, the epidemiological occurrence of hypertension does not exist, except in experiments involving immobilization stress, electric shocks, or in cats which had been exposed to the barking of dogs in a cage for months. Those animal experiments prove the stress hypothesis.

Another population showing a low susceptibility to hypertension are blacks in their native countries (low-stress lifestyle?), while blacks in the Northern USA display extremely high blood pressure readings (high stress environment?).

5.1.2. Pulsation of the ANS

We need to distinguish between chronic sympatheticotonia or biopathy as the precursor of a disease and the symptom’s occurrence itself. Hypertension is a very good example of this. On the ANS’ level, stress means sympathetic excitation, with the body preparing for fight or flight. Besides chronic muscular tension, the failure of the anticipated activity to occur also causes a chronic increase of the arteriolar vessels’ resistance. In accordance with Reich, this amounts to a biopathy: we have a “preparedness” that, in connection with situative stress, can lead to the changes in blood pressure which are stronger than in healthy persons, as mentioned above. The biopathy as the basis for illness is also the reason for the wide variety of blood pressure fluctuations: chronic hypertension, unstable hypertension, or hypertensive crises.

Beneath the surface - the “muscular armor ing” according to Reich - hypertensive patients are emotionally still very alive. At its core, the organism keeps producing energy, it does not shut down as in cancer. Again, the hypertensive crisis can be viewed as the organism’s struggle to escape stagnation, a sort of discharge towards the inside instead of living emotions or sexuality in the outside world.

Besides neuronal factors, hormones like renine/angiotensine and aldosterone also play a role in the increase of blood pressure.

In orthodox medicine hypertension is mainly treated with medication. Beta-blockers, centrally effective sympathicotylic agents (blocking sympathetic activity), saluretics (decreasing blood volume and sodium load), and vasodilators (dilating the blood vessels) are employed. The patient’s compliance with this pharmaceutical therapy is often unsatisfactory, since there are no subjective symptoms. Pharmaceutical therapy may be also difficult because of the pressure’s variability. Ideally, the medication should take effect when the blood pressure rises, but not further decrease normal pressure.

Stress reduction, physical activity, special diet (especially in overweight patients) as well as abstinence from cigarettes, alcohol, coffee, and tea are prescribed besides medication. Relaxation techniques and psychotherapeutical approaches are on the rise. Newer studies, however, showed...
that relaxation techniques alone were insufficient for lowering blood pressure: after one year, a group of hypertensive patients who had been instructed in various relaxation techniques displayed no lower readings than a control group which had only been advised by a physician.[12]

5.1.3. Psychological Component

Hypertension is found in a variety of personality structures. They all have one common characteristic, however: the incapability of freely expressing aggressive feelings. Rebellion against the parents during childhood was chronically suppressed, and a strong sense of obedience developed. Of central importance in this case are feelings of guilt for the aggressive impulses and the problem of being accepted despite aggressive desires. The inhibited anger can vent in explosive break-throughs. Externally, people suffering from hypertension are often "super-normal", apparently well-adjusted, contained, active, conscientious, hard-working, reliable, friendly, and honest. Behind that, they are sensitive, vulnerable, dependent, and unstable. Externally the "peacemaking" type, they are hiding their readiness for fight. They often show and even feel no fear. This is called a "facade structure".

Hypertensive patients display an extraordinary strife for achievement, with an unrealistically high level of demand, they "aim high" and are under "heavy pressure". Performance is often perceived as a duty or as a mean to gain appreciation. Hypertension also often originates from "territorial conflicts".

Hypertension is triggered only to a lesser degree by occasional heavy distress. Usually it is by daily, recurring demands, worries, afflictions, anxieties, and conflicts.

5.1.4. Therapy

As a consequence of the psychosexual energy's block, hypertensive patients generally display a shifting of energy into the upper body segments. We find muscular armoring in the chest in the form of a locked inspiratory position and shallow breathing, the chest being hypomobile. This serves the suppression of "roaring rage, wholehearted weeping, sobbing, heart-rending yearning"[13]. Instead of these emotions, the patient often feels hardness and inaccessability. During therapy, the chest segment is mobilized through deeper breathing and direct treatment of the intercostal muscles.

Because of tension in the neck area, emotions cannot be "voiced", they are "swallowed". The neck's tightness prevents the head from getting flooded with energy. Voice exercises, massage, and careful triggering of the gag reflex aid in the loosening of this area.

Blocks in the abdomen, diaphragm, and pelvis represent a protection against sexual feelings, as well as feelings of surrender, which turn into anger in the patient's subjective perception.

In therapy, we work from the tension in the chin and throat towards the essential blocks in the chest. Blocked feelings of anger, pain and longing are felt once again. Next, we work on the pelvis, bringing up fear of surrender in the process.

5.2. Glaucoma

5.2.1. Pulsation of the ANS

Glaucoma is the generic term for various diseases, which all have in common an increase in intraocular pressure. Because of a continous cycle of the intraocular fluid's replenishment and drainage, this pressure is normally constant. The drainage capacity is determined by the pupil's width: with a dilated pupil, drainage is obstructed, the liquid may become dammed up, internal eye pressure rises and may result in impaired vision, with painful glaucoma attacks carrying the risk of blindness. A constricted pupil, however, means a wider passageway for the water and a decrease in pressure.

In orthodox medicine glaucoma is treated by medication mimicking parasympathetic stimulation of the eye, thus constricting the pupils. This is a merely symptomatic therapy. Medication must be applied several times a day and cannot always prevent the disease's progression.

I mention this disease here - even though it is not very common - because it represents so clearly a case of pure autonomic sympathetico-tonic dysfunction as its cause. As explained above, the pupils' width is regulated by the autonomic nervous system: dominant parasympatheticotonus causes their constriction, sympathetico-tonus their dilation. So here we have a syndrome which is set off by pure sympathetico-tonic hyperfunction.

5.2.2. Psychological Component

Navarro, neuro-psychiatrist and Reichian therapist, describes patients with increased intraocular pressure as "people who are hiding aggression which is combined with deep depression...These persons feel compelled to keep their eyes wide open in order to keep track of reality, and block their emotions at this level."[14]

In various psychosomatic studies, glaucoma patients' tendency to rigidity in their attitude towards life, irreconcilability and vulnerability, as well as a propensity to compulsiveness have been pointed
out. Frustrating and distressing living situations trigger the disease. Psychological strain leads directly to an increase in intraocular pressure: a patient who ran over a cat on his way to the ophthalmologist showed an immediate distinct increase in pressure in his eye-pressure profile for that day.[15]

My own experience with glaucoma patients in my practice is consistent with the concept of biopathy: the illness is expressed only as a clinical symptom in the eye. The origin, however, is a sympatheticotonic disturbance of the whole organism. Accordingly, those patients do not only have high intraocular pressure, this is so-to-speak just the tip of the iceberg. With such patients, we rather find their whole nature to be "under pressure", and their diminished ability for relaxation and rest. They are focused outwardly and mostly "re-act" to their environment.

5.2.3. Therapy

The therapeutic goal is to lift the basic sympatheticotonia from the eye. As shown above, glaucoma immediately originates from insufficient flexibility regarding the pupil width, which we can stimulate directly, for instance by moving a light or a pencil up and down in front of the eyes in varying distances. While focusing near and far, the pupil has to open and close a little. Also direct light stimuli to the eye by a flashlight causes the pupil to constrict.

In body therapy, however, we do not stop at dealing directly with the symptom, but activate the whole eye segment, since "the vegetative" (autonomic) function does not know the anatomical demarcations.[16]. The dissolution of the "ocular armor" can be achieved by activating eye movements - such as rolling of the eyes - instructing the patient to open his eyes wide while inhaling, as in fright, or moving forehead and eyebrows. The overall expression of the eye region and later the whole face is given special attention and dealt with - for example, the patient might be instructed to look right and left "suspiciously". Working the eye segment also includes the treatment of muscular tension at the transition from the skull into the neck (occipital rim), which is always present in eye blocks.

Concerning the eye segment, a lot of techniques have been developed which find application in the treatment of near- and farsightedness[17]. Details on this can be found in the respective books on "Eye exercises".

Naturally, besides the intensive treatment of the eye segment, dealing with the whole organism's chronic sympatheticotonia will be part of therapy as well. This implies learning to reduce inner pressure and complementing the tendency of "keeping one's eyes open" with an "inwardly view". The patients learn to find themselves, to live and feel "from within" instead of having their actions led from outside.

According to what clinical studies found out about the character structure of glaucoma patients, we will expect a resurfacing of suppressed feelings during therapy. Examples of this are anxiety about the environment's reaction, need for control, suppressed anger in case of frustrating experiences or extreme distress, and pain about hurt sustained earlier in life.

5.3. Neck, Shoulder, and Back Pain

5.3.1. Pulsation of the ANS

On the level of the individual body segments according to Reich, increased sympatheticotonus can become manifest in chronically increased tension of the skeletal muscles. Man is basically just as segmentally structured as an earthworm. Reich, too, spoke of the body's segmental structure, and divided it into seven segments. In the following, however, we will refer to the segments of the nervous system, which are not identical with the ones described by Reich.

"The rigidity of the musculature is the somatic side of the process of repression, and the basis for its continued existence. It is never a matter of individual muscles that become spastic, but of muscle groups forming a functional unit from a vegetative (autonomic) "point of view."[18]

Healthy muscles display good tone, being neither floppy nor tense. The skin covering those muscles is warm and rosy, the joints mobile, movement smooth and fluid. But in most of us, permanent tension is present especially in the shoulder-neck-region. The muscles are hard, the skin cold, the joints crack with movement, and sometimes the muscles contain hard little lumps, called myogeloses. Furthermore, the back muscles are often tense, especially in the lumbar region. The subjective sensations can span from a feeling of stiffness in that region to painful contraction all the way to incapacitating backache.

In orthodoxy medicine the genesis of muscular tension has not yet been fully understood, it is rather taken for granted. Orthopedic surgeons often presume mechanical injury to the spinal column. In contrast, x-rays of the spinal column often do not match the intensity of the pain. The pain is also subject to fluctuation, whereas the changes in the spinal column remain constant. All this suggests that psycho-autonomic processes play a role in the intensity of the pain.[19]

It is well-known that relaxation, heat, and massage partly dissolve the tension and alleviate the symptoms temporarily, though unfortunately not permanently. So the treatment is not a causal one. Only a deeper retuning of the basic autonomic disposition can dissolve the chronic muscular block.

Based on the concept of chronic sympatheticotonus, we can see how the body is sent into the
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5.3.2. Psychological Component

Let us now have a look at the psychological components which can be expressed through tense neck, shoulder, and back muscles.

In German vernacular, “having a stiff neck” and “being stubborn” are expressed by one and the same word (“hartnäckig”). The neck becomes a symbol of strong will and striving for power. Anger and defiance are held back in the muscles at the back and sides of the neck as well. Another aspect is fear, which can proverbially be breathing down one’s neck. The block of the neck furthermore intercepts the flow of energy and thus the connection between head and body, between intellect and emotions. People with very tense neck muscles are therefore often very rationally oriented with general difficulties to show their feelings.

Tenseness in the shoulders can imply different emotional components. Elevated shoulders rather point to an anxious expression, depressed ones to general suppression of emotions. Hunched shoulders hide the body’s vulnerable front and, in women, the breast. Beating movements are often held back in the shoulder muscles. Tension in the area between the shoulderblades often originates from restrained crying, presumably in connection with the desire of longingly reaching out for something or somebody.

The expression “holding back” demonstrates the correlation between a muscular “holding of the back” and the restraint on the emotional level. An immobile spinal column can be a sign for mental immobility and lack of flexibility. It mirrors an inner state of mind which requires „backbone”. Aggressions, especially kicking impulses, are frequently suppressed in the lower back. Moreover, the back stands for support in life: a lack of necessary „backing” results in back pain. Fear of softness and surrender lead to tension in the lumbar region: the hollow back lessens the pelvis’ mobility, and with it the experiencing of sexual pleasure.

5.3.3. Therapy

The muscles in the neck region are readily accessible to massage. Using the Points and Positions Technique is easily possible.

Also, voluntary contraction, pressing the head backwards into the mattress, or intensifying the tension with the expression of defiance are possible. The expression of the head’s position can be exaggerated such as „being grabbed by the neck” (fear breathing down one’s neck), or the so-called „martyr position”, with the neck being hyperextended. Moving the neck as in saying „no” or stretching the neck are further techniques of mobilization.

Again, the patient should consciously feel the tense muscles and suppressed impulses, and learn to permit the restrained expression of emotion and motion. Anxiety, defiance, stubbornness, anger, and crying can occur.

The procedure in the shoulder-arm-region is similar. In addition to passive techniques, mobilization of the shoulder muscles can for instance be achieved through beating with the arms, grasping with the hands, or reaching out with the arms. Doing so might involuntarily set off the emotional expression of anger or longing.

In the lower back region, active contraction/relaxation-exercises are performed besides massage and pressing of the muscle insertions. The muscles in this area can also be easily activated by powerfully kicking into the mattress with the feet. Feelings of anger, but also softness and pleasure can occur here. Again, in the process chronic tension is resolved and is replaced by a sensation of streaming in the pelvis and legs.

Through all the mobilization techniques for the neck, shoulders and back mentioned above, pulsation of the ANS is stimulated once again through the muscles’ activation: the muscles relax, become painfree and warmly supplied with blood, flowing sensations occur, pleasurable feelings are perceived more intensely. In addition, a completely different perception of arms and legs may occur, causing long-lasting trouble with cold fingers and toes to give way to a sensation of warm hands and feet.
5.4. Bronchial Asthma

5.4.1. Pulsation of the ANS

Asthma is defined as a fit of difficulty in breathing with labored exhalation, often accompanied by whistling breathing, coughing, and sputum. Asthma attacks are caused by a combination of multiple factors. They are mostly triggered by an overreaction to allergenic matter, but can also happen without such. Often, but not always, the attack is accompanied by an alteration and swelling of the bronchial lining, and increased secretion of mucus in the airways, the crucial aspect being chronic constriction of the smallest bronchi, caused by the contraction of their smooth muscles. As seen earlier, sympathetic stimulation during inhalation causes the airways to widen due to the relaxation of the smooth bronchial muscles, whereas the parasympathetic nerves cause the muscles’ constriction during exhalation. Under healthy conditions, this supports exhalation. In case of an autonomic dysregulation, however, the underlying chronic parasympatheticotonus results chronically in great tension of the bronchial muscles.

Recent clinical studies prove that chronic inflammation of the bronchial mucous membranes acts as the breeding-ground for the development of asthma. Therefore, therapy increasingly includes the use of anti-inflammatory drugs.

Robert A. Dew puts asthma down to the primary presence of muscular armoring in the chest, a contraction in the sense of chronic sympatheticotonus, caused by external or internal stress. Further increase in stress leads to its turning over into chronic parasympatheticotonus in this organ, thus triggering an asthma attack. He interprets this turnaround as the organism’s attempt to breaking free from the chronic contraction. In his opinion, the retention of emotions through muscular armoring in the chest results in this parasympathetic “eruption”.

Supporting this assumption is the fact that asthma often builds up only in the relaxation phase (parasympathetic) after external stress, such as after physical activity (sympathetic). Nurses also report that an asthma attack ceases when the patient is calmed down (parasympathetic). So here, the whole organism’s increased sympatheticotonus beyond the imaginary “turning point” causes a turnaround of the ANS’ way of influencing the airways into its opposite, chronic parasympatheticotonus.

fig. 5: oscillation between sympathetic and parasympathetic nerve

Clinically, it cannot be determined for sure at this time whether an asthma attack represents a primarily sympathetic and only secondarily parasympathetic process, as explained above, or a primarily chronic parasympatheticotonus condition. But we can definitely say that asthma is a function of the organism’s restricted pulsation, manifest primarily in the chest region in the form of chronic parasympatheticotonus symptoms.[20]

The traditional treatment emphasizes mainly the choice and application of medication. Additionally, anti-inflammatory drugs (corticosteroids) are recommended as a prophylactic against the development of asthma attacks. In case of an acute attack, medication imitating sympathetic effects in the lungs is used, thus resolving the parasympatheticotonus. Again, the treatment does not go beyond a merely symptomatic therapy.

5.4.2. Psychological Component

The relevance of psychological elements in the genesis of asthma is assessed variably in literature, but is presumably high. Even job-related asthma often manifests only when combined with other psychologically straining elements. In this context, investigations concerning the experimental triggering of asthma attacks are interesting: 16 out of 18 subjects were able to learn to “produce” an asthma attack in very little time[21]. According to this, asthma would constitute a purely functional breathing disorder.

The asthmatic’s character structure includes a particular sensitivity for smells, as well as a reduced tolerance for his surroundings’ dirt and uncleanliness, but also for people’s dirty and unclean
behavior. The protest against this “incorrect” environment finds expression through the asthma attack. Asthmatics are longing for love and being cared for, but have a hard time letting themselves fall. Aggressions are experienced intensely, but are difficult to express: they cannot “vent” their anger. The ambivalence between longing for closeness on the one hand and aggression on the other has been interpreted as “a scream for the mother”[22], but also “a scream against the mother”[23]. The desire for reuniting with the motherly object is countered by the fear of losing one’s own individuality in the process. Asthma patients have difficulty keeping the balance between closeness and distance.

Dew and Baker describe the asthmatic’s character structure in terms of external calmness, superficial anxiety, with underlying anger, and eventually deep fear. In Dew’s view, besides the suppression of those feelings, the “chest armorng” also serves to retain excitation in the body’s upper half, lest it should travel into the pelvis and genitals and arouse sexual feelings there[24].

Looking at the vernacular gives the impression of the asthmatic’s increased demand for dominance, reflected in being “puffed-up”, as well as the suppressed aggression - to “gasp for breath with anger”.

5.4.3. Therapy

The increased inspiratory position of the ribcage becomes transfixed by chronically tense muscles, especially intercostal, back, deltoid, and diaphragm muscles. The energetic flow through the body is interrupted, the energy captured in the ribcage. This is enforced by muscular tension in the neighboring segments: much tension is often present in the throat, chin, and neck area on the one hand, and the diaphragmatic region on the other hand. Arms and hands are often rather under-charged energetically and cannot adequately perform their “natural tasks of grasping, giving and taking”[25].

In order to remedy the asthmatic’s basic breathing disorder, we can start by dissolving the muscular blocks in the chest segment, and remobilize it by means of the Points and Positions Technique, contraction/relaxation technique as well as supporting exhalation. If the tension around the chest is disregarded, however, this can lead to increased anxiety and trigger an attack. Therefore it is of utmost importance to include the surrounding tension in the work, especially in the neck and diaphragmatic areas.

In the following, I will just briefly go into a few possible techniques which can be employed in order to further dissolve the muscular tension asthma is based upon. In doing so, the impression might arise that we are dealing with some genuinely “mechanical” job. However, the structural work on the individual body segments is never the goal as such, but serves the restimulation of the whole organism’s energy flow - pulsation of the ANS. This is often linked to the experiencing and expressing of deep emotions by the patient, which formerly he could hold back through muscular tension. Structural work on the individual segments’ muscular tension and functional work in the sense of supporting the re-enactment of previously suppressed feelings are therefore inextricably linked. Both have their common ground in working on the pulsation of the ANS, and are covered separately only for reasons of clarity.

On the emotional side, superficial anxiety and the fear of anger, especially in the form of guilt feelings, are apparent when starting therapy. Those feelings are also reflected in the facial expression. They can be addressed by instructing the patient to exaggerate a particular facial expression, especially by opening his eyes and mouth wide as in fright. In the area of chin and neck, “gritting the teeth” and a “stubborn”, hard neck aid the patient’s effort to suppress unpleasant feelings. In order to loosen the chin’s tension mechanically, the therapist, besides direct treatment of the chewing muscles, may encourage the patient to perform biting exercises (for instance, using a biting ring or a towel). For the neck, we can once again employ immediate treatment of the muscles, contraction/relaxation techniques and head-rolling as in saying “no”. Dissolution of the tension in neck and chin often generate spontaneous feelings of rage and anger. The patient learns to improve his “bite” in a figurative sense, or becomes more “biting” with other people for a certain time. Voice exercises are performed with the patient to help open the throat. Tension in the shoulder-arm region is released by beating or grasping exercises, massage, and contraction/relaxation techniques. Increased pulsation in the area of mouth and neck becomes noticeable for the patient by an improved ability to “vent” feelings, including anger. After working the chest segment, as explained above, the diaphragm can be relaxed through direct massage of its insertions on the ribs, triggering of the gag reflex, and breathing techniques. This enables the energy to flow increasingly from the upper body into the pelvic region.

If deepened exhalation is combined with the patient using his voice while having chin and eyes open, and beating with the arms or grasping, after some time the so-far suppressed “scream for the mother” or “scream against the mother”, respectively, will find spontaneous expression while experiencing either rage or deep longing. When, given some time, this works without feelings of guilt, the patient feels very relieved. Because the chest segment’s pulsation of the ANS has been stimulated so much by the procedures mentioned above that chronic sympathetic over-stimulation turning into chronic parasympatheticotonicus cannot happen any longer, the frequency of asthma attacks will have largely decreased by that time.

Through the work on the diaphragm and the increased flow of energy into the pelvic region, the patient is confronted with his difficulties of experiencing sexual pleasure. The surfacing feelings activate the patient’s deep anxiety of surrender, and may again trigger asthma attacks. This is another sign of the asthmatic’s ambivalence between looking for “symbiotic fusion” on the one hand, but fearing to lose individuality in the fusion on the other. The goal is to reach balance between closeness and distance, dependency and freedom, and to take charge of shaping one’s own life.
Peptic ulcers develop on the basis of sympathetic hyperactivity with reduced blood supply in the stomach, however, is based on higher sympathetic activity. According to clinical studies, active just as it activates the gastro-intestinal tract's motility on the whole. Reduced blood supply to the As to the ANS, increased production of gastric acid is activated by the parasympathetic nerves, definitely not the sole reason. indication of a rather multi-determinant genesis of the disease: bacteria may be involved, but are population is carrying this bacterium with most of them not suffering from ulcers, there is an pylori. However, ulcers without bacterial settlement can be found. Moreover 80% of Ireland's cases of either excessive production of gastric acid or insufficient blood supply in the mucous membranes, this protection is no longer sufficient.

There has been a lot of talk lately about peptic ulcers being caused by a bacterium, Helicobacter pylori. However, ulcers without bacterial settlement can be found. Moreover 80% of Ireland's population is carrying this bacterium with most of them not suffering from ulcers, there is an indication of a rather multi-determinant genesis of the disease: bacteria may be involved, but are definitely not the sole reason.

As to the ANS, increased production of gastric acid is activated by the parasympathetic nerves, just as it activates the gastro-intestinal tract's motility on the whole. Reduced blood supply to the stomach, however, is based on higher sympathetic activity. According to clinical studies, active stress ulcers develop on the basis of sympathetic hyperactivity with reduced blood supply in the gastric lining. With chronic peptic ulcer and duodenal ulcer, increased acid production caused by increased parasympathetic tonus is predominant.[28]

Ulcers can develop as literal "stress ulcers" through damage in the autonomic nervous system. In tests with rats which were exposed to external stress without any possibility to escape it ("immobilization stress"), peptic ulcers could be caused in a high percentage of animals.[29] In studies of a patient with a stomach fistula, tense, ambivalent situations with persistent trouble resulted in parasympathetic effects on the gastric lining (increase in blood circulation, motility and secretion). Anxiety, fear and depressivity, however, set off an opposite sympathetically reaction.[30]

Clinical neurologists assume that formation of ulcers cannot be viewed so much as an either sympathetically or parasympathetically process, but that disturbances in the "autonomic coordination" with damage of the gastric lining through insufficient blood circulation on the one hand and increased acid production on the other hand lead to the formation of ulcers.[31]

Accordingly, the origin of ulcers would be not so much a chronic persistence of either of the autonomic extremes, but a back and forth between the extremes, but not in the sense of a healthy, coordinated pulsation and oscillation, but in the sense of sudden change "from one extreme to another", without coordination of sympathetic and parasympathetic activity, more in the sense of the body's inability to "decide" on either direction.

Generally, it can be said that disturbances in the "autoregulation of the balance between defensive (or protective) and aggressive (or damaging) mechanisms can result in the formation of ulcers."[32]

The orthodox therapy basically consists of symptomatic measures, such as stopping the haemorrhaging, application of acid blockers and antibiotics, as well as dietary recommendations. A causal therapy does not take place.

5.5.2. Psychological Component

Psycho-somatic researchers found out about the "typical" ulcer patient's longing for a conflict-free childhood, motherly care, infantile dependency, and being loved. Critical for the dependency tendency might be experiences of separation during childhood, which can often be substantiated biographically.[33]

As a compensation for family security, ulcer patients often give high priority to the affiliation with a social group. The longing for care is often compensated by great ambition and striving for success. Between the usually unconscious desire for being dependent and cared for...
The manifestation of an ulcer is presumably typical for a situation in which the person is torn between two opposing tendencies. If that person does not know whether to fight or flee, attack or surrender, he is in a dilemma similar to the stressed-out, immobilized rat’s mentioned above.

[34] The patient longs for the conflict-free existence, does not want to fight, but then feels threatened by deep helplessness in the face of attacks from outside. As a compensation, he wants to fend these attacks off. They either “plunge headlong into the battle” and deny their passive side (pseudo-independent type), or get stuck due to aggressive inhibition, swallowing their anger and denying their aggressive side (openly dependent type). In both cases, the conflict between longing for care and the aggressive approach of life’s tasks is not fundamentally resolved. There is no “as well as”, but only “either/or”. On the autonomic level, uncoordinated back and forth between sympathethicotonic - in the sense of attack mode - and parasympatheticotonus - in the sense of resignation mode - takes place, forming the morphological foundation for the ulcer process.

5.5.3. Therapy

On the segmental level, peptic ulcer goes along with a hardening of the muscles in the diaphragmatic and abdominal region. This tension has a direct impact on the activity of the solar plexus, the large autonomic nerve node located immediately below the diaphragm. On the muscular level, therefore, techniques which activate the diaphragmatic and abdominal muscles, establishing “healthy tone”, prevail.

There are various ways to work on the diaphragm. One possibility is via various breathing techniques, for instance practicing extreme diaphragmatic breathing. The diaphragm’s insertions on the ribs as well as the posterior ligament attachments are also accessible to direct stimulation by Points and Positions work. The strongest stimulus to the diaphragm is the triggering of the gag reflex without interrupting the exhalation. By this, the parasympathetic nerve is activated, and autonomic oscillation stimulated again, the diaphragmatic block is resolved, and the diaphragm is once again free to oscillate with breathing in and out.

Practicing the gag reflex can be accompanied by nauseous feelings going as far as vomiting. It constitutes a strong manipulation of the patient’s autonomic system. Gagging is actually a movement opposite to swallowing (as well of food as of emotions!). In a non-armed organism, gagging and vomiting can happen very easily. It is observable in infants as well as in the animal kingdom with dolphins, cats and dogs. The “normal” adult’s agonizing about gagging is due only to acquired muscular tension. Through the practice of triggering the gag reflex during therapy (and also artificially induced vomiting), it can gradually be loosened, while at the same time the emotion captured in it becomes perceivable and expressable to the patient.

Resolution of the diaphragmatic block, being the muscular block located between upper and lower body, goes along with twitching and waves of excitement towards the head and the genitals, and is accompanied by feelings of giving way and surrender.

The abdominal segment, the free mobility of which is mainly impeded by tension of the straight and transversally running abdominal muscles, some back muscles, and muscles inside the abdominal cavity along the spinal column, can also be influenced by breathing techniques and manual treatment (Points and Positions).

Once again, I would like to emphasize here explicitly that body therapeutical work does not consist solely of the mechanical relief of individual muscular tension. Especially the triggering of the retching reflex must not be carried out isolatedly, since it represents a very invasive autonomic intervention. The “dis-armoring” of all segments above the diaphragm is an indispensable prerequisite. The “overall view” is important. As an example, let me point out here that the capability of gagging or vomiting largely involves the activity of throat and ribcage. If these were not mobile, the energy which is set free through the treatment of the diaphragmatic segment and which wants to flow towards the head would be obstructed by muscular blocks further above. It would “get caught” in that block, i.e. aggravate it even more. This could cause pain and new somatic symptoms in that area.

The treatment of the diaphragmatic and abdominal area moreover leads to an increased flow of energy into the pelvic region, which can activate strong anxiety. Therefore, it should be followed by further body-therapeutical work on the pelvic area. The resolution of the diaphragmatic block is to be viewed as only one part of the body-therapy that is of particular importance for the ulcer patient’s recovery.

During the resolution of the blocks mentioned above, the patient is of course once again confronted with previously repressed emotions. He becomes at first more aware of passive aggression and oral...
need. Anxiety surfaces before the patient learns to deal actively aggressive with the environment. The diaphragmatic segment is especially capable of hosting “murderous rage”, which is allowed to be expressed in a protected therapeutic atmosphere. Feelings of giving way and surrender once again can only be admitted after dealing with the deep fear of pleasurable energetic flow through the body.

By the end of therapy, the ulcer patient should have acquired the ability to “take care of himself” instead of oral regressive dependency, as well as expressing aggression in an adequate manner.

6. SUMMARY AND CONCLUSION

The present account of structure and function of the autonomic nervous system, definition of disease and health according to Reich, and the exemplary presentation of individual syndromes has been an attempt to bring body therapy’s “medical side” somewhat more to the fore. The autonomic nervous system is a complex subject. I consider it very important not to let the Reichian findings vanish in the mist of mysticism, especially when so-called “neo-Reichian therapies” are popping up like mushrooms. Reich was a physician and a scientist, always busy further elaborating the scientific foundation of his theoretical concepts further. There are still a lot of exciting discoveries waiting to be made in this area, and I hope to have aroused some curiosity for them in you.

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Barriers to the Integration of Psychosocial Factors in Medicine: Results of a National Survey of Physicians

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Purpose: Examine physicians’ attitudes toward the incorporation of psychosocial factors in diagnosis and treatment and identify barriers to the integration of evidence-based mind-body methods.

Method: Random sample of primary care physicians and physicians from selected non-primary specialties was drawn. A total of 1058 physicians completed a 12-page survey.

Results: The response rate was 27%. Although a majority of physicians seem to recognize the importance of addressing psychosocial issues, approximately one third believe that addressing such factors would lead to minimal or no improvements in outcomes. A minority reports their training regarding the role of psychosocial factors was effective, and relatively few indicate interest in receiving further training in these areas.

Males were less likely to believe in the importance of addressing psychosocial factors. Additional factors included perceptions that training was poor in these areas; feelings of low self-efficacy to address psychosocial issues and the perception that such factors are difficult to control; lack of knowledge of the evidence-base supporting the role of psychosocial factors; and lack of time and inadequate reimbursement to address the psychosocial domain.

Conclusions: These results suggest the need for more comprehensive training in the role of psychosocial factors in health. In addition, the finding that physicians identify lack of time and inadequate reimbursement as significant barriers suggests that the current health care delivery system may, in many respects, be antithetical to the biopsychosocial model.

Behavioral treatment of hypertensive heart disease in African Americans: rationale and design of a randomized controlled trial


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African Americans experience higher morbidity and mortality than Whites do as a result of hypertension and associated cardiovascular disease. Chronic psychosocial stress has been considered an important contributing factor to these high rates. The authors describe the rationale and design for a planned randomized controlled trial comparing Transcendental Meditation, a stress-reduction technique, with lifestyle education in the treatment of hypertension and hypertensive heart disease in urban African Americans. They pretested 170 men and women aged 20 to 70 years over a 3-session baseline period, with posttests at 6 months. Outcomes included clinic and ambulatory blood pressure, quality of life, left ventricular mass measured by M-mode echocardiography, left ventricular diastolic function measured by Doppler, and carotid atherosclerosis measured by beta-mode ultrasound. This trial was designed to evaluate the hypothesis that a selected stress reduction technique is effective in reducing hypertension and hypertensive heart disease in African Americans.

Publication Types:
- Clinical Trial
- Randomized Controlled Trial
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Behavioural treatments: rationale and overview of the most common therapeutic protocols.

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The view of headache as a psychophysiological disorder predates contemporary behavioural research and also the concept that psychosomatic illnesses are the result of specific emotional conflicts that eventually produce physical symptoms. Behavioural interventions include strategies for the identification and modification of behavioural headache triggers and the acquisition and use of self-regulation skills aimed at prevention of headache episodes. Consequently, research in behavioural medicine has matured scientifically, although methodological imperfections have had an impact on contemporary headache management. The evidence suggests that the level of headache improvement with behavioural interventions may rival those obtained by using medications. As side effects and complications are minimal, these approaches are optimal options for young patients or for patients where the medications remain contraindicated.

PMID: 17508183 [PubMed - indexed for MEDLINE]
Abstract:
This article reviews the clinical results and experiences of users of the SCIO/EPYX biofeedback device after almost two decades of use. The practice of biofeedback dates back to the fifties. The technique of using biofeedback devices to diagnose stress and treat stress is receiving more attention in our ever increasingly stressful world. In this article we review the positive results achieved from clinical experience treating patients on a day to day basis.

In over two hundred million patient visits the SCIO/EPYX was estimated at an 80% success rate in reducing stress.

Key Words: Biofeedback, stress, stress reduction

Introduction:
In 1976 the World Health Organization announced to the world that stress was the major cause of disease in the world at that time, and any ways or means to reduce stress were encouraged.

Stress is the most incipient killer of people today. Stress is responsible for 70 to 80 percent of the disease in America. Stress reduction is a must in today’s society for longevity, health and happiness. Stress awareness begins with recognition or awareness. As we become aware of stress, we can begin to deal with it. The “ostrich” technique of stress reduction never works. Humans resist change. Whether change occurs in the body, mind, social, spiritual or environment, most humans will resist. To learn to relax, we must learn to break our old habits of stress reaction and substitute more productive reactions such as clear thinking, calm headed and relaxed understanding. To change requires perseverance, positivity, proper goals and beneficial rewards. Whether changing eating habits, exercise routines, stress reactions or social skills, change requires work, but the rewards of a healthy body and mind for you and your family are worth it.

Although biofeedback is an effective clinical procedure, it is not used in isolation from other therapeutic techniques. Since many of its clinical applications focus on the reduction of anxiety or physiological arousal, relaxation procedures have been used with biofeedback to maximise this effect. The patient undergoing biofeedback treatment is often introduced to a relaxation technique prior to receiving biofeedback. Clinicians using biofeedback frequently develop their own individual relaxation procedures. Most of these modified techniques are based on the progressive relaxation method originally developed by Jacobson in 1958.

Standardised relaxation techniques are effective for most patients. If the patient has difficulty, the therapist must be certain that the patient’s failure to relax is not due to a misconception or to therapeutic resistance. For example, some patients try too vigorously to relax, which results in increased tension. This may occur with Jacobson’s technique because patients spend too much time tensing muscles and too little time relaxing. If a well-motivated patient, however, cannot adjust to the standard relaxation procedure, other methods are available. Biofeedback therapists must be familiar with alternative procedures when a standard technique fails to generate the desired response (i.e. Lowered arousal). We define arousal as it is commonly used in the field of psychology; i.e. an excess level of muscular tension and or hyperactivity to stress.

Gage Tarrant is a professional Biofeedback Therapist and Stress Consultant practising in the Los Angeles area of California, USA. She has been using the SCIO/EPYX device as her principle intervention biofeedback tool for approximately four and a half years. The focus of Gage’s work is on stress reduction which involves in-depth stress testing, analysis and the biofeedback therapies found in the SCI/EPYX process. The intention is to identify unresolved stressful conflicts which are then reduced and resolved through a series of biofeedback sessions.

Mrs. Tenten has conducted over one thousand sessions in the past two and a half years using the SCI/EPYX device. One hundred and eleven clients appear in this study. Some patients received multiple sessions while some received a single Comprehensive Initial Sessions involving an extensive stress analysis, biofeedback therapy and a program for self guided stress reduction techniques based on the stress profile as indicated by the SCI/EPYX processes.

William Cunningham is a LBT practising in Boulder Colorado. He has used the system for over two decades. He has seen over twenty five thousand patients and 523 clients have participated in this study.

Debbie Drake is a M.D. in Ontario, Canada. Her experiences with the SCI. device and stress reduction have been extensive and an important part of this study. She reports a clinical review of over two thousand patients stress reduction for a period over a year. In this study she reports on the results of 490 patients.

Igor Cetojevic MD, of Cyprus has also used the SCI. for over a decade and reports a ninety percent success rate in stress reduction. He shares with us that the stress reduction is accompanied with cellular rejuvenation and immuno-stimulation.

Matthias Heiliger M.D. of Germany and Switzerland has used the system for over five years with his patients and finds that reducing their physiological stress burden is key to promoting change and a drive for a more healthy lifestyle. He reports on 302 patients in this study.

Anna Maria Cako M.D. of Hungary reports a 93% success rate with her patients in many areas after first reducing the physiological stress burden. She had 320 patients in this study.

Mezei Iosif MD, of Romania has used the system for over a decade with wondrous results. He reports an 80% SCI. success rate on dealing with stress in his medical practice. In this study, He was given a placebo deactivated device and was assigned 70 patients. Only 63 patients reported for study completion. This was a double blind as that he and his patients were not aware of the placebo device. Iosif was chosen for his particular lack of charisma, which was valuable in the placebo group.

In this article we will concentrate on the results of using the SCI./EPYX device in a clinical setting for stress reduction. This study is a repeat of the basic study done in 1996. A new study was deemed necessary for revalidated confirmation of the safety and efficacy of the device versus a placebo group.

Methods and Materials:
In each of our practices a stress survey (sample in Appendix 1). Patients fill out the survey when they start the therapy. On the first visit there is a discussion of the term of therapy needed to meet the needs of the patient. The consequent visits will range of two to possibly ten. At the end of the negotiated time a reassessment is performed for purposes of determining progress. Patients
with only one visit are not included in this study. In total over three thousand plus patients were assessed.

Informed consent was attained on all participants in the study. (See appendix 2) Patients were evaluate medically and the stress questionnaries was used to evaluate the stress on each visit. Other improvements were observed from immuno-stimulation to cellular regeneration but this study will confine it’s examination to the simple issue of stress reduction.

**Results:**

In the collective experiment there were 1746 participants and 63 in a placebo group.

**INTERVENTION SCI. group**

The average first visit score on the pretest stress interview was 3.9. The post test score is 2.8. the significance of the data easily meets alpha factors of .5. There was significant evidence of the SCI./EPYX device ability to reduce stress. 85% of the patients had significant reduction in stress.

**PLACEBO group**

The average first visit score on the pretest stress interview was 3.6. The post test score is 3.3. The placebo group had significantly less stress reduction. There was 20% overall stress reduction. There was significant evidence of the SCI./EPYX device ability to reduce stress versus a double blind test group.

There is proof of safety, as that not one patient in this study had any significant risk. In over 25,000 devices sold and well over 200,000,000 patient visits, there has been no record of any significant risk.

**From the desk of Gage Tarrant; Study of Stress Reduction using combined techniques of NLP, Hypnosis, Development Theory and the EPFX Biofeedback Device:**

Gage Tarrant is a professional Biofeedback Specialist, Certified Hypnotherapist and Stress Consultant who practiced in the Los Angeles area of California, USA, and is now located on Vancouver Island, British Columbia, Canada. She has been using the SCIO/EPFX device as her principle intervention biofeedback tool for approximately 6 years. The focus of Gage’s work is on stress reduction which involves in-depth stress testing, analysis and the biofeedback therapies found in the SCIO/EPFX process. The intention is to identify unresolved stressful conflicts which are then reduced and resolved through a series of biofeedback sessions.

Ms. Tarrant has conducted over one thousand sessions in the past 6 years using the SCI./EPFX device. One thousand and eleven appear in this study. Some clients received multiple sessions while some received a single comprehensive Initial session involving an extensive stress analysis, biofeedback therapy and a program for self guided stress reduction techniques based on the stress profile as indicated by the SCI./EPFX programs.

Her comments are as follows:

The primary focus of my hypnotherapy practice has always been to identify and resolve subconscious conflicts operative within my clients’ minds which were acting as stressors blocking the attainment of their emotional, mental and physical comfort, as well as their goals of success in various areas of life. I have found no greater tool to assist me in this endeavour than the SCI./EPYX biofeedback stress reduction system, as it enables me to compare my client’s concerns against their stress responses during session in a sophisticated and in depth way, and enables us to subsequently reduce their conditioned stress responses associated with these conflicts more effectively.

I, along with the client’s participation, cooperation and desire, am able to help them achieve this by replacing painful conditioned responses stored in their “memory” systems with positive conditioned responses to “new memory” we create for them. They have described this process as the greatest stress reduction they have ever experienced. Before I can describe how I have been able to use the device to assist in accomplishing this, I must briefly explain the theory that this methodology is based in, called “The Theory of Mind”.

**The Theory of Mind**

In mind and behavioural theory, the subconscious mind stores responses to events in ways that behave as “memories” and operate as “beliefs”, whether true or false in actual content. The emotional, physical and mental impact of responses to events, and the subsequent memory of them stored within the mind/body system, is always an individual and internal perception, something referred to in the field of Biofeedback as an “internal locus” of control.

This implies that each individual’s response to a common circumstance, such as the pain of a particular emotional trauma (such as the loss of a parent) is always unique to each individual’s reaction to it, regardless of how common the actual trauma is. Their reactions, which often include physiological stress reactions governed by the autonomic nervous system’s fight/flight mechanisms, which in turn affect other organ systems, are often stored as memory in a way that is often recalled and/or reactivated when similar circumstances or even recollections of the events present themselves again. The memories of these responses, including the emotional, mental and physiological reactions involved with the original response, do not have to be based in truth or falsehood; they simply have to be stored as “known” within the individual’s memory through experiencing them in order to be retriggered by similar stimuli.

Because memory can be reactivated through circumstances similar to the original event that created them, this can cause a recurrent and similar level of discomfort and stress if the original reaction was emotional and/or mental pain. Because there is usually a series of physiological reactions that accompany mental and emotional pain, these biological activities may also have been stored in the memory of the response system by association, and also reactivated due to the way the subconscious stores information within the mind/body system. Because the fight/flight mechanisms are automatic response mechanisms, if the flight flight mechanisms were active during the first experience of the memory, they risk being automatically being reactivated during recollection of the original memory, and can create an enormous amount of stress. This process causes many clients recurrent pain and a feeling of loss of control over their internal responses to stressful stimuli.
The reason for this is because of the laws of hypnosis, or learning. The “Theory of Mind” states that when we are born, there are only 2 common fears possess instinctually: the fear of falling and the fear of loud noises. Every other fear and belief is learned through the process of “identification” and “association”. From age 0 to approximately age 8, the mind develops a library of positive and negative associations and identifications which operate in the subconscious system as “knowns” or beliefs, whether true or false, and can operate as the basis of conditioned responses to the environment and events. These positive and negative associations and identifications form what is essentially our subconscious belief “system”, or memory base, which operates much the same way as learned “scripted” or automatic responses to the common stimuli that created them. This “script” is based on what we remember, or “know”. The script does not yet know the difference between good and bad, or right from wrong. It’s only aware of “knowns” that are stored in memory, or through the experience of imagination, which uses the same circuits in the body as memory.

Between the ages of approximately 8 and 12 we start to solidify our ability to use logic and reason. We become capable of making more complex decisions and developing will power. This capacity represents what is referred to as our “conscious” verbal mind, which this theory states is approximately a small 32% of our total mind power. The remaining subconscious mind, containing the “script” based on “knowns” whether true or false, constitutes the remaining 88% of our total mind power. Components of the subconscious mind are involved in autonomic response systems such as the more primitive fight or flight survival response, as well as the conditioned responses referred to above. Superconscious theory, or the “new” theory of mind, would suggest our conscious mind represents only .1%, and that the subconscious represents 99.9% of our total mind power. The superconscious processes information on all perceptual levels, and is aware of spiritual, biological, mental, emotional and environmental factors operating in our external and internal environment, and much more.

The subconscious operates on a “pain vs. pleasure” principle which states that a “known”, whether false or negative, is always a more comforting or “pleasurable” reference and/or response mechanism over an “unknown”, be it positive and desirable to the conscious mind. Because the subconscious “pleasure” or comfort zone may be based in “knowns” that are mentally or emotionally painful, this can represent a stumbling block to more positive conscious desires. Positive conscious desires may be counter to the subconscious base of beliefs that it will “allow” to operate within it’s “comfort zone”. Because the subconscious is usually at least 85% more powerful than the conscious verbal mind, this means that our client may have a conscious goal that does not match the subconscious “comfort” level, and may be struggling to attain their conscious goals of comfort and success because of the inherent strength of the subconscious over the conscious mind. In simpler terms, it may mean that they consciously feel overpowered by negative subconscious memories which create a stress response that they experience recurrently.

Our “critical” mental faculties separate the conscious and super-conscious “areas” of mind and protect the subconscious from the pain of “unknowns” coming from the environment or internally through stress. The “critical” faculties of mind are able to manage 7 or 8 bits of information well at once. More than 7 or 8 pieces of information generally represents stress to the critical faculties of mind. If more than 7 or 8 bits of information are received by the critical mind at once, such as through the shock and complicated reaction to an emotional trauma, or even from the barrage of message units coming from the environment during this modern “age of information”, the critical faculties of mind can become disorganized. The information or circumstances from the environment, or even messages received internally as mental “conclusions”, thus run a greater chance of bypassing this “critical” filter and reaching the subconscious in ways that will be experienced and stored as a perceptual “known”, or belief on the more powerful subconscious level.

Many of these new “beliefs” are undesirable and create complicated stress responses on several levels, including the biological level. Unfortunately, the “age of information” and the activity of modern life often keeps our “critical” faculties in a perpetual state of stress, activating our autonomic nervous system more frequently than it was designed to be, which further complicates our ability to manage stress.

This process of memory storage and reactivation represents a much more serious picture when we consider someone with a history of frequent abuse. More often than not, part of their conditioned responses to stress are the resulting mental beliefs or “conclusions” they made about the abusive situation regarding their beliefs about “life” or “self” in general, which operate on an internally auditory level as negative, self deprecating statements about themselves. This internal activity can result in more than 7 or 8 pieces of information to the critical faculties of mind, retrigger a stress response, and reach the subconscious in ways that operate as stressful and negative beliefs.

Since the subconscious mind seeks to prove the “truth” of it’s “knowns” (whether they are false in actuality or not), this can cause clients a great deal of internal stress, which activates the rest of the stress response, even on a physiological level that they feel they cannot control.

I therefore based my work in attempting to stop the painful automatic stress responses of my clients’ subconscious memory storage systems, change resulting negative beliefs into positive new ones by using stress reduction and imagination to create “new memories” until they became operative as automatic responses. When I practiced hypnotherapy alone to achieve this end, I usually asked for a minimum of 6 sessions, if not more. By employing the EPFX biofeedback system to assist me in this endeavor, I was able to achieve not only faster results, but stronger ones. Below are 2 examples of such results.

**Case History 1:** Client X: male, 37 years of age.

Client X sought my services because he was unable to control his responses to the stress of memories of sexual abuse by his father. He was assaulted nightly by his father from ages 5-12. He had sought years of psychotherapy and counseling, which helped, but did not enable him to stop the impulse to self mutilate. Using EPFX biofeedback and hypnotherapy, in one session we were able to identify reactive emotional, physical and mental stressors to the memories of the events, reduce them down to comfortable levels, re-imagine a less stressful response to the events while using biofeedback stress reduction, and reorganize his “memory” of knowns into one of control and a higher sense of self esteem. He has not self mutilated since that one session intervention, which was 3 years ago.

**Case History 2:** Client Y: female, 42 years of age.

Client Y sought my services because she had never been able to completely experience a sense of trust, and the perpetual feeling of mistrust that she experienced caused her self doubt, dissatisfaction and stress. She had sought psychotherapy, and was not diagnosed with paranoia, but felt that she had never experienced a deep sense of trust in herself, others or her life path that she desired. By measuring stress responses with the EPFX to the stimuli of certain references to
Muscle Memory Stress Reduction:
Because most clients are able to identify, through EPFX stress responses, the muscles that hold the tension of the painful memory, we are able to send stress reduction signals to those muscles which helps to reeducate the muscles to hold the new "memory" of the positive new patterns of beliefs I am suggesting to them, along with their goals of self improvement and a higher self esteem.

Hormonal Memory Stress Reduction:
Because the autonomic fight or flight response impacts the adrenals and affects the entire hormonal balance of the body, clients have reported that by reorganizing and controlling their internal response to pain and stress, that a positive improvement on their overall hormonal balance has resulted, creating an overall improved state of health and well-being, and a greater sense of self control over external and internal stimuli.

Brainwave Stress Reduction Training:
By changing internal responses to emotional traumas into positive new beliefs in their place, I have observed that clients are able to hold less stressful and more positive brain wave speeds and patterns as reflected on the EPFX with greater ability. The EPFX brainwave training facilities helped train them to learn these new patterns with greater control and recall, and most clients report the changes they experience as a result of these components of the program as "subtle but positive and powerful".

EPFX Electro Hypnosis:
I have observed that the positive hypnotic suggestions that I give in session, when coupled with the EPFX electro-hypnosis program, are accepted by the client with greater speed and depth, and with less resistance to change. Clients have consistently reported a sense of peace and relaxed euphoria created by the use of this portion of the program, and has been effective on even my most resistant of clients.

EPFX Main Test Page Stress Reactivity Programs:
I have found this facility to be the most profound in observing stress reactions to a very detailed search effort of one stressor in association with another. For example, I can measure the client’s reactive stress response to an electrical signature of a homeopathic of "depression", and then test their stress reaction of that "depression" item against a subfile of 73 more electrical signatures of emotional homeopathies, in a way that most clients recognize and validate immediately as operative emotional "associations" accompanying the original signature of depression, if not a week later as the insight becomes more comfortable for them. In this way, the client can discern which stressors accompany other stressors, and begin managing their emotional responses down to simpler, less stressful levels with more self control.

In conclusion, I have found the EPFX to be the most effective tool available to rapidly identify a client’s stress reactions to memory storage patterns they hold in a way that causes them to system of the spine has allowed my clients to hold what they refer to as a "different posture" as a result of the work. Most of them have commented that they seem to hold their bodies differently with less pain, and with a more pleasant feeling by reorganizing their biological memory responses held in their spinal nervous system through the EPFX stress reduction process.

Brainwave Stress Reduction:
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age, we were able to determine that she had a strong stress response to age 1. She then shared that she had been in the hospital for the first 6 months of life, a stage of human development associated with learning “trust” through Normative Attachment theories of bonding with the primary care taker. Being deprived of a regular and rhythmic bonding experience through hospitalization and separation from her primary care taker (her mother), coupled with the stress of being on life support during the first stage of development, she became aware that she had never adequately “learned” trust.

In session, we cultivated a sense of biological ‘earned trust” in her body/mind system through theatrical “trust exercises” of my catching her as she deliberately fell backwards into my hands. I then caught and supported her back into a normal standing position repeatedly, for a sense of trust to develop through the process. We were then able to, using the EPFX, measure and transfer the electrical profile of her freshly conditioned “trust” response into the system, and then fed it back to her in a way that she “learned”, and was able to continue recognizing in association with additional EPFX stress reduction signals we sent throughout the session process.

We repeated this technique for 3 sessions to reinforce the work. She has reported that ever since, she has been able to maintain this positive feeling of healthy trust and experience it in a way that she never obtained from her first stage of development. She has stated that this has positively changed her entire adult perception to a level of satisfaction and comfort.

EPFX Facilities Used:
I have many client reports of this nature, and I credit the use of the EPFX for producing such fast and effective stress reduction, which facilitates the subconscious mind’s ability to accept new positive information I am “suggesting” through hypnotherapy with less inherent subconscious resistance to change.

Because the electrical signature of a homeopathic of “resistance to change” is stored on the system much the same way I stored my client’s “earned trust” into the system, I am able to “invert” this electrical signature on resistant clients. In my observation, this consistently further speeds the process of subconscious acceptance of new positive knowns they wish to have operative on the deeper subconscious level of memory.

EPFX Unconscious Reactivity:
This panel within the EPFX program is designed to detect stress responses pertaining to associated biological stress reactions linked to emotional traumas in a way that, through my observation and feedback from clients, seems to cause their subconscious to feel “validated” without the pain of judgment. I further “validate” the sensitive and vulnerable information obtained through the client’s stress responses in this part of the program by sending them stress reduction pulses to the areas of the body that they indicate stress reactions to. This seems to enable most clients to effectively remove the negative memory responses of the original painful event so that they can more easily instill the new positive belief they wish to hold in it’s place with less resistance to change.

EPFX Spinal Program: Nerval Stress Reduction:
Because the nervous system is intwined with the spine, reducing the stress associated with the emotional traumas in question as we perform stress reduction on the muscle/ nerval memory...
gain insight into what they desire to be changed, and how to identify positive new beliefs, or “goals”, for them to create in their place. By suggesting these new positive beliefs to the client throughout the process of stress reduction, the success of instilling the positive new belief is greatly increased. The work is a co-creative joy, creates a strong rapport of partnership with the client, and teaches them self control in a way that they have described as nothing short of life changing and seemingly miraculous.

Gage Tarrant

Discussion:
Stress is a part of all disease pictures and stress reduction should be a part of all medicine. The SCIO/EPFX or in fact any biofeedback can be helpful for stimulating awareness, control, responsibility and return of health. The techniques tested in this paper were shown extremely helpful in reducing stress.

In conclusion, the authors views the SCIO/EPFX as an important biofeedback tool useful in many stages of stress reduction-oriented therapy and would encourage allied professionals and regulatory bodies to recognize its value.

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APPENDIX 1
DETERMINING THE SOURCES AND EXTENT OF STRESS IN YOUR LIFE

Stress that is not handled properly can affect you in many ways. It can impair your ability to function mentally at home and at work. You can experience a variety of physical symptoms that can range from headaches to gastrointestinal upsets. Everyone experiences the negative effects of stress at various points in their lives. The danger lies in chronic stress overload. When your body is constantly in the fight or flight mode, you are bound to blow a fuse at your body’s weakest point. For some people the end result is a serious mental or physical illness.
This survey is designed to help you determine:
1) Your general level of stress.
2) Your level of stress at work.
3) Your physical symptoms of stress.
4) Your level of stress in interpersonal situations.

Take a look at the checklists that follow to see how stressed you are.

How Stressed Are You?
Directions: Indicate how often your feelings agree with the statements below. Scoring for each item is based on the following scale:
1 = Never feel that way
2 = Seldom feel that way
3 = Sometimes feel that way
4 = Frequently feel that way
5 = Always feel that way

How Stressed Are You? (General Feelings)
1. I worry a lot.
2. I feel unhappy.
3. All kinds of worrisome thoughts run through my mind.
4. There are times when I feel like crying for no reason.
5. I don’t know what’s the matter with me. I’m so irritable.
6. I have lost my ability just to sit around and do nothing.
7. I feel like I’m living inside a pressure cooker and about to explode.
8. Lately I’m bored with my life, job, friends and even my loved ones.
9. Deep inside, I’m dissatisfied and I don’t know why.
10. I forget things.

Total Score =

How Stressed Are You? (Work Performance)
1. I have trouble concentrating on my work.
2. It takes me forever to make decisions.
3. I can’t seem to stick to a job.
4. From the time I get there until I leave, I’m plain fidgety.
5. I overreact to things at work.
6. I let minor things get to me.
7. I procrastinate.
8. I can’t seem to get organized.
9. I’m unclear about my role at work.
10. I do a lot of paper shuffling.

Total Score =

How Stressed Are You? (Physical Symptoms)
1. My heart races or pounds.
2. I have trouble catching my breath.
3. I have diarrhea.
4. I have headaches.
5. I have to urinate frequently.
6. I get dizzy for no reason.
7. I spend my nights awake, or it takes forever to fall asleep.
8. I’m tired.
9. My throat and/or mouth is often dry.
10. My stomach is tense.
11. I have no energy.
12. I’m chilly.
13. My neck (or shoulders, eye, chest, lower back, throat, hands) is sore, stiff or painful.
14. Lately I seem to have one bug or cold after another.

Total Score =
15. In the afternoon I run out of steam.
16. My posture is terrible.

Total Score =

How Stressed Are You? (Interpersonal Relations)

1. I startle easily when people come up on me.
2. Around people, I can’t speak correctly.
3. I can’t stand to be around a particular person (or group).
4. I can’t stand to be around people when they are emotional.
5. I can’t tell anyone how I feel.
6. I don’t feel anything.
7. I can’t laugh at myself.
8. Down deep, I’m not happy with my sex life.
9. I don’t trust anybody.
10. I need help (food or drink) to be social.

Total Score =

<table>
<thead>
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<th>SCORING</th>
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<tr>
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<td>Physical</td>
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<tr>
<td>Interpersonal</td>
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ALL SCALES 46

To compute overall average score, add up your total scores for each scale and divide by 46.

5 is the highest score, 1 the lowest.

Informed Consent:
The EPFX Biofeedback Medical device is registered in the USA and Europe. It is a Biofeedback device that measures how a person reacts to items. It is designed to measure reactions for allergy, homeopathy, nutrition, sarcodes, nosodes, vitamins, minerals, enzymes and many more items. Biofeedback is used for pre-diagnostic or therapy.

The USA allows us to develop an Institutional Review Board and operate an Investigational Device Exemption for this software. To use this software in the USA we need to get informed consent from the patients or persons who are tested. Informed consent must be signed, implied, or understood.

The registered EPFX software and hardware uses a micro current medically safe pulse applied to the wrists, ankles and forehead. We safely measure some of the electrical aspects of the body. A variant micro current is then adapted to the patient to feedback the signal. The EPFX software will use the same medically safe standards to develop a wider range of variant wave forms to the body. The patient will choose and direct the therapy by their unconscious electrical reactions. The EPFX will also use a subspace system or Prayer wheel if there is no biological signals present. The system will show the patient reactions to homeopathic or nutritional items. This will help the therapist and the patient choose items that might be helpful. These choices are voluntary suggestions. The patient can greatly benefit from help with these choices. No items of significant risk are possible. These items are not part of the study and purchase of them is the patient’s responsibility.

There is insignificant risk and the only discomfort is sitting still for the 30 or 40 min evaluation. The patient name will be held confidential in the study. Participation is always purely voluntary. There is no penalty for withdraws. The other facts of the case are e-mailed to QX ltd IRB. The FDA of America reserves the right to inspect records. But confidentiality is always guaranteed.

The results of the studies are to be published on the International Journal of the Medical Science of Homeopathy. These results are available in 2006 on the internet or through your therapist. Over 35 studies on the device have already been published.

Since there are over 10,000 EPFX machines around the world, and all have access to the EPFX software, assuming 10 patient visits a week there might be over 400,000 data streams per month. We fully expect over a million bits of data in the first year alone. We will analyze all types of diseases - all types of clients - in one of the world’s largest studies of its kind. We welcome your participation.

The clinical therapist is responsible for ensuring that informed consent is obtained from each research subject before that subject participates in the research study. FDA does not require the therapist to personally conduct the consent interview. The therapist remains ultimately responsible, even when delegating the task of obtaining informed consent to another individual knowledgeable about the research.
I am informed of the experiment on the EPFX software. I willingly give my consent to participate in the study. I give my consent for any children under my supervision or custody. I am to be guaranteed confidentiality of the data. I will be allowed to see the results of the publication in roughly one year. I recognize that there is no firm diagnosis resulting from the software. We are diagnosing and treating only Stress via Biofeedback.

I give my full and informed consent to partake in this research.

SIGNATURE_________________________________
DATE______________________________________
THERAPIST OR WITNESS_____________________________

In short
1. The EPFX software research is to study millions of people with a wide variety of diseases to see who gets or feels better.
2. The EPFX software will allow the unconscious of the patient to guide repair electrical and vibrational aberrations in your body.
3. The device and the study is always voluntary, confidential and safe.
4. There are a wide amount of benefits already displayed by the thousands of users and millions of patients. A millions of people have already been helped.
5. Results of the study and answers to your questions are available.

Comparison of Two Behavioral Treatments for Stress Reduction

This study is currently recruiting participants. 
Verified by National Center for Complementary and Alternative Medicine (NCCAM), February 2008

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<td>ClinicalTrials.gov Identifier:</td>
<td>NCT00625807</td>
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**Purpose**

Currently there are 2 popular stress reduction courses that are widely used in the US. Although they use somewhat similar techniques, it is currently unknown whether or not they work the same way, or if they are similarly effective at reducing stress. The study will directly compare these 2 courses. Participants will undergo approximately 4-5 hours of testing before and after each 8-week course.

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<th>Condition</th>
<th>Intervention</th>
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<tr>
<td>Stress</td>
<td>Behavioral: RR</td>
<td>Phase 0</td>
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<td>Behavioral: MBSR</td>
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Study Type: Intervventional
Study Design: Treatment, Randomized, Single Blind (Subject), Uncontrolled, Parallel Assignment, Efficacy Study
Official Title: Exploratory Analysis of RR and MBSR for Stress Reduction

Further study details as provided by National Center for Complementary and Alternative Medicine (NCCAM):

**Primary Outcome Measures:**
- Brain activity (fMRI) [TimeFrame: Pre, post] [Designatessafetyissue: No]

**Secondary Outcome Measures:**
- Physical and psychological well-being [TimeFrame: Pre, post, 3-months post] [Designatessafetyissue: No]
is THE Medical Concern

Estimated Enrollment: 60
Study Start Date: January 2008
Estimated Study Completion Date: June 2009
Estimated Primary Completion Date: March 2009 (Final data collection date for primary outcome measure)

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<th>Arms</th>
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<td>RR: Active</td>
<td>Behavioral: RR A well-validated 8 week stress reduction course. Classes meet once a week from 5-8:30 PM. Participants will be asked to perform stress reduction techniques each night for 25 minutes throughout the entire 8-week course</td>
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<td>One of the 2 stress reduction courses</td>
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<td>MBSR: Active</td>
<td>Behavioral: MBSR A well-validated 8 week stress reduction course. Classes meet once a week from 5-8:30 PM. Participants will be asked to perform stress reduction techniques each night for 25 minutes throughout the entire 8-week course</td>
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<tr>
<td>One of the 2 stress reduction courses</td>
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</table>

Eligibility

Ages Eligible for Study: 25 Years to 55 Years
Genders Eligible for Study: Both
Accepts Healthy Volunteers: Yes

Criteria

Inclusion Criteria:
• 25 to 55 years old
• Good general health
• Able to attend all 8 sessions of the course and practice the techniques each night for 25 minutes

Exclusion Criteria:
• Psychiatric medications
• Significant medical or psychological illness
• Metallic implants (such as a pacemaker or artificial joints) that are not MRI compatible.
• Claustrophobia
• Pregnancy
• Previous head trauma or neurological disorder
• Previous experience with yoga or meditation

Contacts and Locations

Please refer to this study by its ClinicalTrials.gov identifier: NCT00625807

Contacts

Contact: Sara Lazar, PhD 866-449-6779
dmccaff@nmr.mgh.harvard.edu

Contact: Dan McCaffery 617-643-5078
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Contact 866-449-6779
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Principal Investigator: Sara Lazar, PhD

Sponsors and Collaborators

National Center for Complementary and Alternative Medicine (NCCAM)

Investigators

Principal Investigator:
Sara Lazar, PhD
Massachusetts General Hospital

More Information

Responsible Party: Massachusetts General Hospital (Sara Lazar, PhD)
Study ID Numbers: R21 AT003425-01A2, SL1
First Received: February 26, 2008
Last Updated: February 26, 2008
ClinicalTrials.gov Identifier: NCT00625807
Health Authority: United States: Federal Government
Complementary and alternative therapy use in adult survivors of childhood cancer: a report from the Childhood Cancer Survivor Study.

University of Minnesota, Minneapolis, Minnesota, USA. mertens@epi.umn.edu

BACKGROUND: Little information is available on the use of complementary and alternative medicine (CAM) in long-term survivors of childhood and adolescent cancer. PROCEDURE: The Childhood Cancer Survivor Study (CCSS) is a resource evaluating the long-term effects of cancer and associated therapies in 5-year survivors of childhood and adolescent cancer diagnosed between 1970 and 1986 before the age of 21 years. A survey of CAM use during the previous year was distributed in 2000-2001 and completed by 9,984 survivors and 2,474 sibling controls. RESULTS: CAM use reporting was similar in cases (39.4%) and siblings (41.1%). Compared to female siblings, female survivors were more likely to use biofeedback (odds ratio (OR) = 3.3; 95% CI = 1.0-10.8) and hypnosis/guided imagery (OR = 3.2; 95% CI = 1.6-6.8); male survivors were more likely than male siblings to use herbal remedies (OR = 1.3; 95% CI = 1.1-1.6). Factors associated with CAM use in survivors included elevated scores on the brief symptom inventory (BSI)-18 (OR = 1.6; 95% CI = 1.3-1.9), prolonged pain (OR = 1.5; 95% CI = 1.3-1.7), and having seen a physician in the past 2 years (OR = 1.6; 95% CI = 1.4-1.8). Survivors reporting low alcohol intake and excellent or good general health reported lower levels of CAM use (OR = 0.7; 95% CI = 0.7-0.8 and OR = 0.8; 95% CI = 0.7-0.9, respectively). CONCLUSIONS: Survivors have a similar reported use of CAM compared to a sibling cohort. However, our data suggest that survivors turn to CAM for specific symptoms related to previous diagnosis and treatment. Future research is needed to determine whether CAM use reflects unmet health needs in this population. (c) 2007 Wiley-Liss, Inc.

PMID: 17366533 [PubMed - indexed for MEDLINE]
Interventions may enhance the effectiveness of more traditional psychoeducational programs for cancer patients. The proposed project will develop, pilot-test examine the feasibility of a palm-size personal computer assisted cognitive-behavioral stress management (PPC-CBSM) program for women with breast cancer. In Part I, we will conduct focus groups and intensive interviews to determine the most common cognitive distortions, the most prevalent cancer-related stressors, and specific strategies for coping with different cancer-related stressors. In Part II, we will examine the different coping strategies for specific cancer-related stressors using ecological momentary assessment techniques with the PPCs. The information from Parts I and II will be used to refine the final PPC program and to individually tailor the program to provide patients with preferred situation-specific coping strategies. In Part III, we will be recruited and initial measures obtained during the week before the administration of the first cycle of chemotherapy. Women will be randomly assigned to a PPC-CBSM group (which will receive six sessions of CBSM supplemented with the PPC) or to a traditional CBSM group (which will receive six sessions of CBSM). Patients will be assessed at three other time points: at the end of the six sessions of CBSM, 1 week before the fourth cycle of chemotherapy, and 6 months after the end of the interventions. We hypothesize that the use of this new innovative technology will help increase the efficacy of traditional psychosocial interventions by increasing the use of adaptive coping strategies and the frequency of practice of the stress management skills through providing coping strategies that can be accessed in “real time” when they are needed to help manage side effects of treatment and promote faster recovery.
Controlling Stress Helps Fight Chronic Diseases Such As Lupus

ScienceDaily (Aug. 6, 2007) — Lupus is an autoimmune disease which produces antibodies causing injuries to the body’s cells and tissue. It makes the immune system go out of control and the organism attack healthy cells instead of the germs on them. This pathology, which affects more than 5 million people around the world, is more developed in women of fertile age between 15 and 44 years old. A study conducted in the Department of Medicine at the University of Granada determined that daily stress (which occurs in circumstances of little importance but of high frequency) could exacerbate the symptoms of patients suffering from lupus. In other words, controlling the stress level of those suffering from this disease allows the determination of its negative effects, such as inexplicable loss of weight, feeling of fatigue, continuous fever or pain and inflammation in joints. This study, carried out by Dr. Nuria Navarrete Navarrete and led by researchers Juan Jiménez Alonso and María Isabel Peralta Ramírez, aimed to check the effects of stress treatment in patients suffering from lupus and with high levels of stress. A team of psychologists from the University of Granada applied a therapy to fight stress in a group of 45 patients suffering from lupus to teach them how to manage their stress to reduce the negative effects of this disease. Results showed that patients who received psychological therapy significantly reduced their levels of stress, anxiety and depression, achieving levels even lower than those of the general population. Furthermore, they significantly improved their quality of life both on a physical and psychological level and presented fewer skin and muscular skeletal symptoms, which usually appear in patients suffering from lupus.

Managing daily stress

Nuria Navarrete explains that lupus is a chronic disease whose course is unpredictable. Patients alternate periods of clinical stability with others in which there are symptoms and signs showing that the disease is active. In addition, there are certain factors such as stress which may cause crisis and, therefore, worsen the prognosis of the disease. Daily stress is very common in patients suffering from lupus. Apart from the usual circumstances which produce anxiety in a healthy population, other effects include knowing that your body suffers from a chronic disease which is controllable but incurable and of uncertain prognosis that requires chronic treatment (in some cases for the rest of their life) and which have important secondary effects. The results of this study highlighted the importance of dealing appropriately with patients suffering from lupus and, by extension, from other chronic diseases. “According to our results, attention on other psychological aspects is essential to achieve an effective global treatment of the patient”, says Navarrete. In other words, the treatment of daily stress, together with the usual pharmacological treatment, is a useful weapon when treating patients suffering from lupus. “We think that this treatment could be useful from the moment in which the disease is diagnosed, as patients may require help to manage their stress and minimise its negative effects,” says researcher Navarrete.

Part of the results of this study were published in the journals “Psychosomatic Medicine” and “Revista Clínica Española”.

Adapted from materials provided by University of Granada.

Cortisol, Stress, and Health

Keeping levels of the stress hormone cortisol in check may help prevent illness and slow aging By Edward R. Rosick, DO, MPH, MS

Edited and reviewed By Professor of Medicine William Nelson IMUNE

International Journal of the Medical Science of Homeopathy

Today, we are more stressed than ever before. Men and women are working more hours, teens are committing suicide at high rates, and physicians cannot write enough prescriptions for antidepressant and anti-anxiety medications.

Although modern technology is light years ahead of that of our primitive forebears, our biological make-up has not changed appreciably for many thousands of years. Because of this, understanding how our bodies react to external and internal stressors is vitally important to the quest for optimal health and well-being.

While questions remain as to precisely how stress contributes to the disease process, research has shown that chronic stress causes a significant dysfunction of one of the most vital systems of our body—the neuroendocrine system.

The Mind-Body Connection

The study of brain-body interaction, or psychoneuroimmunology, is one of the most contentious fields in medicine today. While more researchers and physicians believe that the mind and body are one, a significant number of doctors still insist that the mind and body are separate entities that have only minimal interaction.

Of course, this stubbornness is not surprising, as Western medicine has long held as one of its major axioms that the mind and body are separate entities. By contrast, Chinese and other traditional medicines have always recognized the interconnectedness of the body and mind. For those who still doubt this interplay, recent scientific research proves that what happens in the mind can profoundly influence the body.

The Neuroendocrine Connection

Scientists are just now beginning to unravel the ways in which the mind influences the body, and vice versa. The hypothalamic-pituitary-adrenal (HPA) axis plays a major role in both mind and body health. The intimate connection between the brain and endocrine system broadly influences our health, and many researchers suggest that our stressful, modern lifestyles are overtaxing the HPA axis.

Before we explore how aberrations of the HPA axis can contribute to many chronic disease states, it is important to understand how the HPA axis works. It starts with the hypothalamus, a specialized glandular area of the brain that some consider the “master gland” of the neuroendocrine system. The hypothalamus has many functions, such as controlling the body’s temperature, water balance, thirst, and hunger. It also acts as a controller of the pituitary gland, a small, bean-sized structure that sits just below the hypothalamus. During times of stress, the hypothalamus releases corticotropin-
releasing factor, which in turn signals the pituitary gland to release adrenocorticotropic hormone, or ACTH. This hormone then travels through the bloodstream to the adrenals, two small, triangle-shaped glands located on the top of the kidneys. When ACTH reaches the adrenals, it causes them to release a biochemical known as cortisol.

**Cortisol: the Stress Hormone**

Cortisol is, in many ways, a paradoxical hormone. A certain amount of cortisol is needed to maintain optimal health, but too much or too little can be deadly. Cortisol is involved in multiple bodily functions, including blood pressure regulation, cardiovascular and immunological function, and the metabolism of fats, proteins, and carbohydrates. In stressful situations, the body secretes cortisol at higher-than-normal rates to help break down and use fatty acids and proteins for energy production, which is especially important for optimal brain function. Unlike levels of other hormones such as testosterone and DHEA, cortisol levels generally do not decrease as we get older. In fact, some researchers now believe that many age-related problems may result from a ratio of increased cortisol and lowered DHEA as we age.5-7

**How Stress Kills**

In the 1930s, the renowned endocrinologist Hans Selye discovered that both psychological and biological stress can adversely affect human health through interactions between the mind and the adrenal glands.8 Following his landmark work on the crucial link between stress and the HPA axis, in 1946 Selye published his now-classic work on the relationship between chronic stress and disease. Selye reasoned that living organisms, including humans, react in physiologically predictable ways to both physical and psychological stressors, seeking to maintain homeostasis, or a constant, dynamic metabolic equilibrium wherein all organ systems function to maintain optimal health. He termed these often-complex physiological and behavioral responses to stress the “general adaptation syndrome,” or GAS.9 Selye also observed that if the stressors were continuous, the organism would ultimately “burn out” and die. He devised the following three-step model to describe the process:

- **Step 1:** Alarm reaction. Faced with an immediate stressor (either physical or psychological), there is activation of both the “flight or fight” response and the HPA axis, leading to secretion of greater amounts of hormones such as cortisol.
- **Step 2:** Resistance phase. If the perceived stressors are not countered in a timely fashion and the HPA axis is in a continual “on” mode in an attempt to maintain homeostasis, adrenal hypertrophy and numerous other deleterious health effects begin to occur.
- **Step 3:** Exhaustion phase. If the perceived stress is prolonged, the adrenal glands and other organ systems begin to “burn out” and experience a precipitous decline in function. If the exhaustion phase continues long enough, the organism will die.

**Stress, Cortisol, and Illness**

Taking their lead from Selye’s original work, scientists have demonstrated that both acute and chronic levels of stress contribute to elevated levels of cortisol.10-12 In addition, high levels of stress are now known to be significantly linked to various illnesses, including upper respiratory infections,13 exacerbation of multiple sclerosis,14 and gastrointestinal disorders such as irritable bowel syndrome.15,16

Since the mid-1990s, scientists have presented provocative evidence linking cancer, stress, and elevated cortisol levels. In a 1996 case-controlled study, scientists examined hormone levels of the hypothalamic-pituitary-adrenal system in women with both early-stage and metastatic breast cancer.17 Both groups had statistically higher levels of cortisol compared to women without breast cancer. Furthermore, those with metastatic breast cancer had higher cortisol levels than women with early-stage breast cancer. The authors noted, “these data provide evidence that breast cancer is associated with a hyperactive adrenal gland.”

A more recent report in the journal Lancet Oncology summarized what is currently known about the complex interactions between the HPA system, stress, and cancer. According to the authors, “Evidence mainly from animal models and human studies suggests that stress and depression result in an impairment of the immune system and might promote the initiation and progression of some types of cancer...Through HPA activation, the mediators released during chronic stress suppress some non-specific and specific parts of the immune response...compromising the most important effectors of the immune response against tumors.”18

While cancer is probably the most widely feared chronic disease, heart disease remains the number-one killer of Americans. Mayo Clinic researchers examined the medical and economic costs of stress in heart disease patients.19 In a study of 311 men and 70 women, the authors found that patients with the highest stress levels had markedly higher rates of rehospitalization and reoccurrence of further heart disease-related problems, including heart attacks and cardiac arrest. Concluding that psychological distress may adversely affect prognosis in heart disease patients, the authors suggested that identifying and treating psychological distress could improve outcomes in these patients.

A more recent report in the European Heart Journal supports the theory that stress can literally be a killer.20 In this 21-year prospective study of nearly 14,000 men and women, researchers concluded, “chronic stress is an independent risk factor for [cardiovascular disease], particularly fatal stroke.” Other scientists, however, have criticized these data, indicating the need for further investigation.

Alzheimer’s disease, the most common cause of dementia in those aged 65 or older, is characterized by a progressive decline in cognition and memory. This debilitating condition currently affects over 15 million people worldwide. With the rapidly aging US population—an estimated 30% of all Americans will be 65 or older by the year 2050—projections are that 14 million people in the US alone will be affected by Alzheimer’s in the next few decades.21,22 This represents a quadrupling over the current prevalence of Alzheimer’s in the US.

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Although scientists continue to search for the root cause of this devastating illness, new evidence suggests that increased levels of stress, along with high levels of cortisol, may play a significant role. Research indicates that high cortisol levels may promote degeneration and death of neurons,23-25 along with decreased memory function in otherwise healthy elderly men and women.26 Furthermore, a recent report in the journal Neurology showed that chronic stress is associated with the risk of developing Alzheimer’s disease.27 In this study, researchers found that people who were prone to experiencing high levels of stress had twice the risk of developing Alzheimer’s as those who were not prone to stress. The authors concluded, “proneness to experience psychological stress is a risk factor for [Alzheimer’s disease].”
While mainstream medicine offers little in the way of reducing chronic stress or high cortisol levels, making behavioral changes and using certain supplements can help you bring your stress load and high cortisol levels safely under control.

**Exercise Counters Stress**

Humans are designed to be physically active. However, our typical twenty-first century lifestyle—sitting in front of a computer all day—is a far cry from the daily hunting and gathering activities of our ancestors. While it is common knowledge that exercise can keep our muscles and bones strong and healthy, less often recognized is that moderate exercise can also decrease stress and high cortisol levels.

A newly published study in the journal Psychoneuroendocrinology examined the effects of aging and fitness on the HPA axis response to stress. The study authors hypothesized that aging is associated with a greater HPA axis reactivity to psychological stress leading to higher cortisol levels, and that exercise could ameliorate this reactivity. The researchers subjected three groups of women—categorized as “young-unfit” (aged 25-30), “older-unfit” (aged 64-67), and “older-fit” (aged 64-68)—to a battery of psychological and physical tests meant to induce stress. These tests included an EKG-monitored treadmill test, a mental arithmetic test, an anagram test, and a cold pressor test, where subjects placed their hands in a bucket of ice water for as long as they could tolerate. While cortisol levels rose in all three groups of women, those in the older-unfit group had the most significant increase. The authors concluded that “aging is associated with greater HPA axis reactivity to psychological stress, and that higher aerobic fitness among older women can attenuate these age-related changes as indicated by a blunted cortisol response to psychological stress. These findings suggest that exercise training may be an effective way of modifying some of the neuroendocrine changes associated with aging.”

**Relaxation and Meditation**

If you want to decrease stress and lower your cortisol, then taking time out each day to relax and meditate may be just the solution. Considerable scientific evidence has established that relaxation and meditation techniques are valuable therapeutics for optimal health.

An article in Psychoneuroendocrinology highlighted meditation’s effects on levels of various hormones, including cortisol, in otherwise healthy male subjects who were subjected to mental and physical stressors. In this prospective, randomized study, blood samples were taken and hormone levels analyzed at the study’s onset and again four months later after the subjects had learned and practiced a meditation technique. Those who had practiced meditation had lower average cortisol levels compared to subjects who had not meditated, suggesting that meditation may help reverse the effects of chronic stress. A paper in the journal Psychosomatic Medicine described how women with stage I or II breast cancer could decrease their perceived levels of stress, as well as their cortisol levels, by simple cognitive-behavioral stress-management techniques.

**Supplements to Combat Cortisol**

Exercise and meditation are two important modalities that may help many individuals manage stress-filled lives. In addition, studies suggest that effective natural supplements, such as vitamin C, fish oil, phosphatidylserine, and herbal adaptogens, may help keep the HPA axis in equilibrium, reduce elevated cortisol levels, and help optimize health.

**Vitamin C**

Besides its beneficial effects in maintaining proper immune system function, vitamin C has been shown to help modulate high levels of cortisol brought about by stress. A study in 2001 examined the effects of supplemental vitamin C on high cortisol levels brought about by physical stress in marathon runners. In a randomized, placebo-controlled study, ultramarathon runners were given 500 mg a day of vitamin C, 1500 mg a day of vitamin C, or a placebo seven days before a marathon, the day of the race, and two days after the race. Researchers found that athletes who took 1500 mg per day of vitamin C had significantly lower post-race cortisol levels than those taking either 500 mg a day or placebo.

Another study published in the journal Psychopharmacology reviewed evidence showing that vitamin C can reduce high cortisol levels brought about by psychologically induced stress. In a randomized, double-blind, placebo-controlled trial, researchers gave 3000 mg per day of vitamin C or a placebo to 120 volunteers who were subjected to psychological stress through the Trier Social Stress Test (TSST), a commonly used assessment tool in psychological research that simulates public speaking and arithmetic tests to induce stress and raise cortisol levels. Subjects who took vitamin C had lower blood pressure, subjective stress, and cortisol measures compared to those who were given placebo.

**Fish Oil**

In a number of clinical tests, fish oil has been shown to reduce cardiovascular risk in women and men. Preliminary research has shown that fish oil may help individuals cope with psychological stress and lower their cortisol levels. In a study published in 2003, researchers gave seven study volunteers 7.2 grams per day of fish oil for three weeks and then subjected them to a battery of mental stress tests. Blood tests showed that these psychological stressors elicited changes in the subjects’ heart rate, blood pressure, and cortisol levels. After three weeks of fish oil supplementation, however, the rise in cortisol levels secondary to stress testing was significantly blunted, leading the authors to conclude that supplementation with omega-3 fatty acids from fish oil “inhibits the adrenal activation elicited by a mental stress, presumably through effects exerted at the level of the central nervous system.”

**Phosphatidylserine**

Another supplement that has been shown to be useful in combating the deleterious effects of stress is phosphatidylserine. This phospholipid constitutes an essential part of biological cellular membranes. For more than 10 years, studies have shown that phosphatidylserine is able to cut elevated cortisol levels induced by mental and physical stress. In one early study, 800 mg per day given to healthy men significantly blunted the rise in cortisol caused by physical stress. Another paper reported that even small amounts of supplemental phosphatidylserine (50-75 mg administered intravenously) could blunt cortisol increases secondary to physical stressors. In this study, eight healthy men had their blood drawn before and after physical stress induced by riding a bicycle ergometer. While all subjects showed increased cortisol levels, pretreatment with...
the 50- or 75-mg dose of phosphatidylserine significantly blunted cortisol response to the physical stressor.35

Finally, a study published in 2004 examined phosphatidylserine’s effects on endocrine and psychological responses to mental stress.36 The stressor used was the Trier Social Stress Test (TSST), which consists of 15 minutes of psychological stress induced via a mock job interview, followed by a mental arithmetic challenge. This double-blind study followed 40 men and 40 women, aged 20-45, for three weeks. The subjects were given either phosphatidylserine (either 400 or 600 mg daily) or a placebo before taking the TSST. Phosphatidylserine was effective in blunting the cortisol response to stressors, with those taking 400 mg daily (but not, surprisingly, 600 mg) of phosphatidylserine showing a significantly decreased cortisol response. The authors concluded that phosphatidylserine helped dampen the effects of stress on the pituitary-adrenal axis, and may have a role in managing stress-related disorders.36

Herbal Adaptogens

Plant-derived adaptogens can be a very useful in combating the mental and physical rigors of our modern lifestyle. Adaptogens work by modulating the levels and activity of hormones and brain neurochemicals that affect everything from cardiac activity to pain perception. For any herb or substance to be properly classified as an adaptogen, it should:

- produce a non-specific response and increase an individual’s resistance to a wide range of deleterious stimuli
- produce a normalizing response in an individual when subjected to physiological, emotional, or mental stressors
- be non-toxic and not induce changes in the physiological, emotional, or mental state of a non-stressed individual.

One such herbal adaptogen is Rhodiola rosea, or rhodiola. In traditional Asian and European medicine, this herb has been used for centuries to increase physical endurance and longevity, as well as to manage fatigue, depression, and impotence. Rhodiola’s positive effects are thought to be mediated through the actions of rosavins and salidrosides, chemical compounds found in the plant’s roots. Multiple studies from the former Soviet Union have demonstrated rhodiola’s effectiveness in combating both physically and psychologically stressful conditions.37

Another herb that serves as an adaptogen is ginseng, which has been used throughout Asia since antiquity. It is important to note that ginseng is the name given to three different plants used as adaptogens. The most widely used ginseng is Panax ginseng, also known as Korean, Chinese, or Asian ginseng. Panax quinquefolium—or American ginseng—is also considered a “true” ginseng. However, Siberian ginseng (Eleutherococcus senticosus), while commonly referred to as ginseng, is not a true ginseng but a closely related plant. Yet no matter what the genus or species, all three of these plants have experimental evidence backing their adaptogenic claims. Animal studies have shown that ginsenosides, bioactive compounds in ginsengs, improve the sensitivity of the HPA axis to cortisol.38,39 In addition, studies suggest that all three plants provide protection against both physical and psychological stresses.38,39

Finally, another plant that deserves mention as an adaptogen is ginkgo biloba. For the last 5,000 years, leaves of the ginkgo tree have been used to treat various medical conditions. While ginkgo is currently used to help combat the debilitating effects of memory decline and dementia,40-42 emerging evidence suggests that it may be useful in treating the impact of stress and elevated cortisol levels. A recent double-blind, placebo-controlled study published in the Journal of Physiology and Pharmacology examined ginkgo’s effects in modulating cortisol and blood pressure levels in 70 healthy male and female subjects.43 When subjected to physical and mental stressors, subjects who were given 120 mg per day of a standardized ginkgo extract saw smaller increases in their cortisol levels and blood pressure then did their counterparts who were given a placebo.

Raising DHEA Levels

While cortisol levels stay the same or even increase as we age, levels of another vitally important hormone, DHEA, decrease with each passing year. This relationship between cortisol and DHEA has led some to suggest that these adrenal hormones may play a significant role in the aging process and its associated negative health effects. A recent paper in the European Journal of Endocrinology examined the pathophysiological correlates of age-related changes in the HPA axis.44 The authors showed that the cortisol/DHEA ratio increases significantly as one ages, and is even higher in elderly patients who suffer from dementia. Supplemental DHEA, however, enhances the brain’s resistance to stress-mediated changes, maintains functional abilities, and protects against age-related diseases. The authors concluded, “the changes of the hormonal balance [between cortisol and DHEA] occurring in aging may contribute to the onset and progression of the aging-associated neurogenerative diseases.”44

Conclusion

Exercise, stress management techniques such as relaxation and meditation, and nutritional supplements can help you manage stress and lower cortisol to promote optimal health and longevity. The following are scientifically supported techniques that can help support a healthy response to stress.

1. Behavioral techniques to lower stress and manage high cortisol levels
   - Exercise: 30-45 minutes of both anaerobic (resistance training) and aerobic (jogging, cycling) every other day.
   - Meditation/relaxation: 15-30 minutes daily.

2. Supplements to reduce high cortisol levels secondary to stress
   - Vitamin C: 1000-3000 mg/day.
   - Fish oil (omega-3 fatty acids): 1-4 gm/day.
   - Phosphatidylserine: 300-800 mg/day.
   - Rhodiola rosea: 100-200 mg/day, standardized extract.
   - Ginseng: 100-300 mg/day, standardized extract.
   - Ginkgo biloba: 100-200 mg/day, standardized extract.
   - DHEA: 25-50 mg/day (any hormone supplementation should be monitored by your physician).

Ginkgo biloba: 100-200 mg/day, standardized extract.
Fish oil (omega-3 fatty acids): 1-4 gm/day.
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Chida Y, Mao X.

Psychobiology Group, Department of Epidemiology and Public Health, University College London.

Previous psychological studies have paid extensive attention to the association between psychosocial stress and symptomatic herpes simplex virus (HSV) recurrence, but subsequent research has been conducted and conflicting findings have been published. We aimed to quantify the longitudinal association between psychosocial stress and recurrent HSV in the contemporary literature. We searched Medline; PsycINFO; Web of Science; PubMed up to March 2009, and included prospective studies that investigated associations between psychosocial stress and symptomatic HSV recurrence. Two reviewers independently extracted data on study characteristics, quality, and estimates of associations. The overall meta-analysis examining 11 articles (17 psychosocial and disease related relationships) exhibited a robust positive association between psychosocial stress and symptomatic HSV recurrence (correlation coefficient as combined effect size 0.083, 95% confidence interval 0.025-0.141, p = 0.005). This finding was supported by more conservative analysis of aggregate effects and by sensitivity analysis of the methodologically strong studies. There were indications of publication bias in some analyses. Intriguingly, sensitivity analyses demonstrated that psychological distress was more strongly associated with symptomatic HSV recurrence than stress stimuli per se, and that psychosocial stress tended to be more strongly associated with oral than genital herpes recurrence. In conclusion, the current review reveals a robust relationship between psychosocial stress and symptomatic HSV recurrence, justifying further research in this field, especially clinical trials evaluating the efficacy of stress reduction interventions on HSV recurrence.

PMID: 19 [PubMed - as supplied by publisher]
Effectiveness of a meditation-based stress reduction program in the treatment of anxiety disorders

Kabat-Zinn J, Massion AO, Kristeller J, Peterson LG, Fletcher KE, Pbert L, Lenderking WR, Santorelli SF.

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OBJECTIVE: This study was designed to determine the effectiveness of a group stress reduction program based on mindfulness meditation for patients with anxiety disorders. METHOD: The 22 study participants were screened with a structured clinical interview and found to meet the DSM-III-R criteria for generalized anxiety disorder or panic disorder with or without agoraphobia. Assessments, including self-ratings and therapists' ratings, were obtained weekly before and during the meditation-based stress reduction and relaxation program and monthly during the 3-month follow-up period. RESULTS: Repeated measures analyses of variance documented significant reductions in anxiety and depression scores after treatment for 20 of the subjects—changes that were maintained at follow-up. The number of subjects experiencing panic symptoms was also substantially reduced. A comparison of the study subjects with a group of nonstudy participants in the program who met the initial screening criteria for entry into the study showed that both groups achieved similar reductions in anxiety scores on the SCL-90-R and on the Medical Symptom Checklist, suggesting generalizability of the study findings. CONCLUSIONS: A group mindfulness meditation training program can effectively reduce symptoms of anxiety and panic and can help maintain these reductions in patients with generalized anxiety disorder, panic disorder, or panic disorder with agoraphobia.

Publication Types:
Research Support, Non-U.S. Gov't

PMID: 1609875 [PubMed - indexed for MEDLINE]

Effects of stress reduction on carotid atherosclerosis in hypertensive African Americans.

Castillo-Richmond A, Schneider RH, Alexander CN, Cook R, Myers H, Nidich S, Haney C, Rainforth M, Salerno J.

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BACKGROUND AND PURPOSE: African Americans suffer disproportionately higher cardiovascular disease mortality rates than do whites. Psychosocial stress influences the development and progression of atherosclerosis. Carotid intima-media thickness (IMT) is a valid surrogate measure for coronary atherosclerosis, is a predictor of coronary outcomes and stroke, and is associated with psychosocial stress factors. Stress reduction with the Transcendental Meditation (TM) program decreases coronary heart disease risk factors and cardiovascular mortality in African Americans. B-mode ultrasound is useful for the noninvasive evaluation of carotid atherosclerosis. METHODS: This randomized controlled clinical trial evaluated the effects of the TM program on carotid IMT in hypertensive African American men and women, aged >20 years, over a 6- to 9-month period. From the initially enrolled 138 volunteers, 60 subjects completed pretest and posttest carotid IMT data. The assigned interventions were either the TM program or a health education group. By use of B-mode ultrasound, mean maximum IMT from 6 carotid segments was used to determine pretest and posttest IMT values. Regression analysis and ANCOVA were performed. RESULTS: Age and pretest IMT were found to be predictors of posttest IMT values and were used as covariates. The TM group showed a significant decrease of -0.098 mm (95% CI -0.198 to 0.003 mm) compared with an increase of 0.054 mm (95% CI -0.05 to 0.158 mm) in the control group (P=0.038, 2-tailed). CONCLUSIONS: Stress reduction with the TM program is associated with reduced carotid atherosclerosis compared with health education in hypertensive African Americans. Further research with this stress-reduction technique is warranted to confirm these preliminary findings.

Publication Types:
Clinical Trial
Comparative Study
Randomized Controlled Trial
Research Support, U.S. Gov't, P.H.S.

PMID: 10700487 [PubMed - indexed for MEDLINE]
Emotions and Disease
Ruthy Levy Guyer, Ph.D.

How tightly are emotions and diseases linked to each other? Can someone actually die from loneliness? Is it really possible to become sick with fear?

When the great French Impressionist painter Renoir suffered from both severe arthritis and bouts of depression, his contemporaries gave only passing thought to the possibility that his two problems might in some way be connected. But today there are so many examples of ties between the workings of the brain and the reactions of the body—stressed executives who die of heart attacks during fiery board meetings, survivors of wars, earthquakes, and floods who subsequently experience severe physical disabilities, and widows and widowers who become ill themselves soon after their spouses have died—that the question has changed from “are emotions and diseases related?” to “how are the two related?”

These issues and questions are the subjects of Emotions and Disease, a museum exhibit (1) that examines the evolution of scientific, medical, and public understanding of the links between health and strong emotions like anger, love, stress, and fear. Two powerful and changing variables—the tools of the day and the philosophies of the times—shape and influence understanding of these relations.

In the 18th and 19th centuries, when it became possible to listen to the sounds of the heart with a stethoscope and look at cells and tissues with microscopes, doctors found they could account for most of the diseases of their patients with concrete examples of changes in anatomy or physiology—the numbers of white cells in the bloodstream would definitely increase in response to infections, the heart would beat much too rapidly when a patient experienced episodes of lightheadedness or breathlessness, and so on. Because they could point to such “evidence,” most doctors were skeptical that emotions “could have much to do with disease.”

A contemporary view of cells in the bloodstream—lymphocytes, red blood cells, macrophages and monocytes. The cells are seen through a scanning electron microscope. Courtesy of Bruce Wetzel and Harry Schaefer, National Cancer Institute.

But there was always the rare patient who had a serious illness for which no “organic” cause could be found or measured. These patients were said to have “functional neuroses,” problems that in some vague way had to do with their nervous systems.

At the end of the 19th century, the French neurologist Jean-Martin Charcot set his large boxy accordion-sized camera to the study of hysterical patients. Charcot’s photographs captured the “fits” of his patients and thereby demonstrated that hysteria was no different from the organic diseases: it too was associated with distinguishing symptoms. “The camera did not lie.” Although Charcot’s pictures showed what was happening, they did not come close to explaining why.

Enter Sigmund Freud and his colleague Josef Breuer. Their approach — “less in looking and more in listening” — was known as psychoanalysis. It involved intensive probing over many months, years, or even decades into past events in patients’ lives that may have led to the patients’ current problems. Their slant was that physical symptoms could have “emotional causes and biographical meanings.”
By 1950, psychosomatic illness and medicine were so deeply embedded in popular culture that they had found their way to Broadway. In the musical Guys and Dolls, which premiered that year, Adelaide sings, “...just from worrying whether the wedding is on or off, a person can develop a cough...”

Adelaide was suffering from what Hans Selye, a physician in Montreal, had labeled a “stress syndrome.” And she was not alone. Stress seemed to be an increasing fact of life. Selye said that, under certain circumstances, it was right for people and other animals to respond with stress responses to dangerous and frightening stimuli. He identified three stages to the response. The first was the “alarm reaction” during which bodily defenses are mobilized to the stressful situation; the second was the “stage of resistance” in which the person adapts to the situation that is causing stress, and the third was the “stage of exhaustion” in which the stress response dies out (2). When a person sees a tiger, for example, there is initial shock but then flight. And when tiger and person no longer share the same turf, the stress response appropriately ends.

Selye speculated that, in western cultures, people are bombarded with constant noise, constant danger, relentless feelings of powerlessness and hopelessness, and unremitting pressures at home and at work—what cartoonist Scott Adams has been capturing in his popular character Dilbert. Simply stated, stress never ends, and the stress response remains stuck in the “on” position for days, months, even years, tipping the balance away from health toward stress syndromes that can have both physical and emotional components.

Selye's insights and hypotheses came unintentionally from his laboratory experiments with rats. He had not been studying stress at all. He was not adept at handling the rats and often bungled an experiment by dropping an animal while he was trying to give it an injection. Over the course of the experimental period, many of Selye’s rats developed ulcers, shrunken immune tissues, enlarged glands and other physical signs and symptoms that were in no way associated with the substances he was injecting. He concluded that the animals’ physiologic problems must be “due to the strains of life in his laboratory.”

If the pace of everyday life could cause stress responses in animals and people, then it came as no surprise that crises—wars and other traumatic situations—could produce even more dramatic stress responses and stress-associated diseases. In fact, roughly 20% of the disabled soldiers from World War II were classified as “shell shocked” or suffered from “combat neuroses.”

In a fascinating documentary film made after World War II by Hollywood director John Huston, a soldier with paralyzed legs is helped onto a hospital bed by two attendants. The doctor in the film hypnotizes the soldier, taking “a shortcut to his unconscious mind” by injecting him with the drug sodium amytal. Doctor and patient discuss the soldier’s inability to walk, the nature of his “neuropsychiatric problem,” why and how the paralysis began two days earlier, and what sorts of stresses he has encountered at home since he returned from the battlefield. The film ends with the hypnotized soldier moving his legs, getting up off the table, and then rapidly regaining his...
ability to walk as a result of the doctor’s “suggestion” and verbal encouragement. Days later, the soldier is playing a vigorous game of baseball, hitting a home run, and sprinting around the bases.

Few psychiatric symptoms and illnesses are “solved” as easily as were the problems of the film’s soldier. (Few strictly medical ones are either.) But, the movie graphically illustrates the point that health is “a state of the whole brain and body.”

Today, “a critical mass of solid sophisticated scientific research” documents the mind-body connection, notes exhibit co-director Dr. Esther Sternberg and these data are being accepted by “researchers in the hard-core biological disciplines.” Sternberg commented that at a recent meeting of brain-immune interactions that included researchers in numerous fields—psychiatry, neurobiology, neurology, endocrinology, immunology, neuroimaging, rheumatology, psychology—“scientists all along the spectrum were learning the language of other disciplines and finding ways to interact.”

Among the most valuable new tools for studying emotions and disease are “imaging” devices, like PET and MRI scanners, which record brain activities as they are taking place. These cutting-edge technologies were, says exhibition manager Patricia Tuohy, the most challenging parts of the exhibit to develop and present. “Everyone can relate to feeling withdrawn, to feeling anxiety. But making science accessible to the public was the hardest part. We had a big chunk of science to deal with, but we still had to talk about ‘me’ and what happens to my body. This most sophisticated science is all brand new.” Commented one guest at the opening of the exhibit: “Scientists have instincts; technology is letting them prove them.”

The genes that are active in the hypothalamus of the brain can be seen by combining molecular biology techniques and computerized imaging microscopy. The stained areas indicate exactly where the genes are expressed. Courtesy of Miles A. Herkenham, National Institute of Mental Health, NIH.

New model systems—knockout and transgenic mice—have also boosted understanding and given insights into the roles of individual genes in various diseases. Says Sternberg: “Part of how stress affects disease severity depends on you and your genes. Genes affect susceptibility and resistance to inflammatory and infectious diseases. You have to look at it as a package. But with strong enough stresses, even the most tuned-down system will respond.” She comments that it may be most accurate to say that “stress is not what happens to you but how you respond to it.”

In the early 20th century, decorative containers like this one were put on display in drug stores and symbolized the growing power of pharmaceuticals. From the Elaine and Arthur Shapiro Collection.
Ancient physicians understood disease as an imbalance of four fluid „humors” in the body—phlegm, blood, black bile, and yellow bile; a person could become healthy only when the balance was restored. Scientists today also talk about achieving a balance. This time around, the balance is understood in molecular terms, involving circulating molecules called interleukins, neurotransmitters, and hormones that send signals to each other and make people sick or well.

Strong, painful emotions trigger these chemical messengers in ways that tip the balance toward disease. Good health represents a different molecular balance. Laughter may thus actually be, as the saying goes, „the best medicine.”

References:
• Emotions and Disease is currently on display at the National Library of Medicine on the campus of the National Institutes of Health in Bethesda, Maryland. The show will run through 1997 April. The exhibit was made possible by support from the Charles A. Dana Foundation, the John D. and Catherine T. MacArthur Foundation, and the National Institute of Mental Health. All of the images in this story are from the exhibit.
• From American Journal of Nursing 1965, 65(3): page 98.
• The exhibit was developed by Sternberg, a neuroendocrinimmunologist and Dr. Elizabeth Fee, a historian of medicine.
• Third International Congress of the International Society for Neuroimmunomodulation, Bethesda, MD, November, 1996.

Gene Variants Affect Human Stress Resilience

Inherited genetic variations that affect an anxiety-reducing molecule help explain why some people can withstand stress better than others, according to a new study.

Mood and anxiety disorders have been found by previous studies to have a genetic component. A nationwide team of researchers led by Dr. David Goldman of NIH’s National Institute on Alcohol Abuse and Alcoholism (NIAAA) set out to investigate genetic variants of a signaling molecule called neuropeptide Y (NPY), which is induced by stress. Found in the brain and other tissues, NPY’s release helps to reduce anxiety. It affects appetite, weight control and emotional responses. The researchers suspected that NPY variants might contribute to maladaptive stress responses that often underlie mood and anxiety disorders.

Analyses of human brain and other tissue samples allowed the research team to identify gene variants that affect the expression of NPY—that is, of how much of the protein is produced. The results were reported online in Nature on April 2, 2008.

To evaluate the gene variants’ effects on brain responses to stress and emotion, the researchers used functional brain imaging to look at the amygdala, the brain’s fear and anxiety center. They found that people with the variant yielding the lowest NPY levels reacted with heightened emotion to images of threatening facial expressions. „Metabolic activity in brain regions involved in emotional processing increased when these individuals were presented with the threatening images,” Dr. Goldman said.

Previous studies showed that NPY exerts its effects through interactions with opioid compounds. Opioids are produced by the body to help suppress pain, stress and anxiety. In another set of experiments, the researchers found that people with the low-level NPY variant were less able to tolerate moderate levels of sustained muscular pain. Brain imaging showed that they released less opioid neurotransmitter in response to the muscle discomfort than people with higher levels of NPY.

„Their emotional response to pain was also higher,” Dr. Goldman said, „showing the close tie between emotionality and resilience to pain and other negative stimuli.”

In a preliminary finding, the low-level NPY gene variant seemed to be more common than other variants among a small sample of people with anxiety disorders. Low-level NPY expression was also linked to high levels of anxiety.
This research supports the idea that NPY plays a role in reducing anxiety. It also helps explain why people vary in their resiliency to stress.

“Stress response is an important variable in vulnerability to alcohol dependence and other addictions, as well as other psychiatric disorders,” said NIAAA Director Dr. Ting-Kai Li. “This finding could help us understand individuals’ initial vulnerability to these disorders.”

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9000 Rockville Pike
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Department of Health and Human Services

Good Coping Skills May Raise ‘Good’ Cholesterol Levels

By Kathleen Doheny

WebMD Medical News

Reviewed by Louise Chang, MD

Aug. 20, 2007 -- The better you cope with stress, the better your “good” cholesterol level is likely to be, according to a new study.

“We know that stress and hostility affect cholesterol,” says researcher Carolyn M. Aldwin, PhD, professor and chairwoman of the department of human development and family sciences at Oregon State University in Corvallis. There has been less research, however, on how coping skills can counteract the effects of stress, she says.

Good coping skills were associated with better levels of the so-called “good” cholesterol or high-density lipoprotein (HDL) in her study.

The study was released at the 115th annual convention of the American Psychological Association in San Francisco.

Stress and Cholesterol

Aldwin and her colleagues evaluated data from 716 men who participated in the Normative Aging Study. The researchers looked at the interplay of hostility, stress, coping, and the participants’ cholesterol levels.

The average age of the participants was 65; most were white. They were evenly split between white-collar and blue-collar occupations.

The researchers assessed the men’s hostility and asked them to describe their most stressful problem in the past week.

The men also completed a questionnaire that asked them to rate how often they used 26 different coping strategies when dealing with a stressful problem in the past month. Some were unhealthy strategies, such as socially isolating themselves when under stress or blaming themselves for the stress. Other strategies were healthy, such as making a plan of action to deal with the problem causing the stress.

The more hostile the men were, the more likely they were to look at problems as stressful. They were also more apt to use unhealthy coping skills to deal with that stress.

After fasting overnight, the men’s blood was tested for HDL cholesterol, low-density lipoprotein (LDL) or “bad” cholesterol, and triglycerides.

Coping Skills Aid HDL Cholesterol

The results were a surprise, Aldwin tells WebMD. “What we were really expecting is that coping would mitigate the effects of stress on LDL,” she says. But the researchers found that the good coping skills only helped the protective effect of the “good” HDL cholesterol.

“People who coped well had higher levels of HDL than people who didn’t cope well,” she says. She cannot cite an exact improvement in HDL or an average HDL level among those who coped
well. “This is simply a correlational study,” she says, finding an association between good coping skills and better HDL levels.

The amount of stress you deal with isn’t as important, they also found, as how you deal with it. “Stress doesn’t matter nearly as much as how you cope with it,” she says.

The more hostile the men were, the worse the LDL and triglyceride levels, the researchers also found.

While the study included only men, Aldwin says she would think the same findings would apply to women.

It’s been known for years, Aldwin says, that stress affects LDL and makes it rise. “Stress raises total cholesterol levels in general and it raises LDL levels,” she says.

The results “are consistent” with research by Peter Vitaliano, PhD, professor of psychiatry and behavioral sciences, psychology, and health services at the University of Washington in Seattle. The new study, Vitaliano says, “adds to the body of research on how hostility relates to health, in particular heart disease.”

Other research, he says, also found that “avoidance” coping, such as blaming oneself, is unhealthy and related to hostility and anger. “Both of those are related to blood pressure elevation and lower HDL,” he says.

“Hostility is also associated with higher blood glucose levels in healthy people and in diabetics,” he says, “and that raises the risk of heart disease.”

Hostile people, he says, “often use emotion-focused coping,” he says. “They use emotions like anger and avoidance instead of problem solving.”

Ideally, total cholesterol levels should be below 200 mg/dL, according to the American Heart Association. HDL levels 60 mg/dL and above are heart-protective, while levels below 40 in men and below 50 in women are considered low and a risk factor for heart disease. LDL below 100 mg/dL is optimal, and below 130 is “near or above optimal.” Triglycerides should be below 150 mg/dL.

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Perspiration decreases and GSR rises, thus our GSR BIOFEEDBACK “BIOTRAINER” (GBF-2000) is developed with the following features:

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<thead>
<tr>
<th>Feature</th>
<th>Specification</th>
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<tr>
<td><strong>DISPLAY</strong></td>
<td>17 Light steps on screen (Green 11. Yellow 1. Red 5) GSR balanced (starting) Value and also the changes in the GSR value in K - ohm is displayed on LCD panel meter</td>
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<tr>
<td><strong>SOUND</strong></td>
<td>Melodic variation in 17 steps</td>
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<tr>
<td><strong>SENSITIVITY</strong></td>
<td>3 steps 2%, 5% and 10%</td>
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<tr>
<td><strong>POWER</strong></td>
<td>220 VAC, 50 Hz</td>
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<tr>
<td><strong>DIMENSIONS</strong></td>
<td>420 x 210 x 125 (H) mm</td>
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<td><strong>OUTPUT</strong></td>
<td>Provided for Recorder, Oscilloscope Computer and others</td>
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<tr>
<td><strong>ACCESSORIES</strong></td>
<td>Set of silver electrodes Headphones</td>
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- **Sensitivity**: 3 steps 0.05, 0.02, 0.5 °C
- **Transducer**: Solid State Sensor
- **Power**: 20 VAC, 50 Hz
- **Dimensions**: 420X210X125 (H) mm
- **Output**: Provided for Recorder, Oscilloscope Computer and others
- **Accessories**: Temperature sensor prob/Headphone

**EMG BIOFEEDBACK "BIOTRAINER" (MBF-4000)**

High stress in pregnancy tied to stillbirth risk

**Monday, June 23, 2008**

By Amy Norton

NEW YORK (Reuters Health) - Women who are under high psychological stress during pregnancy may have an elevated risk of stillbirth, a new study suggests.

Over a 10-year period, the researchers found that of more than 19,000 Danish women who were pregnant those who reported high levels of psychological stress were 80 percent more likely to suffer a stillbirth than women with low stress levels.

Most women with high stress levels did deliver a healthy baby, with the stillbirth rate being just under 5 percent. However, women with low or moderate stress levels had a stillbirth rate of about 3 percent, the researchers report in the medical journal BJOG.

This is the first study to establish a link between psychological stress and stillbirth, so it’s too soon to conclude that stress causes fetal deaths, lead researcher Dr. Kirsten Wisborg told Reuters Health.

“Our result should be confirmed by other studies,” said Wisborg, of Aarhus University Hospital in Denmark.

If heavy stress is confirmed as a risk factor for stillbirth, she noted, then it will be necessary to see whether stress reduction can lower the risk.

The researchers based their findings on data from 19,282 women who were scheduled to deliver a single infant at their hospital between 1989 and 1998. The women completed several questionnaires during their pregnancy, including a standard measure of psychological stress that they completed before their 30th week of pregnancy.

The questionnaire also asked them about their stress levels in the past month -- gauging, for instance, how often they had felt unhappy, worried or unable to deal with their problems.

Wisborg’s team found that women with high stress scores were more likely to be smokers or to have been overweight before pregnancy than women with low stress levels; they were also less educated overall and more likely to be single.

However, even with these factors taken into account, high stress alone was linked to an 80-percent higher risk of stillbirth.

Wisborg said she could only speculate on the reasons. One possibility is that chronically high stress hormones play a role.

For example, Wisborg noted, stress, depression and anxiety all trigger the release of catecholamines, a group of hormones that includes dopamine and epinephrine (adrenalin). Animal research suggests that high levels of these hormones may hinder blood flow to the placenta.

However, Wisborg pointed out, it is also possible that women under heavy stress differ from less-stressed women in their lifestyle habits, which might explain the higher stillbirth risk.

Further studies are needed to sort these questions out, she said.

THE ADRENAL MEDULLA, CATECHOLAMINES, & STRESS AS A CAUSE OF HYPO-ADRENA

Chief Editor:

William Nelson Prof of Medicine, IMUNE

ABSTRACT:

In this review article we will review the anatomy of the adrenal glandular system and the large effect on the health of a human. The adrenal glands make the adrenalin and other catecholamines that operate the Sympathetic Nervous system. This effects every cell of the body. The balance of the sympathetic and para-sympathetic nervous system is crucial for health. Medicine has now laid out the psych-neural-immunol. link of the various systems of the body. The research is very extensive of just how stress reduction can help any disease. The effect of stress reduction’s positive effects on health are obvious to absolutely all in medicine except those who do not like drugless therapies. Only a hidden motive would allow some one to see the negative effect stress reduction has on the body. Selye stress system of medicine is a most eloquent system. Understanding Stress as a multitude of stressors should be the basis of medicine, not the synthetic pharmaceutical drug treatments currently emphasized. Medicine must face this fact to progress.

ANATOMY

ADRENAL GLANDS

Adrenal glands are paired organs located above the kidneys. Each adrenal consists of two separate glands, an outer adrenal cortex and an inner adrenal medulla. Though the two glands have different embryological origin, structure, and hormonal secretions, at least with respect to responses to stress, their functions are synergistic and aimed at a common goal. See Fig 1.

CHROMAFFIN CELLS AND CATECHOLAMINES. The adrenal medulla is essentially part of the sympathetic division of the autonomic nervous system, being in fact a modified sympathetic ganglion. The secretory cells of the adrenal medulla, called the chromaffin cells, are equivalent to postganglionic sympathetic neurons that have lost their axons. The chromaffin cells contain vesicles filled with epinephrine and norepinephrine. These biogenic amines, collectively called catecholamines, are produced from the amino acid phenylalanine via several enzymatic chemical reactions in the chromaffin cells, as follows: Phenylalanine® p-tyrosine®Dopa®Dopamine®No repinephrine®Epinephrine. Recently, the opiate peptide endorphin has also been found in the chromaffin cells. This analgesic (anti-pain) peptide is co-secreted with the catecholamines. In this review article we will review the anatomy of the adrenal glandular system and the large effect on the health of a human. The adrenal glands make the adrenalin and other catecholamines that operate the Sympathetic Nervous system. This effects every cell of the body. The balance of the sympathetic and para-sympathetic nervous system is crucial for health. Medicine has now laid out the psych-neural-immunol. link of the various systems of the body. The research is very extensive of just how stress reduction can help any disease. The effect of stress reduction’s positive effects on health are obvious to absolutely all in medicine except those who do not like drugless therapies. Only a hidden motive would allow some one to see the negative effect stress reduction has on the body. Selye stress system of medicine is a most eloquent system. Understanding Stress as a multitude of stressors should be the basis of medicine, not the synthetic pharmaceutical drug treatments currently emphasized. Medicine must face this fact to progress.

Each time the sympathetic nervous system is strongly stimulated, the activity of the adrenal medulla increases. Thus, during fear and excitement or stressful muscular exercise (running, physical exertion, and struggle), stimuli from various parts of the nervous system impinge on the hypothalamus, which, among other things, acts as the highest center for the regulation of sympathetic responses. Excitatory fibers from hypothalamic neurons descend in the spinal cord, stimulating the preganglionic sympathetic neurons. The preganglionic fibers enter into the two chains of sympathetic ganglia, one on each side of the vertebral column, releasing acetylcholine and sympathetically stimulating the postganglionic neurons. The latter send their fibers to the visceral organs and skin. Norepinephrine is the neurotransmitter at these nerve endings. The adrenal medulla receives a long preganglionic sympathetic fibers (via a splanchnic nerve). CATECHOLAMINE ALPHA AND BETA RECEPTORS. Catecholamine hormones reach their target organs and bind with specific adrenergic receptors present on the cell membranes of their target organs. The adrenergic receptors are divided into the alpha and beta types. Norepinephrine binds mostly with the alpha receptors; epinephrine can bind with both types. The particular responses of the target organs depend on the kind and number of receptors present in the cells of the organ. Also, because sympathetic nerve fibers release only norepinephrine, they tend mainly to activate the alpha receptors. The adrenal medullary secretion, being a mixture of both catecholamines, tends to activate both types of receptors.

CATECHOLAMINES IN FIGHT-FLIGHT RESPONSES. The functions of the adrenal medulla and the effects of its hormones are best understood in terms of the preparation of the body for unexpected stressful situations such as fight-flight, or exercise. In all these responses, the intense muscular activity demands increased blood flow, nutrients, and oxygen supply.

Consider a person who is running fast. The need for increased oxygen and fuel for muscles demands increased delivery of blood by the heart. Thus, cardiac output (heart rate and cardiac contractility) must be increased (see plate 39). At the same time, the blood vessels to the heart and muscles must be dilated while those to the skin and visceral organs must be constricted, shunting the blood to where it is most needed (muscles and heart). The respiratory activity must be increased and the bronchioles dilated to supply more oxygen and remove more carbon dioxide. All these responses are brought about by various effects of epinephrine and norepinephrine acting on the target organs.

Epinephrine acts mainly on the heart, causing increased rate and contractility; norepinephrine acts on the visceral blood vessels (arterioles) to cause vaso-constriction, increasing blood pressure and shunting blood to muscles. This differential response occurs because the heart contains mainly beta receptors which bind preferentially with epinephrine, and visceral arterioles have the alpha type, which bind with norepinephrine. The smooth muscles of bronchioles and those of arterioles of the heart and muscle contain beta receptors. These receptors, when activated by epinephrine, relax the smooth muscles, causing vaso-dilation and bronchiolar dilation.

Metabolically, the body demands increased nutrient supply. Epinephrine increases glycogen breakdown in the liver and fat in the adipose tissue to mobilize ample fuel substances (glucose and fatty acids). Lastly, catecholamines act on the brain to increase arousal, alertness, and excitability. They also act on the iris of the eye to dilate the pupil, thus permitting more light into the eyes and enhancing peripheral vision.
In short, the functions of the adrenal medulla should be construed as complementary and synergistic with the functions of the sympathetic nervous system.

**THE ADRENAL CORTEX: CORTISOL AND STRESS**

Cortisol is the chief steroid hormone secreted by the cells of the middle part of the adrenal cortex (zona fasciculata). The best known action of cortisol is to increase the blood glucose supply for tissues, mainly the brain and heart. Cortisol exerts this action by promoting catabolism of proteins and by stimulating the conversion of the resultant amino acids to glucose, a process known as gluconeogenesis. Gluconeogenesis occurs principally in the liver. It is for this role in carbohydrate metabolism that cortisol and similar steroids are called "gluco"-corticoids.

Cortisol has numerous other effects in the body. Many of these, along with the gluconeogenic action are intimately related to body responses in various "stress" conditions. Some of these responses are short term, exerted in conjunction with the catecholamines from the adrenal medulla. Other cortisol actions are exerted independently and are longer lasting. Because of the importance of cortisol in defense of the body against noxious and traumatic stresses, this hormone is considered essential for life. Adrenalec-tomized animals and humans may die if exposed to sudden unexpected stresses.

**REGULATION OF SECRETION.** A variety of stressful conditions (cold, fasting, starvation, loss of blood pressure [hypotension], hemorrhage, surgery, infections, pains from wounds, fractures, inflammations, severe exercise, and even emotional traumas) all act on the brain to elicit the release of CRH (corticotropin-releasing hormone) from the hypothalamus. CRH stimulates the release of ACTH (corticotropin), a polypeptide hormone, from the corticotrop cells of the anterior pituitary. ACTH acts on the adrenal cortex, stimulating the synthesis and release of cortisol.

Once the cortisol level is sufficiently elevated, CRH and ACTH secretion are decreased through the negative-feedback effect of cortisol on the hypothalamus. This reduces the cortisol level back to the normal baseline condition. When stress is chronic, the brain overrules this control. Continued stimulation of zona fasciculata by ACTH leads to hypertrophy (excess growth) of this area and enlargement of the adrenal cortex. Other zones remain unaffected.

**SYNERGISM OF CORTISOL AND CATECHOLAMINES.** In many instances of short-term responses to stress, both cortisol and catecholamines are secreted from the adrenal gland. The increased release of cortisol occurs rapidly, within a few minutes. Although the effects of catecholamines in these instances are well known, those of cortisol are not. Cortisol may promote the effects of catecholamines. For example, the vasoconstriction and fatty acid-mobilizing effects of catecholamines are markedly reduced in the absence of cortisol.

**CORTISOL AND ADAPTATION TO STRESS.** The effects of cortisol in promoting long-term metabolic adaptation are better known. This adaptation is necessary to improve defenses, promote tissue repair and wound-healing, and to provide adequate nutrients in the form of glucose and amino acids. Consider, for example, an animal, hurt, with broken bones and immobilized, or a man stranded in the sea, overcome by starvation, fatigue, sunburn, anxiety, and despair (stress conditions). Food intake being nil, liver and muscle glycogen stores are soon exhausted, threatening the supply of glucose to the nervous system and the heart. This may have disastrous consequences, because, under normal conditions, the brain relies practically entirely on glucose for its energy needs. Adequate supplies of amino acids are also needed for tissues that must regenerate, repair, or grow. The amino acid-mobilizing and gluconeogenic actions of cortisol are essential in combating these stress related deficiencies.

Increased secretion of cortisol acts on muscle, connective tissue (bones, etc.), and lymphatic tissue, stimulating the catabolism of their labile protein reserves. The "mobilized" amino acids are taken to the liver, where, after deamination (removal of the amine group), they are converted to glucose (gluconeogenesis). Cortisol stimulates the synthesis of gluconeogenic enzymes in the liver. The newly formed glucose ensures adequate fuel supply for the brain and heart. In addition, cortisol reduces the uptake of glucose by muscle cells, sparing glucose supply for the brain and heart.

Amino acids liberated by tissue catabolism are not all utilized for gluconeogenesis; some are shunted to tissues that need them for repair and regeneration. Others are used in the liver for synthesis of blood proteins necessary for survival. Under the influence of cortisol and catecholamines, the triglycerides of the fat cells are broken down, and fatty acids are mobilized. The latter can be used by the muscle, heart, and liver for energy.

**PERMISSIVE ACTIONS AND DIURNAL VARIATION.** Several actions of cortisol are "permissive." Thus, cortisol must be present for glucagon and growth hormone to exert their actions on the liver (glycogenolysis) and adipose tissue (lipolysis) and for catecholamines to cause vasoconstriction.

Normally, the secretion of cortisol shows a "diurnal" (daily) cycle, the secretion rate being highest in the morning and lowest in the evening. This cyclicity is regulated by centers in the hypothalamus and is independent of stress.

**CORTISOL AS A DRUG.** Treatment with large doses of cortisol (pharmacologic doses) has therapeutic effects against inflammations produced by wounds, allergies, or rheumatoid (joint) diseases. It is not known how these pharmacologic effects of cortisol are exerted or whether they occur during "physiological" defenses.

**STRESS-RELATED DISEASES.** In chronic stress, excess cortisol may have detrimental and harmful effects. Thus, stomach ulcers, atrophy of lymphatic nodes, reduction in white blood cells (decreased immunity), hypertension, and vascular disorders are often observed after severe stresses. All diseases are stress related.

Dr. Hans Selye Outlined a very thorough and profoundly elegant form of medicine dealing with stress. Stress comes in many forms as we outline in the other works. When stress enters it produces an Alarm reaction. Here we have symptoms. As the stress continues the body goes into an Adaptation phase where the disease progresses inward while the symptoms go away. Allopathy which deals with symptoms can not work. Being symptom free is not an indicator of “physiological” defenses. Diseases are stress related. Dr. Hans Selye outlined a very thorough and profoundly elegant form of medicine dealing with stress. Stress comes in many forms as we outline in the other works. When stress enters it produces an Alarm reaction. Here we have symptoms. As the stress continues the body goes into an Adaptation phase where the disease progresses inward while the symptoms go away. Allopathy which deals with symptoms can not work. Being symptom free is not an indicator of health. As the stress continues there is an Exhaustion stage where the organs fail and eventually there is death. This is the pathway of disease. Modern medicine is lost chasing symptoms and spending vast amounts of money trying to diagnose diseases without any consideration of the pathway of the disease.

In the medicine of Dr. Hans Selye the only diagnosis needed is stress. This is International Classification of Disease (ICD numbers) number 308 is for stress. The work of the Hungarian doctor Janos (Hans) Selye showed the world a proper medicine based
on stress reduction and stress control. He showed the negative effects of stress on the body and the physiology. Stress starts by producing an Alarm response in the patient which will provoke symptoms. If the stress continues the body will go into an Adaptation stage which is symptom free. The disease progresses as the symptoms reduce.

LACK OF SYMPTOMS IS NOT A PERFECT SIGN OF HEALTH.

The patient can have deep disease and be symptom free. The SCIO device and software can analyze stress and treat stress. Stress can be of many types from toxicity, trauma, deficiency, perverse energy, pathogens, allergy, heredity, mental factors and others. Stress reduction and behavioral medicine should be the core of medicine. This system uses Biofeedback and TENS to detect stress and treat the same.

Selye Pathway of Disease
Health is Ease of Flow, Dis-ease when ease is disrupted
Stress Enters >>> 1. Alarm State; Symptoms which are messengers of dis-ease.
Stressor Continues >>2. Adaptation Stage; symptoms go away, disease deepens
Stressor Continues >>3. Exhaustion Stage; disease deepens and accelerates
1st  A. Functional Disorders, the functional regulation of the organs is diminished
2ndB. Organic Disorders; now the physical structure of the cells is effected
Swelling = Hypertrophy, Shrinkage = Atrophy
Stressor Continues >>4. Death Stage, cellular death, gland death, organ death, organ system death, organism death

There are several very important points to remember about energetic Medicine. Study and learn these points as that they are ultimately important for the progress of this art in medicine. In other professional endeavors new research and discoveries are universally circulated and discussed. In Homeopathy however new discoveries are often ignored. The educated however seek out and investigate new discoveries with zeal. The research and trends in homeopathy are revealing many interesting new concepts. This is leading to a new Peridyme in medicine. The research has demonstrated certain cofactors that enhance the endotoxin effect. Stability and safe methods of administration have also been investigated. 1994 saw the start of a specific journal for endotoxins. (ref Studies, Endotoxins,1995 )

In fact vast Quantities of new research has shown a new wealth of immunomodulation and immune stimulation effects of a host of bacterial residues or endotoxins. Staph and Strep endotoxins show positive treatment for cancer. Nocardia and other mycobacterial endotoxins have shown positive immunostimulation effects in many conditions. (ref Books, 19, Guenounou, 1995)

STRESS REDUCTION SUGGESTIONS
Stress is the most incipient killer of people today. Stress is responsible for 70 to 80 percent of the disease in America. Stress reduction is a must in today’s society for longevity, health and happiness. Below are some simple rules for fighting this unseen killer.

1. Stress awareness begins with recognition or awareness. Our stress inventory provides insight into the amount of stress in our lives. As we become aware of stress, we can begin to deal with it. The “ostrich” technique of stress reduction never works.

2. Humans resist change. Whether change occurs in the body, mind, social, spirit or environment, most humans will resist. To learn to relax, we must learn to break our old habits of stress reaction and substitute more productive reactions such as clear thinking, calm headed and relaxed understanding. To change requires perseverance, positivity, proper goals and beneficial rewards. Whether changing eating habits, exercise routines, stress reactions or social skills, change requires work, but the rewards of a healthy body and mind for you and your family are worth it.

3. Stop addictive behavior. Whether it is coffee, soda, sugar, heroin, cocaine, alcohol, etc. an addiction is an addiction. Addiction to stimulants will always rob health and always cause disease. If you care for your children, you would fight to stop them from using heroin. But so often we let them indulge in potato chips, candy bars, tobacco, etc. The seeds of addictive disease. If you care for your children, you would fight to stop them from using heroin. But often we let them indulge in potato chips, candy bars, tobacco, etc. The seeds of addictive behavior stem from “stimulation dependency” in our youth. If we are to truly conquer drugs, then we must stop addiction to stimulation or depression early in life. To stop addiction break it’s bond as early as possible. Just say no, if you really care.

4. Relax after meals. Allow at least 30 minutes after a meal to relax with comfortable music (not hard rock and roll), good spiritual books (not tax literature), good conversation (not argumentation), or some other relaxing diversion. Do not lie down. Sitting, standing or a light walk is recommended. Let your body focus on digestion for the best effect.


The research has demonstrated positive effects of these endotoxins on immune function, alcohol damaged livers, radiation defence, ACTH level, serum T4, lymphotropic sensitivity, peripheral lymphocyte number and effectiveness, trauma recovery, serum ribonuclease activity, catecholamine storage, digestion, and positive effects on bowel flora. The research has also demonstrated certain cofactors that enhance the endotoxin effect. Stability and safe methods of administration have also been investigated. 1994 saw the start of a specific journal for endotoxins. (ref Studies, Endotoxins, 1995)
5. Allow one to two hours for worry or think time per day. Make this a quality think time to completely analyze your problems and concerns. Any more than 2 hours a day and your mind will distort the problem and not produce a solution. Excessive worry will produce more problems and more worry until this violent spiral results in disease. Use your quality think time to develop quality solutions you can act on to really help you solve your problems and concerns.

6. Take 30 minutes a day for relaxation and silent reflection. Concentrate on calmness, acceptance, relaxation, health, peace, stillness, etc. Save your active thinking for later. Let this still time be one for producing calmness. Wear comfortable clothing, find a quiet spot and let those around you know how important this time is to you.

7. During this quiet time, relax tense muscles. Breathe deeply and slowly. Calm and relax your mind as you detach yourself from the turmoil of the day. Let go of your troubles and fill your thoughts with positive thoughts. Use this daily experience to foster your mind and body develop your inner health.

8. Remember, laughter is the best medicine.

9. Learn the laws of good health.
stress
Hormonal Feedback Mechanism

Hypothalamic stimulation triggers a complex feedback mechanism that controls the blood levels of many hormones. First, the hypothalamus sends releasing and inhibiting factors or hormones to the anterior pituitary. In response, the anterior pituitary secretes tropic hormones, such as growth hormone (GH), prolactin (PRL), adrenocorticotropic hormone (ACTH), thyroid-stimulating hormone (TSH), follicle-stimulating hormone (FSH), and luteinizing hormone (LH), and sends them to an appropriate target gland. This, in turn, stimulates the target organ to release hormones that regulate various body functions. When these hormones reach normal levels in the body tissue, a feedback mechanism inhibits further hypothalamic and pituitary secretion.

For example, reduced cortisol levels in body tissues stimulate the hypothalamus to send corticotropin-releasing factor to the anterior pituitary, which then secretes ACTH. In turn, ACTH stimulates the adrenal cortex to secrete cortisol. When cortisol levels reach normal, they inhibit hypothalamic secretion of corticotropin-releasing factor, which in turn prevents the pituitary from secreting ACTH.

Adrenal Gland + Connection

Glands which release chemicals directly into the bloodstream.

- Hypothalamus
- Pineal
- Pituitary gland
- Parathyroid gland
- Thyroid gland
- Thymus gland
- Adrenals
- Pancreas
- Ovary (female)
- Testis (male)
**Adrenal Gland + Connection**

Glands which release chemicals directly into the bloodstream.

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- Thymus gland

**Adrenals**

- Pancreas
- Ovary (female)
- Testis (male)
Integrating a portable biofeedback device into clinical practice for patients with anxiety disorders: results of a pilot study.

Reiner R.
Behavioral Associates, 114 East 90th Street, New York, NY, 10128, USA. Robert.reiner@nyu.edu

This study examined the effectiveness of a portable Respiratory Sinus Arrhythmia (RSA) biofeedback device as an adjunct to CBT in persons with anxiety disorders and other disorders associated with autonomic dysfunction attending outpatient treatment. Participants were 24 individuals attending outpatient cognitive behavioral treatment for a range of anxiety disorders. Participants were assessed over a 3 week period. Outcomes included measures of anxiety (STAI-Y), sleep disturbances (PSQI), anger (STAEI), and subjective questions about the effectiveness of the device as a treatment adjunct. Significant reductions were found for anxiety and anger and for certain sleep variables (e.g. sleep latency). There was a significant dos-effect in that those who were more compliant had significantly greater reductions in most domains including sleep, anger and trait anxiety. Overall, participants found the device more helpful than other relaxation techniques such as mediation, yoga and unassisted breathing techniques but less helpful than exercise. The most frequently endorsed side effects were dizziness (15%) and sleepiness (55%). These preliminary results suggest that portable RSA biofeedback appears to be a promising treatment adjunct for disorders of autonomic arousal and is easily integrated into treatment. Results support the need for further investigation with more rigorous experimental designs.

PMID: 18286369 [PubMed - in process]

Medical Encyclopedia: Bruxism

URL of this page: http://www.nlm.nih.gov/medlineplus/ency/article/001413.htm

Alternative names
Teeth grinding and clenching

Definition
Bruxism is when you clench (tightly hold your top and bottom teeth together) or grind (slide your teeth back and forth over each other) your teeth.

Causes, incidence, and risk factors
People can clench and grind without being aware of it during both the day and night, although sleep-related bruxism is often the bigger problem because it is harder to control.

The cause of bruxism is not completely agreed upon, but daily stress may be the trigger in many people. Some people probably clench their teeth and never feel symptoms. Whether or not bruxism causes pain and other problems may be a complicated mix of factors:

- How much stress you are under
- How long and tightly you clench and grind
- Whether your teeth are misaligned
- Your posture
- Your ability to relax
- Your diet
- Your sleeping habits

Each person is probably different.

Symptoms
Clenching the puts pressure on the muscles, tissues, and other structures around your jaw. The symptoms can cause temporomandibular joint problems (TMJ).

Grinding can wear down your teeth. Grinding can be noisy enough at night to bother sleeping partners.

Symptoms include:

- Anxiety, stress, and tension
- Depression
- Earache (partly because the structures of the temporomandibular joint are very close to the ear canal, and partly because you can perceive pain in a different location than its source (referred pain))
- Eating disorders
- Headache
• Insomnia
• Sore or painful jaw

**Signs and tests**

An examination can rule out other disorders that may cause similar jaw pain or ear pain, including:

• Dental disorders
• Ear disorders such as ear infections
• Problems with the temporomandibular joint (TMJ)

You may have a history of significant stress and tension.

**Treatment**

The goals of treatment are to reduce pain, prevent permanent damage to the teeth, and reduce clenching as much as possible.

To help relieve pain, there are many self-care steps you can take at home. For example:

• Apply ice or wet heat to sore jaw muscles. Either can have a beneficial effect.
• Avoid eating hard foods like nuts, candies, steak.
• Drink plenty of water every day.
• Get plenty of sleep.
• Learn physical therapy stretching exercises to help restore a normal balance to the action of the muscles and joints on each side of the head.
• Massage the muscles of the neck, shoulders, and face. Search carefully for small, painful nodules called trigger points that can cause pain throughout the head and face.
• Relax your face and jaw muscles throughout the day. The goal is to make facial relaxation a habit.
• Try to reduce your daily stress and learn relaxation techniques.

To prevent damage to the teeth, mouth guards or appliances (splints) have been used since the 1930s to treat teeth grinding, clenching, and TMJ disorders. A splint may help protect the teeth from the pressure of clenching.

A splint may also help reduce clenching, but some people find that it makes their clenching worse. In others, the symptoms go away as long as they use the splint, but pain returns when they stop or the splint loses its effectiveness over time.

There are many different types of splints. Some fit over the top teeth, some on the bottom. They may be designed to keep your jaw in a more relaxed position or provide some other function. If one type doesn’t work, another may.

For example, a splint called the NTI-tss fits over just the front teeth. The idea is to keep all of your back teeth (molars) completely separated, under the theory that most clenching is done on these back teeth. With the NTI, the only contact is between the splint and a bottom front tooth.

As a next phase after splint therapy, orthodontic adjustment of the bite pattern may help some people. Surgery should be considered a last resort.

Finally, there have been many approaches to try to help people unlearn their clenching behaviors. These are more successful for daytime clenching, since nighttime clenching cannot be consciously stopped.

In some people, just relaxing and modifying daytime behavior is enough to reduce nighttime bruxism. Methods to directly modify nighttime clenching have not been well studied. They include biofeedback devices, self-hypnosis, and other alternative therapies.

**Expectations (prognosis)**

Bruxism is not a dangerous disorder. However, it can cause permanent damage to the teeth and uncomfortable jaw pain, headaches, or ear pain.

**Complications**

• Depression
• Eating disorders
• Insomnia
• Increased dental or TMJ problems

Nightly grinding can awaken roommates and sleeping partners.

Calling your health care provider

See a TMJ specialist immediately if you are having trouble eating or opening your mouth. Keep in mind that a wide variety of possible conditions can cause TMJ symptoms, from arthritis to whiplash injuries. Therefore, see a TMJ specialist for a full evaluation if self-care measures do not help within several weeks.

Grinding and clenching does not fall clearly into one medical discipline, and TMJ specialists have a variety of treatment approaches. For a massage-based approach, look for a massage therapist trained in trigger point therapy, neuromuscular therapy, or clinical massage, particularly for TMJ disorders.

Dentists who specialize in evaluating and treating TMJ disorders will typically take x-rays and prescribe a mouth guard. Surgery is now considered a last resort by most TMJ experts.

**Prevention**

Stress reduction and anxiety management may reduce bruxism in people prone to the condition.

**Update Date: 4/24/2008**

Medical Encyclopedia: Menstruation - absent

URL of this page: http://www.nlm.nih.gov/medlineplus/ency/article/003149.htm

Alternative names
Missed periods; Lack of menses; Periods - missed; Amenorrhea

Definition
The absence of menstruation means no menstrual flow. Absent menstruation may be primary (no menstruation before age 16) or secondary (menstruation begins at the appropriate age, but later stops for more than 3 cycles or 6 months).

Absence menstruation is called amenorrhea.

Considerations
Many perfectly normal females begin to menstruate later than most (the median age is 12.8). Pregnancy is often the first thought when a period is missed, but there are many reasons for having a late period.

The incidence of primary amenorrhea in the United States is less than 1%. The incidence of secondary amenorrhea (due to some cause other than pregnancy) is about 4% in the general population.

Symptoms associated with amenorrhea depend on the cause and may include the following:
- Headache
- Galactorrhea (breasts produce milk in a woman who is not pregnant or breast-feeding an infant)
- Visual loss (in rare cases of pituitary tumor)
- Marked weight gain or weight loss
- Dry vagina
- Increased hair growth in a “male” pattern (hirsutism)
- Voice changes
- Breast size changes

Common Causes
Causes of primary amenorrhea:
- Delay may be normal if puberty characteristics, such as breast development, are present by age 13
- Birth defects of the female reproductive system
- Lack of an opening in the membrane at the entrance of the vagina (hymen)
- Problem with the hypothalamus gland

Factors that can disrupt normal menstruation include:
- Drastic weight reduction
- Eating disorders
- Stress

Causes of secondary amenorrhea:
- Pregnancy
- Stress and anxiety
- Drastic weight reduction
- Hormonal imbalance (such as with polycystic ovarian syndrome)
- Endocrine disorders such as thyroid disease or pituitary disease/tumor
- Other illness
- Excessive exercise
- Menopause (normal for women over age 45)
- Medications, including birth control pills and other contraceptives
- Uterine scarring, usually from procedures such as dilation and curettage (D and C)

Home Care
Treatment depends on the cause.
- For amenorrhea caused by normal delay of menstruation onset, have patience until age 16. However, keep in mind that the delay is only normal if the girl displays some signs of puberty, such as breast development
- Consult your obstetrician to determine if you may be pregnant.
- For a missed period caused by drastic weight loss or obesity, proper diet is recommended.
- For a missed period resulting from excessive exercise, cut back to a more conservative workout program.

Call your health care provider if
- You have never had a menstrual period and you are age 16 or older
- You have previously menstruated but have missed 3 or more periods in a row

What to expect at your health care provider's office
The first step is to rule out pregnancy. This is done with a urine or blood test.
Next, the doctor will perform a physical exam and ask questions about your medical history, which may include the following:

Menstrual history
- Are you a woman presently in a menstruating age range (over 12 and under 55)?
- Are you sexually active?
- Do you use birth control? What type?
- Quality
- Was the previous menstrual period a normal amount?
- Are the menses absent or decreased?
- Do you usually have regular periods?
When was your last menstrual period?
At what age did you have your first menstrual period?
Have you ever had normal periods?

What medications do you take?
How much do you exercise?

What other symptoms are also present?
Is there breast tenderness?
Is there morning nausea and vomiting?
Is there a headache?
Is there a nipple discharge (and not breast feeding)?
Is there vision loss or change in vision?
Is there an unintentional weight gain?
Is there an unintentional weight loss?
Is there hair growth in a male pattern?
Is there excessive anxiety?

Tests that may be performed include:
- Progesterin withdrawal (take a hormonal medicine for 7 to 10 days to trigger bleeding)
- Prolactin level
- Serum hormone levels such as testosterone levels
- Thyroid function studies, including TSH (thyroid stimulating hormone)
- Pregnancy test (serum HCG)
- FSH (follicle stimulating hormone level)
- LH (luteinizing hormone level)
- Pelvic ultrasound
- CT scan of the head may be done if a pituitary tumor is suspected

Treatment depends on the cause of the amenorrhea. Your doctor may tell you to make lifestyle changes if the absent menstruation is due to weight changes, physical activity, or stress level. If you have polycystic ovarian syndrome or athletic amenorrhea, you may be given hormonal contraceptives to treat the problem.

If the absent menstruation is caused by another systemic disorder, normal menstrual function usually returns after the primary disorder is treated. For example, if the primary disorder is thyroid or pituitary disease, medicines will be prescribed.

Young women with primary amenorrhea that is caused by birth defects may require medicine, surgery, or both. In any case, psychosocial support and counseling for the patient and family is necessary to address specific concerns and provide guidance regarding anticipated sexual development.

Medical Encyclopedia: Night terror

URL of this page: http://www.nlm.nih.gov/medlineplus/ency/article/000809.htm

Alternative names
Pavor nocturnus; Sleep terror disorder

Definition
Night terrors are a sleep disorder in which a person quickly awakens from sleep in a terrified state.

Causes, incidence, and risk factors
The normal sleep cycle involves distinct stages, from light drowsiness to deep sleep. During rapid eye movement (REM) sleep, the eyes move quickly and vivid dreaming is most common. Each night there are several cycles of non-REM and REM sleep.

Night terrors (sleep terrors) occur during stage 3 and stage 4 sleep (deep sleep). The cause is unknown but night terrors are often triggered by fever, lack of sleep, or periods of emotional tension, stress, or conflict.

Night terrors are like nightmares, except that nightmares usually occur during REM sleep and include unpleasant or frightening dreams. Nightmares are most common in the early morning.

Night terrors usually happen in the first half of the night. The child often screams, and will usually not remember the details of the scare. You may be unable to talk to a child who is having a night terror. In contrast, nightmares are normal on occasion, especially after someone watches frightening movies/TV shows or has an emotional experience. A person may remember the details of a dream upon awakening, and will not be disoriented after the episode.

Night terrors are most common in preadolescent boys, although they also can occur in girls and in adults. They are fairly common in children 3 - 5 years old, and much less common after that. Night terrors may run in families. They can occur in adults, especially with emotional tension and/or the use of alcohol.

Symptoms
- Sudden awakening from sleep
- Persistent fear or terror that occurs at night
- Screaming
- Sweating
- Confusion
- Rapid heart rate
- No recall of “bad dreams” or nightmares
  - Unable to explain what happened
  - May have a sense of frightening images
  - No memory of the event when they awaken the next day
- Unable to fully wake up
- Difficult to comfort
Note: Episodes are most common in the first third of the night. They may last 10 - 20 minutes, then normal sleep returns.

**Signs and tests**

In many cases, no further examination or testing is needed. If the night terror is severe or prolonged, the child may need a psychological evaluation.

**Treatment**

In many cases, a child who has a night terror only needs comfort and reassurance. Psychotherapy or counseling may be appropriate in some cases. Benzodiazepine medications (such as diazepam) used at bedtime will often reduce night terrors; however, medication is not usually recommended to treat this disorder.

**Expectations (prognosis)**

Most children outgrow night terrors. They don’t usually remember the event. Stress reduction and/or psychotherapy may be helpful for night terror in adults.

**Complications**

- Insomnia (unusual)

**Calling your health care provider**

Call for an appointment with your health care provider if the night terrors are persistent or frequent, or occur often enough to regularly disrupt sleep.

Also call if other symptoms occur with the night terror or if the night terror causes, or almost causes, injuries.

**Prevention**

Minimizing stress or using coping mechanisms may reduce night terrors. The number of episodes usually decreases after age 10.

**Update Date: 6/4/2007**

Updated by: Allen J. Blaivas, D.O., Pulmonary, Critical Care, and Sleep Medicine, Department of Veteran Affairs, VA System, East Orange, NJ. Review provided by VeriMed Healthcare Network.
Examination and testing may be used to rule out other disorders that may cause similar symptoms, especially disorders associated with claudication of the legs.

**Treatment**

There is no known cure for restless leg syndrome.

Treatment is aimed at reducing stress and helping the muscles relax. Warm baths, gentle stretching exercises, massage or similar techniques may help.

If sleep is severely disrupted, medications such as Sinemet (an anti-Parkinson's medication) or tranquilizers such as clonazepam may be prescribed, but they may cause daytime sleepiness. Low doses of pramipexole or ropinirole (Requip) have been found to be very effective in controlling symptoms in some people.

Low doses of narcotics may sometimes relieve symptoms of restless leg syndrome.

**Expectations (prognosis)**

Restless leg syndrome is not dangerous or life-threatening and does not indicate a serious disorder. It can be uncomfortable and can disrupt sleep.

**Complications**

- Insomnia may occur.

**Calling your health care provider**

Call for an appointment with your health care provider if symptoms of restless leg syndrome are present and sleep is disrupted.

**Prevention**

Techniques to promote muscle relaxation and stress reduction may reduce the incidence of restless leg syndrome in people prone to the condition.

**Update Date: 8/26/2006**


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Meditation and Stress Reduction - How Meditation Can Reduce Stress and Improve Help

Marc Anthony Rios

Aug 1, 2007

As chronic stress becomes epidemic in our culture the ancient art of meditation is gaining a foothold in the arena of Western orthodox medicine.

Meditation has been getting more attention in recent years as the understanding of the link between mind and body grows. Indeed the medical field of psychoneuroimmunology demonstrates the acceptance of the power the mind has over the body. Sadly the epidemic levels of depression and chronic stress is taking its toll on people’s health. Although stress has a biological purpose the human body was never meant to be subjected to it constantly. Stress hormones are meant to aid the body in the fight or flight response and then the body is supposed to break them down and dispose of them. With the case of depression there is the poor nutrition that most people get as well as the dissatisfaction with their personal and professional lives. Keep in mind that the brain utilizes one fourth of available blood sugar as well as tremendous amounts of nutrients.

Meditation involves slowing down the constant chatter inside of a person’s mind and with it eliminates the physiological responses to the emotions evoked by said chatter. The word emotion can be considered a contraction of the words “energy in motion”. Emotions generate energy and that energy affects the body. Traditional Chinese Medicine recognizes the energy generated by emotions as well as the organs that produce or are affected by this energy. The meridians that run through the body direct the flow of energy into and out of the organs. Through various forms of meditation this energy can be controlled.

Any form of contemplative meditation teaches how to control the mind by letting discursive thoughts fade to the point of no longer disrupting conscious brain function. When the level of agitation of the mind by these thoughts diminishes a person becomes less distracted and functions more efficiently. Shamatha meditation or “peaceful abiding” of the Tibetan Buddhist tradition is one method of meditation that accomplishes this.

Chi Kung is a form of meditation that takes this a step further and teaches the control of the energies in our body that affect the body to improve health. This form of meditation uses visualization to direct the flow of energy along the meridians. By directing the flow of energy one can not only reduce the negative effects on health caused by out of control emotions but actually harness this power to improve health. The human energy system is a concept that sadly many Western physicians are reluctant to accept. Ironically quantum physics has demonstrated that many alternative medical theories are not so far fetched. As interest in things such as yoga, t’ai chi ch’au, chi kung and other meditative arts grows so will research into the medical applications of meditation. Perhaps this will help other fields of alternative medicine become more accepted.
Meditation Therapy for Rheumatoid Arthritis Patients

Posted 10/10/2007

Author Information

Explore an agent offering persistent pain relief with extended benefits. Learn about around-the-clock treatment with potential to reduce the number of breakthrough pain episodes and a demonstrated improvement in pain-related sleep parameters. Read more

A revered contemplative practice for centuries, meditation has recently inspired research into its therapeutic value for everything from anxiety disorders to heart attack prevention. A painful, progressive autoimmune disease, rheumatoid arthritis (RA) is associated with a high risk of depression—double the risk of the healthy population, by conservative estimates—and various forms of psychological distress. Increasingly, RA patients are turning to alternative therapies like meditation to ease the toll of their disease.

Mindfulness-Based Stress Reduction (MBSR) is a meditation training program developed by Dr. Kabat-Zinn and colleagues at the University of Massachusetts Medical School. MBSR teaches participants to relate differently to thoughts and emotions, and continually focus the mind on the present moment to increase clarity and calmness. The program has been shown to improve psychological symptoms in patients with fibromyalgia, cancer, and multiple sclerosis, among other conditions. Researchers with the University of Maryland School of Medicine set out to assess the effect of this meditation therapy on depressive symptoms, psychological distress, general well-being, and disease activity among RA patients. Featured in the October 2007 issue of Arthritis Care & Research (http://www.interscience.wiley.com/journal/arthritiscare), their study supports the potential benefits of prescribing a course in MBSR along with the conventional course of physical and pharmacological therapy.

Recruited through community health fairs and ads in Baltimore newspapers, 63 adult RA patients were selected to participate in this novel pilot study. Averaging 54 years in age, participants were mostly female, white, married, college educated, and comfortably middle-class. None had a history of psychiatric illness, alcohol or drug addiction, or other chronic pain disorders. All patients remained under their rheumatologist’s care and continued to take their routine medications throughout the study.

Through random assignment, 31 of the participants received intensive MBSR therapy, starting with an 8-week training course followed by a 4-month maintenance program. The remaining 32 participants were designated to a waitlist, agreeing to attend assessment sessions in exchange for free MBSR training after the study’s end. At baseline, and again at 2 months and 6 months into the study, both groups of participants underwent psychological and rheumatological examinations.

To evaluate depressive symptoms and psychological distress, researchers used the Symptom Checklist-90-Revised, a self-report questionnaire widely recognized for its reliability and validity. Overall well-being was measured by the Psychological Well-Being Scales, comprised of questions designed to gauge positive outlook and approach to coping with difficulties. RA disease status was assessed by the Disease Activity Score in 28 joints (DAS-28).

Researchers compared scores of psychological and physical disease symptoms among MBSR participants with those among controls. Overwhelming, MBSR students embraced the program and kept up their mindfulness practice throughout the followup period. After 2 months, both groups showed improvements in depressive, psychological, and emotional symptoms, with no significant benefits attributed to MBSR. By 6 months, however, gains in the control group had largely disappeared, while MBSR participants maintained or improved further in psychological outcomes. By the culmination of the study, the MBSR group achieved a significant 35 percent reduction in psychological distress. Despite this dramatic improvement, the therapy had no impact on RA disease activity, measured by the DAS-28, which takes into account number of tender or swollen joints, a blood measure of inflammation, and the patient’s own report of disease status.

As the researchers acknowledge, the study had limitations, primarily its small sample size and its likely floor effect. On the strength of their backgrounds, participants might have been less vulnerable to psychological distress and depression than RA patients with fewer socioeconomic advantages, not to mention those with a history of mental illness or substance abuse. Yet, these limitations should not overshadow the positive findings and applications. „The study demonstrated that for patients with RA under routine medical supervision, an 8-week MBSR class plus a 4-month maintenance program had beneficial effects, and that it was safe and appealing to participants,” notes investigator Elizabeth Pradhan, PhD. „For doctors wishing to offer patients a complement to medical management, mindfulness meditation may offer hope for improving psychological distress and strengthening well-being in patients with RA."
Mindfulness-based stress reduction in therapeutic community treatment: a stage 1 trial.

Marcus MT, Schmitz J, Moeller G, Liehr P, Cron SG, Swank P, Bankston S, Carroll DD, Granmayeh LK. Center for Substance Abuse Education, and Prevention, and Research, University of Texas Health Science Center, Houston, 77030, USA. Marianne.T.Marcus@uth.tmc.edu

OBJECTIVE: This trial compared Mindfulness-Based Stress Reduction, adapted for therapeutic community treatment (MBTC), with treatment as usual (TAU) for reducing stress and increasing retention in a residential facility for substance use disorders. METHOD: Four-hundred and fifty-nine participants, who met DSM-IV criteria for substance dependence were recruited (TAU = 164, MBTC = 295). RESULTS: A survival analysis of time to dropout did not show a significant difference between groups, however level of participation in MBTC was associated with decreased likelihood of dropout (p = < .01), and higher Symptoms of Stress Inventory (SOSI) scores at baseline were associated with increased likelihood of dropout (p = .03). CONCLUSION: The association between retention and level of stress on intake as well as level of participation in MBTC provides support for further research on integrating MBTC into therapeutic community treatment.

PMID: 19... [PubMed - in process]

Mindfulness-based stress reduction and health benefits - A meta-analysis

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Abstract

Objective: Mindfulness-based stress reduction (MBSR) is a structured group program that employs mindfulness meditation to alleviate suffering associated with physical, psychosomatic and psychiatric disorders. The program, nonreligious and nonesoteric, is based upon a systematic procedure to develop enhanced awareness of moment-to-moment experience of perceptible mental processes. The approach assumes that greater awareness will provide more veridical perception, reduce negative affect and improve vitality and coping. In the last two decades, a number of research reports appeared that seem to support many of these claims. We performed a comprehensive review and meta-analysis of published and unpublished studies of health-related studies related to MBSR. Methods: Sixty-four empirical studies were found, but only 20 reports met criteria of acceptable quality or relevance to be included in the meta-analysis. Reports were excluded due to (1) insufficient information about interventions, (2) poor quantitative health evaluation, (3) inadequate statistical analysis, (4) mindfulness not being the central component of intervention, or (5) the setting of intervention or sample composition deviating too widely from the health-related MBSR program. Acceptable studies covered a wide spectrum of clinical populations (e.g., pain, cancer, heart disease, depression, and anxiety), as well as stressed nonclinical groups. Both controlled and observational investigations were included. Standardized measures of physical and mental well-being constituted the dependent variables of the analysis. Results: Overall, both controlled and uncontrolled studies showed similar effect sizes of approximately 0.5 (P < .0001) with homogeneity of distribution. Conclusion: Although derived from a relatively small number of studies, these results suggest that MBSR may help a broad range of individuals to cope with their clinical and nonclinical problems.

Keywords: Chronic disease; Coping; Meta-analysis; Mindfulness; Psychosomatic disorders; Stress

Introduction

Coping with the symptoms, disability, and uncertain perspectives of chronic disease is a harrowing challenge for a significant proportion of the population. However, addressing the biopsychosocial adjustment of chronically ill individuals is an area that continues to tax the resources and limits of modern conventional medicine and one for which few professionals have adequate time or training. Programs that do exist to improve the well-being and health status of the chronically ill are often still in their infancy and typically directed toward a specific illness and limited range of symptoms. A single, relatively brief and cost-effective program that can potentially be applied to a range of chronic illnesses and is able to effect a positive shift in fundamental perspectives toward health and disease should be of great interest.

During the last two decades, a group-intervention program known as mindfulness-based stress reduction (MBSR) has been proposed as just such an approach [1]. This procedure has been employed among patients with a wide variety of chronic clinical ailments, as well among groups of relatively healthy individuals who have hoped to improve their abilities to cope with the normal but often significant stresses of daily life. Preliminary reports have suggested substantial benefits for individuals suffering from chronic pain, anxiety, depression, and stress.
cancer, anxiety disorders, depression and the stresses of contexts as diverse as medical school and prison life (e.g., Refs. [2–4]). However, many of the published studies remain critically unevaluated and may be of questionable scientific rigor or too limited in scope to confirm such claims. A recently published paper provided a valuable critique of MBSR, but without providing a quantitative assessment of existing studies [5].

In this report, we provide a meta-analytic review of all accessible published and unpublished investigations purporting health-related benefits of MBSR. Our aim is to provide an empirical basis for evaluating whether or not evidence exists that MBSR systematically improves health-related dimensions among the chronically ill and others, what and how large the specific benefits may be, and whether more extensive evaluation of MBSR may be warranted. MBSR is a group program that focuses upon the progressive development of the ability to recognize and respond to moment-to-moment awareness of perceptible mental states and processes. This includes continuous, immediate awareness of physical sensations, perceptions, affective states, thoughts, and imagery. Mindfulness is nondeliberative: It merely implies sustained paying attention to ongoing mental content without thinking about, comparing or in other ways evaluating the ongoing mental phenomena that arise during periods of practice. Thus, mindfulness may be seen as a form of naturalistic observation, or participant-observation, in which the objects of observation are the perceptible mental phenomena that normally arise during waking consciousness. Underlying this concept and approach are the following assumptions: (1) Humans are ordinarily largely unaware of their moment-to-moment experience, often operating in an “automatic pilot” mode; (2) we are capable of developing the ability to sustain attention to mental content; (3) development of this ability is gradual, progressive and requires regular practice; (4) moment-to-moment awareness of perceptible mental states and processes. Thus, mindfulness meditation practice, mindful awareness during yoga poses, and progressiveness during stressful situations and social interactions. Because development of mindfulness is predicated upon regular and repeated practice, participants enter upon enrolling into a commitment to carry out daily 45-min homework assignments primarily in the form of meditation practice, mindful yoga and applying mindfulness to situations in everyday life. For the purpose of the current review, we examined 64 empirical reports that either used the structured MBSR program or applied mindfulness procedures as the central component of a group procedure to improve health-related measures.

Methods

Methods of the analysis and inclusion criteria were specified in advance and documented in a protocol.

Inclusion criteria

Criteria for the inclusion of studies included the following: 1. Studies were published before 12/2002 or, in the case of unpublished material, relevant information obtained before 12/2001. 2. Published or, as unpublished, investigations were included. A minimum requirement for inclusion was the availability of an abstract in the English language. 3. Programs emphasized a mindfulness-based intervention, with mindfulness operationalized as the following: 3.1. Moment to moment awareness to be cultivated with a nonjudgmental attitude. 3.2. Teaching of formal meditation techniques. 3.3. Stressing the importance of daily and systematic practice. 4. Interventions were group taught, i.e., no individual training.

5. Courses were based on a length of 6–12 weeks with approximately 2.5 h per week; intensive meditation retreats were not included. 6. Quantitative outcome measures were available. 7. Outcome measures could be subdivided under dimensions of physical or mental health. 8. Outcome measures were derived from standardized and validated scales. 9. Available data of each study allowed for the calculation of effect sizes. 10. Controlled studies were required to have a control group procedure that was either inactive (wait-list) or active in the sense that they were oriented to controlling for nonspecific effects of the mindfulness group (e.g., social support, demand characteristics and expectancy effects). 11. Postintervention, and not necessarily follow-up, data were provided and assessed.

Literature research

Several search strategies were applied: 1. An electronic search was conducted in the following databases: Medline, PsycINFO including Digital Dissertations, PsycDex Plus, Web of Science including Science Citation Index and the Cochrane Library. Databases were searched for the occurrence of the keywords mindfulness, Vipassana, insight meditation, stress reduction and mind/body research. This search was limited to the English language and restricted to studies published between 2003 and 2005. 2. We inspected the reference sections of all retrieved studies, as well as in a set of theoretical publications on mindfulness meditation. 3. We contacted the first authors of all identified studies assessing the effect of a mindfulness meditation intervention and asked them for unpublished material, ongoing research, whether they knew of any other researchers having unpublished data or ongoing studies.

Study coding

All studies meeting the above inclusion criteria were coded by the second author (LN). Studies were coded for their design (controlled study, observational study, follow-up or an intervention (randomization, quasiexperimental, clinical trial), type of control (wait-list, no treatment, treatment as usual, active control), study population (patients, nonpatients, students, inmates, etc.), patients’ diagnoses, and outcome measures. All coding was later verified by the first author (PG).

Data selection and extraction

The aim of our meta-analysis was to assess the effect of a mindfulness meditation intervention on health status measures. We considered the concept of health to include both physical and mental health. All outcome measures were either subsampled under “physical health”, “mental health” or were excluded from the analysis. We only included data from standardized and validated scales with established internal consistency (e.g., the Global Severity Inventory of Symptom Check List—R, Hospital Anxiety and Depression Scale, Beck Depression Inventory, Profile of Mood States, Medical Outcome Study Pain Rating Scale, Short Form 36 Health Survey, and Medical Symptom Checklist; a full list is available upon request). Also a conservative procedure was chosen to exclude relatively ambiguous or uncontrolled within-group analyses. Finally, we excluded one study believed that it might be informative to compare effect sizes between observation periods, and both randomized and quasiexperimental controlled investigation.

In the case of (i), posttreatment values are usually entered into the equation assuming no baseline difference between groups before the intervention. As this assumption could not always be made, for the calculations we subtracted the baseline difference from the effect size for the postintervention values.
For the calculation of the (ii) pre–post effect sizes, the correlation between pre- and postintervention measures is needed. As this correlation could not be obtained from the study reports, we entered a global estimation of \( r = 0.7 \) into the formula. All effect sizes were corrected for small sample bias by a simple formula provided by Hedges [9].

Data aggregation

We first integrated all effect sizes within a single study by the calculation of a formula that provides a Q value, which is \( d^2 \) distributed with \( df = k - 1 \), with \( k \) standing for the number of studies entering the test [9].

Overall and sensitivity analyses

We calculated two separate meta-analyses. The first included all effect sizes with the effect size based on the comparison between the experimental and the control groups. The second analysis used data from both controlled studies (employing only results from the mindfulness intervention) and observational studies (i.e., in which no control group existed). Regarding the latter set of analyses, we aggregated all effect sizes based on a pre–post difference for groups undergoing meditative training. For both analyses, we calculated separate mean effect sizes for mental and physical health. Sensitivity analyses were calculated for several subgroups by splitting the data set and by calculation of separate analyses for each subgroup.

Results

We retrieved 64 studies but only 20 reports, comprising a total of 1065 subjects, met the inclusion criteria (noted in Reference with an asterisk and in Further Reading; note that some studies were presented in more than one publication). A list of all retrieved studies are included in Appendix 2. Most of the excluded studies did not operationalize mindfulness training in the specified manner or reported insufficient statistical details for effect size calculation. Studies investigating mindfulness training among medical patients involved allocating diagnoses: Fibromyalgia, mixed cancer diagnoses, coronary artery diseases, depression, chronic pain, anxiety, obesity and binge eating disorders.

Table 1

Overview of controlled studies included in the meta-analysis

<table>
<thead>
<tr>
<th>Study</th>
<th>Year</th>
<th>Status</th>
<th>Sample</th>
<th>Diagnosis</th>
<th>Design</th>
<th>Control group</th>
<th>N</th>
<th>Nc</th>
<th>MH</th>
<th>PH</th>
<th>Mean effect size</th>
<th>95%-CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bruckstein [21]</td>
<td>1999</td>
<td>d</td>
<td>Pat.</td>
<td>Chronic pain</td>
<td>QE</td>
<td>attention placebo</td>
<td>22</td>
<td>15</td>
<td>7</td>
<td>4</td>
<td>2</td>
<td>0.33</td>
</tr>
<tr>
<td>Murphy [22]</td>
<td>1995</td>
<td>d</td>
<td>Pris.</td>
<td>-</td>
<td>RCT</td>
<td>Jacobson relaxation</td>
<td>31</td>
<td>15</td>
<td>16</td>
<td>3</td>
<td>1</td>
<td>0.30</td>
</tr>
<tr>
<td>Perkins [23]</td>
<td>1998</td>
<td>d</td>
<td>Pris.</td>
<td>-</td>
<td>RCT</td>
<td>WL</td>
<td>97</td>
<td>49</td>
<td>48</td>
<td>4</td>
<td>1</td>
<td>0.49</td>
</tr>
<tr>
<td>Rossmannig et al. [24]</td>
<td>2003</td>
<td>u</td>
<td>Stud.</td>
<td>-</td>
<td>QE</td>
<td>Seminar</td>
<td>277</td>
<td>125</td>
<td>152</td>
<td>2</td>
<td>1</td>
<td>0.54</td>
</tr>
<tr>
<td>Sophonlert et al. [25]</td>
<td>2001</td>
<td>ab</td>
<td>Pat.</td>
<td>Fibromyalgia</td>
<td>RCT</td>
<td>WL</td>
<td>55</td>
<td>36</td>
<td>39</td>
<td>4</td>
<td>2</td>
<td>0.67</td>
</tr>
<tr>
<td>Shapiro et al. [26]</td>
<td>2004</td>
<td>p</td>
<td>Stud.</td>
<td>-</td>
<td>RCT</td>
<td>WL</td>
<td>73</td>
<td>36</td>
<td>37</td>
<td>4</td>
<td>1</td>
<td>0.62</td>
</tr>
<tr>
<td>Speir et al. [2]</td>
<td>2005</td>
<td></td>
<td>Pat.</td>
<td>Cancer</td>
<td>RCT</td>
<td>WL</td>
<td>98</td>
<td>53</td>
<td>45</td>
<td>2</td>
<td>1</td>
<td>0.54</td>
</tr>
<tr>
<td>Tischinger-Hafer-Gilmet [27]</td>
<td>2002</td>
<td>u</td>
<td>Pat.</td>
<td>Fibromyalgia</td>
<td>QE</td>
<td>Social support, relaxation, and exercise group</td>
<td>38</td>
<td>25</td>
<td>13</td>
<td>4</td>
<td>1</td>
<td>0.52</td>
</tr>
<tr>
<td>and Tiefenbacher and Grossman [22] (1 study)</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Williams, Larkin et al. [19]</td>
<td>2001</td>
<td>u</td>
<td>Pat.</td>
<td>Coronary artery disease</td>
<td>RCT</td>
<td>Stress management training</td>
<td>21</td>
<td>11</td>
<td>10</td>
<td>8</td>
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<tr>
<td>Williams, Kolar et al. [20]</td>
<td>2001</td>
<td></td>
<td></td>
<td></td>
<td>Educational material</td>
<td>47</td>
<td>57</td>
<td>32</td>
<td>19</td>
<td>2</td>
<td>1</td>
<td>0.56</td>
</tr>
</tbody>
</table>

**Overall**

<table>
<thead>
<tr>
<th>Year</th>
<th>Status</th>
<th>Sample</th>
<th>Diagnosis</th>
<th>Design</th>
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<th>Mean effect size</th>
<th>95%-CI</th>
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<td>1995</td>
<td>d</td>
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<tr>
<td>1998</td>
<td>d</td>
<td>Pris.</td>
<td>-</td>
<td>RCT</td>
<td>WL</td>
<td>97</td>
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<tr>
<td>2003</td>
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<td>277</td>
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</tr>
<tr>
<td>2001</td>
<td>ab</td>
<td>Pat.</td>
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<td>RCT</td>
<td>WL</td>
<td>55</td>
<td>36</td>
<td>39</td>
<td>4</td>
<td>2</td>
<td>0.67</td>
</tr>
<tr>
<td>2004</td>
<td>p</td>
<td>Stud.</td>
<td>-</td>
<td>RCT</td>
<td>WL</td>
<td>73</td>
<td>36</td>
<td>37</td>
<td>4</td>
<td>1</td>
<td>0.62</td>
</tr>
<tr>
<td>2005</td>
<td></td>
<td></td>
<td>Pat.</td>
<td>Cancer</td>
<td>RCT</td>
<td>WL</td>
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<td>Social support, relaxation, and exercise group</td>
<td>38</td>
<td>25</td>
<td>13</td>
<td>4</td>
<td>1</td>
<td>0.52</td>
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**Table 2**

<table>
<thead>
<tr>
<th>Effect size (d)</th>
<th>k</th>
<th>N</th>
<th>Mean effect size</th>
<th>95%-CI</th>
</tr>
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<tr>
<td>Mental health variables</td>
<td></td>
<td></td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>All patients</td>
<td>10</td>
<td>771</td>
<td>0.34</td>
<td>0.19–0.49</td>
</tr>
<tr>
<td>Patients</td>
<td>5</td>
<td>236</td>
<td>0.36</td>
<td>0.23–0.49</td>
</tr>
<tr>
<td>Nonpatients</td>
<td>5</td>
<td>335</td>
<td>0.35</td>
<td>0.26–0.45</td>
</tr>
<tr>
<td>Randomized</td>
<td>7</td>
<td>434</td>
<td>0.34</td>
<td>0.21–0.47</td>
</tr>
<tr>
<td>Quasi-experimental</td>
<td>3</td>
<td>337</td>
<td>0.34</td>
<td>0.12–0.56</td>
</tr>
</tbody>
</table>

**Physical health variables**

| All patients | 4 (patients) and 1 (nonpatients) | 203 | 0.53 | 0.23–0.81 | \( P < 0.001 \) |

**Table 3**

Effect of mindfulness training based on a pre–post comparison for mental and physical health variables (k = number of analyses; n = number of subjects; d, mean effect size; P, two-tailed)

Discussion

Our findings suggest the usefulness of MBSR as an intervention for a broad range of chronic disorders and problems. In fact, the consistent and relatively strong level of effect sizes across very different types of sample indicates that mindfulness training might enhance general features of coping with distress and disability in everyday life, as well as under more extraordinary conditions of serious disorder or stress. Another recently published study employing different inclusion criteria and that the subgroups showed no significant differences for the variables subject population or group allocation.

Only five of the controlled studies reported data that could be subsumed under physical health. Results for 203 individuals are included, 122 of whom received mindfulness instruction. This reduced data set also proved to be homogeneous (\( r^2 = 0.497, df = 4, P = 0.29 \)). The summary results are also presented in Table 2. The mean effect size of \( d = 0.53 \) (95% CI = 0.44–0.62) is similar to that of the mental health variables.
divergent strategy also provides additional support for the effectiveness of mindfulness interventions [28]. In both investigations, improvements were consistently seen across a spectrum of standardized mental health measures including psychological dimensions of quality of life scales, depression, anxiety, coping style and other affective dimensions. Of disablement, likewise, similar benefits were also found for health parameters of physical well-being, such as medical symptoms, sensory pain, physical impairment, and functional quality-of-life estimates, although measures of depression were less frequently assessed in the studies as a whole.

Results of other carefully performed trials that did not conform to our criteria of timeframe, dependent measures, or control procedures also point to the efficacy of mindfulness training [3,10]. For example, a recent randomized study of depressives in remission found one-year relapse rates of major depressive disorder, when conventional treatment was supplemented by a mindfulness program [3].

Another investigation of mindfulness training among anxiety and mood disorder patients showed pre- to postinter- views of depressive symptomatology, sense of control, and spiritual experiences. Psychother Psychosom 1997;66:97–106.


20. Goldberg D, Hoffman A, Furumoto-Dawson A, Nelson-


Further Readings


Mom’s Stress in Pregnancy May Up Baby’s Asthma and Allergy Risk

Higher levels of allergy marker found in cord blood of stressed mothers’ babies

URL of this page: http://www.nlm.nih.gov/medlineplus/news/fullstory_64733.html (*this news item will not be available after 08/16/2008)

HealthDay
Sunday, May 18, 2008

SUNDAY, May 18 (HealthDay News) -- If an expectant mother is exposed to high levels of stress, her baby may be more likely to develop asthma or allergies later in life, new research suggests.

Babies born to mothers experiencing high levels of stress had more IgE in their blood at birth than did babies born to less-stressed moms. IgE is an antibody involved in allergic and asthmatic reactions.

“Moms who had elevated levels of stress had children who seemed to be more reactive to allergens, even when exposed to low levels of allergens,” said study co-author Dr. Rosalind Wright, an assistant professor of medicine at Brigham and Women’s Hospital and Harvard Medical School in Boston.

Wright’s colleague, and another author of the study, Junenette Peters, said that stress may make women more susceptible to allergens because it “may make the cells more permeable” so that even low levels of exposure trigger a reaction. And, women whose immune systems are altered by stress may, in turn, pass down that trait to their infants.

Peters, a postdoctoral research fellow at Harvard Medical School, was to present the findings Sunday at the American Thoracic Society’s 2008 International Conference, in Toronto.

The study, which was funded by a grant from the U.S. National Heart, Lung, and Blood Institute, included 315 expectant mothers and their infants. All of the mothers lived in an urban environment.

Mothers filled out a questionnaire designed to assess their levels of stress in many different domains. Financial issues, home issues, community safety, relationship problems and medical issues were the most frequently reported negative events experienced by the mothers.

Dust mite exposure was also assessed using samples obtained from the pregnant women’s bedrooms. When the babies were born, a sample of cord blood was taken.

After controlling the data to compensate for maternal age, race, smoking, education, history of allergy and asthma, the child’s gender and the season of birth, the researchers found that the number of negative domains -- stressors -- reported was associated with an increased risk of elevated IgE in the cord blood.

“A mom who had three or more negative events would have a 12 percent increased chance of having a baby with elevated cord blood IgE,” Peters said.

Wright pointed out that elevated IgE is “suggestive” of an increased risk of developing asthma and allergy later in life, but that the association isn’t clear-cut and likely depends on exposure to other risk factors. The researchers will be following these children until they’re 5 years old to see if they end up developing asthma and allergies later in life.

Dr. Ashlesha Dayal is a maternal fetal medicine specialist at Montefiore Medical Center, and an assistant professor of obstetrics and gynecology at Albert Einstein Medical College in New York City. She said: „There’s definitely emerging data that stress in pregnancy can affect the pregnancy in different ways; for example, stress has been linked to growth restriction, decreased bonding, and even preterm delivery. So, it wouldn’t be unreasonable to think that it would precipitate a disease that’s triggered by stress.”

But, added Dayal, „This is a small study that needs to be validated. We really need more numbers to verify this association.”

Dr. Jennifer Appleyard, chief of allergy and immunology at St. John Hospital in Detroit, agreed. „This is an interesting study, but it hasn’t demonstrated cause and effect. Maybe what goes on before birth can have long-lasting effects,” she said, but added that she doesn’t think this is something expectant mothers needed to be overly concerned about in most cases.

Wright said that, although the researchers aren’t making specific recommendations on stress reduction based on this study, for your general well-being, it’s a good idea to reduce your stress levels whenever possible.

HealthDay
My shield will protect me against the ANTS: Treatment of PTSD in a client with an intellectual disability.

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BACKGROUND: There are limited interventions for individuals with posttraumatic stress disorder (PTSD) who also have an intellectual disability. This paper reports the successful treatment of a client with an intellectual disability who experienced PTSD following abuse in an intimate relationship. We describe the use of an innovative coping technique ("the shield") developed by the first author to allow exposure to intrusive traumatic memories. METHOD: Treatment involved exposure, stress reduction techniques, and modified cognitive techniques. RESULTS: After 9 sessions of therapy over 3 months, the client had experienced no flashbacks. These gains were maintained at a 5-month follow-up. CONCLUSION: PTSD symptoms were successfully treated and the client reported additional improvements in overall functioning. Limitations and questions about the mechanism of action are raised.

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Neural immune pathways and their connection to inflammatory diseases

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Abstract

Inflammation and inflammatory responses are modulated by a bidirectional communication between the neuroendocrine and immune system. Many lines of research have established the numerous routes by which the immune system and the central nervous system (CNS) communicate. The CNS signals the immune system through hormonal pathways, including the hypothalamic–pituitary–adrenal axis and the hypothalamic–pituitary–gonadal axis and sex hormones also have an important immunoregulatory role. The immune system signals the CNS through immune mediators and cytokines that can cross the blood–brain barrier, or signal indirectly through the vagus nerve or second messengers. Neuroendocrine regulation of immune function is essential for survival during stress or infection and to modulate immune responses in inflammatory disease. This review discusses neuroimmune interactions and evidence for the role of such neural immune regulation of inflammation, rather than a discussion of the individual inflammatory mediators, in rheumatoid arthritis.

Introduction

The inflammatory response is modulated in part by a bidirectional communication between the brain and the immune systems. This involves hormonal and neuronal mechanisms by which the brain regulates the function of the immune system and, in the reverse, cytokines, which allow the immune system to regulate the brain. In a healthy individual this bidirectional regulatory system forms a negative feedback loop, which keeps the immune system and central nervous system (CNS) in balance. Perturbations of these regulatory systems could potentially lead to either overactivation of immune responses and inflammatory disease, or oversuppression of the immune system and increased susceptibility to infectious disease. Many lines of research have recently established the numerous routes by which the immune system and the CNS communicate. This review will focus on these regulatory systems and their involvement in the pathogenesis of inflammatory diseases such as rheumatoid arthritis (RA). For other reviews on the involvement of these regulatory pathways in RA and other inflammatory diseases, see reviews by Eijssouts and Murphy, Crofford, and Imrich.

There are two major pathways by which the CNS regulates the immune system: the first is the hormonal response, mainly through the hypothalamic–pituitary–adrenal (HPA) axis, and the hypothalamic–pituitary–gonadal axis and sex hormones also have an important immunoregulatory role. The hypothalamic–pituitary–adrenal axis and the hypothalamic–pituitary–gonadal axis and sex hormones also have an important immunoregulatory role. The immune system signals the CNS through immune mediators and cytokines that can cross the blood–brain barrier, or signal indirectly through the vagus nerve or second messengers. Neuroendocrine regulation of immune function is essential for survival during stress or infection and to modulate immune responses in inflammatory disease. This review discusses neuroimmune interactions and evidence for the role of such neural immune regulation of inflammation, rather than a discussion of the individual inflammatory mediators, in rheumatoid arthritis.

Regulation of the immune system by the CNS

Hormonal pathways

HPA axis

On stimulation, corticotropin-releasing hormone (CRH) is secreted from the paraventricular nucleus of the hypothalamus into the hypophyseal portal blood supply. CRH then stimulates the expression and release of adrenocorticotropic (ACTH) from the anterior pituitary gland. Arginine vasopressin (AVP) synergistically enhances CRH-stimulated ACTH release. ACTH in turn induces the expression and release of glucocorticoids from the adrenal glands.

Glucocorticoids regulate a wide variety of immune-related genes and immune cell expression and function. For example, glucocorticoids modulate the expression of cytokines, adhesion molecules, chemoattractants and other inflammatory mediators and molecules and affect immune cell trafficking, migration, maturation, and differentiation. Glucocorticoids cause a Th1 (cellular immunity) to Th2 (humoral immunity) shift in the immune response, from a proinflammatory cytokine pattern with increased interleukin (IL)-1 and tumor necrosis factor (TNF)-α to an anti-inflammatory cytokine pattern with increased IL-10 and IL-4. Pharmacological doses and preparations of glucocorticoids cause a general suppression of the immune system, whereas physiological doses and preparations of glucocorticoids are not completely immunosuppressive but can enhance and specifically regulate the immune response under certain circumstances. For example, physiological concentrations of natural glucocorticoids (i.e. corticosterone) stimulate delayed-type hypersensitivity reactions acutely, whereas pharmacological preparations (i.e. dexamethasone) are immunosuppressive.

Glucocorticoids exert these immunomodulatory effects through a cytosolic receptor, the glucocorticoid receptor (GR). This is a ligand-dependent transcription factor that, after binding of the ligand, dissociates from a protein complex, dimerizes, and translocates to the nucleus, where it binds to specific DNA sequences (glucocorticoid response elements) to regulate gene transcription. GR can also interfere with other signaling pathways, such as nuclear factor (NF)-κB and activator protein-1 (AP-1), to repress gene transcription; it is through these mechanisms that most of the anti-inflammatory actions are mediated. A splice variant of GR, GRβ, that is unable to bind ligand but is able to bind to DNA and cannot activate gene transcription (although this is still under some dispute), has been suggested to be able to act as a dominant repressor of GR. Increased GRβ expression has been shown in several inflammatory diseases including asthma, inflammatory bowel disease, ulcerative colitis, and RA.

parasympathetic nerves. In turn, the immune system can also regulate the CNS through cytokines. Conversely, cytokines released in the periphery change brain function, whereas cytokines produced within the CNS act more like growth factors. Thus, cytokines produced at inflammatory sites signal the brain to produce sickness-related behavior including depression and other symptoms such as fever (4-7). In addition, cytokines produced locally exert paracrine/autocrine effects on hormone secretion and cell proliferation.

The interactions between the neuroendocrine and immune systems provide a finely tuned regulatory system required for health. Disturbances at any level can lead to changes in susceptibility to or severity of infectious, inflammatory or autoimmune diseases.
**Hypothalamic–growth-hormone axis**

Hypothalamic–growth-hormone axis

In addition to the HPA axis, other central hormonal systems, such as the HPG axis and in particular estrogen, also modulate the immune system. In general, physiological concentrations of estrogen enhance immune responses whereas physiological concentrations of androgens, such as testosterone and dehydroepiandrosterone (DHEA), are immunosuppressive. Females of all species exhibit a greater risk of developing many autoimmune/inflammatory diseases, such as systemic lupus erythematosus, RA and multiple sclerosis, ranging from a 2-fold to a 10-fold higher risk compared with males. Animal models have provided evidence for the importance of in vivo modulation of the immune system by the estrogen receptors. Knockout mouse models indicate that both estrogen receptors α and β are important for thymus development and atrophy in a gender-specific manner.

In contrast, immune stress, such as occurs during inflammation, has an inhibitory effect on the HPG axis and thus gonadal function is reduced in conditions associated with severe inflammation such as sepsis and trauma. This effect is mediated either through a direct cytokine effect on hypothalamic neurons secreting luteinizing hormone releasing hormone or through other factors such as CRH and endogenous opioids. Cytokines also affect gonadal sex steroid production by acting directly on the gonads.

**HPT axis**

HPT axis

As with the interaction between the HPA axis and the immune system, there is a bidirectional interaction between the HPT axis and immune system. The HPT axis has an immunomodulatory effect on most aspects of the immune system. Thyrotropin-releasing hormone (TRH), thyroid-stimulating hormone (TSH), and the thyroid hormones triiodothyronine (T3) and thyroxine (T4) all have stimulatory effects on immune cells. As for GH, the role of thyroid hormones in the regulation of immunity is somewhat controversial, and for the same reasons the alternative hypothesis of protection from the immunosuppressive effects of glucocorticoids has also been suggested for thyroid hormones. Inflammation inhibits TSH secretion because of the inhibitory effect of cytokines on TRH. IL-1 has been shown to suppress TSH secretion, whereas IL-2 has been shown to stimulate the pituitary–thyroid axis. IL-6 and its receptor have been shown to be involved in developing euthyroid sick syndrome in patients with acute myocardial infarction.

In addition to direct effects of thyroid hormones on immune response, there is also interaction between the HPA and HPT axes. Hyperthyroid and hypothyroid states in rats have been shown to alter responses of the HPA axis, with hypothyroidism resulting in a reduced HPA axis response and hyperthyroidism resulting in an increased HPA axis response. In agreement with this, administration of thyroxine, inducing a hyperthyroid state, has been shown to activate the HPA axis and be protective against an inflammatory challenge in rats, and hyperthyroidism has been shown to cause a reduction in CRH gene expression. Chronic HPA axis activation also represses TSH production and inhibits the conversion of inactive T4 to the active T3.

**Neural pathways**

Neural pathways

**Sympathetic nervous system**

The sympathetic nervous system regulates the immune system at regional, local, and systemic levels. Immune organs including thymus, spleen, and lymph nodes are innervated by sympathetic nerves. Immune cells also express neurotransmitter receptors, such as adrenergic receptors on lymphocytes, that allow them to respond to neurotransmitters released from these nerves. Catecholamines inhibit production of proinflammatory cytokines, such as IL-12, TNF-α, and interferon-γ, and stimulate the production of anti-inflammatory cytokines, such as IL-10 and transforming growth factor-β. Through this mechanism, systemic catecholamines can cause a selective suppression of Th1 responses and enhance Th2 responses. However, in certain local responses and under certain conditions, catecholamines can enhance regional immune responses by inducing the production of IL-1, TNF-α, and IL-8. Interruption of sympathetic innervation of immune organs has been shown to modulate the outcome of, and susceptibility to, inflammatory and infectious disease.

Denervation of lymph node noradrenergic fibers is associated with exacerbation of inflammation, whereas systemic sympathectomy or denervation of joints is associated with decreased severity of inflammation. However, mice lacking β2-adrenergic receptor from early development (β2AR-/- mice) maintain their immune homeostasis. Therefore, dual activation of the sympathetic nervous system and HPA axis is required for full modulation of host defenses to infection.
Opioids
Opioids suppress many aspects of immune responses, including antimicrobial resistance, antibody production, and delayed-type hypersensitivity. This occurs in part through the desensitization of chemokine receptors on neutrophils, monocytes, and lymphocytes. Morphine decreases mitogen responsiveness and natural killer cell activity. In addition to these direct effects, morphine could also affect immune responses indirectly through adrenergic effects, because it increases concentrations of catecholamines in the plasma.

Parasympathetic nervous system
Activation of the parasympathetic nervous system results in the activation of cholinergic nerve fibers of the efferent vagus nerve and the release of acetylcholine at the synapses. Together with the inflammation-activated sensory nerve fibers of the vagus nerve (discussed below) this forms the so-called ‘inflammatory reflex’. This is a rapid mechanism by which inflammatory signals reach the brain; the brain responds with a rapid anti-inflammatory action through cholinergic nerve fibers.

Acetylcholine attenuates the release of proinflammatory cytokines (TNF, IL-1β, IL-6, and IL-18) but not the anti-inflammatory cytokine IL-10, in lipopolysaccharide-stimulated human macrophage cultures through the post-transcriptional suppression of protein synthesis. This effect seems, at least in part, to be independent of the HPA axis, because direct electrical stimulation of the peripheral vagus nerve does not stimulate the HPA axis but decreases hepatic lipopolysaccharide-stimulated TNF synthesis and the development of shock during lethal endotoxemia.

Peripheral nervous system
The peripheral nervous system regulates immunity locally, at sites of inflammation, through neuropeptides such as substance P, peripherally released CRH, and vasoactive intestinal polypeptide. These molecules are released from nerve endings or synapses, or they may be synthesized and released by immune cells and have immunomodulatory and generally proinflammatory effects.

Neuropeptides
The HPA axis is also subject to regulation by both neurotransmitters and neuropeptides from within the CNS. CRH is positively regulated by serotonergic, cholinergic, and catecholaminergic systems. Other neuropeptides, such as y-aminobutyric acid/benzodiazepines (GABA/BZD) have been shown to inhibit the serotonin-induced secretion of CRH.

Regulation of the CNS by the immune system
Cytokines are important factors connecting and modulating the immune and neuroendocrine systems. Cytokines and their receptors are expressed in the neuroendocrine system and exert their effects both centrally and peripherally. Systemic cytokines can affect the brain through several mechanisms, including active transport across the blood–brain barrier, through leaky areas in the blood–brain barrier in the circumventricular organs or through the activation of neural pathways such as the vagal nerve. The blood–brain barrier is absent or imperfect in several small areas of the brain, the so-called circumventricular organs, which are located at various sites within the walls of the cerebral ventricles. These include the median eminence, the organum vasculosum of the laminae terminalis (OVLT), the subfornical organ, the choroid plexus, the neural lobe of the pituitary, and the area postrema. In addition, in the presence of inflammation, the permeability of the blood–brain barrier might be generally altered. Moreover, circulating IL-1 can interact with IL-1 receptors on endothelial cells of the vasculature and thereby stimulate signaling molecules such as nitric oxide or prostaglandins, which can locally influence neurons.

Cytokines signal the brain not only to activate the HPA axis but also to facilitate pain and induce a series of mood and behavioral responses generally termed sickness behavior. Cytokines, such as IL-1, IL-6, and TNF-α, are also produced in the brain. Thus, these brain-derived cytokines can stimulate the HPA axis. For example, IL-1 stimulates the expression of the gene encoding CRH and thereby the release of the hormone from the hypothalamus, the release of AVP from the hypothalamus, and the release of ACTH from the anterior pituitary. IL-2 stimulates AVP secretion from the hypothalamus. IL-6 and TNF-α also stimulate ACTH secretion. In chronic inflammation there seems to be a shift from CRH-driven to AVP-driven HPA axis response.

However, in contrast to these effects of peripheral cytokines on neuroendocrine responses in the CNS, cytokines produced within the brain by resident glia or invading immune cells act more like growth factors protecting from or enhancing neuronal cell death. Cytokines might therefore have a pathological consequence, because cytokine-mediated neuronal cell death is thought to be important in several neurodegenerative diseases such as neuroAIDS, Alzheimer’s disease, multiple sclerosis, stroke, and nerve trauma. In contrast, activated immune cells and cytokines might also protect neuronal survival after trauma and contribute to neural repair.

Vagus nerve
The vagus nerve is involved in signaling of the CNS to the immune system. The vagus innervates most visceral structures such as the lung and the gastrointestinal tract, where there may be frequent contact with pathogens. Immune stimuli activate vagal sensory neurons, possibly after binding to receptors in cells in paraganglial structures. Administration of endotoxins and IL-1 has been shown to induce Fos expression in the vagal sensory ganglia, and vagotomy abolishes this early activation gene response. Vagal afferents terminate in the dorsal vagal complex of the caudal medulla, which consists of the area postrema, the nucleus of the solitary tract, and the dorsal motor nucleus of the vagus. These nuclei integrate sensory signals and control visceral reflexes, and also relay visceral sensory information to the central autonomic network. Subdiaphragmatic vagotomy inhibits activation of the paraventricular nucleus and subsequent secretion of ACTH in response to lipopolysaccharides and IL-1.

Correlation between blunted HPA axis and disease
A blunted HPA axis has been associated with increased susceptibility to autoimmune/inflammatory disease in a variety of animal models and human studies. In general, at the baseline the HPA axis parameters do not differ in individuals susceptible and resistant to inflammatory disease. However, differences become apparent with stimulation of the axis.
Animal models

A blunted HPA axis has been associated with susceptibility to autoimmune/inflammatory diseases in several animal models. These include the Obese strain (OS) chickens, a model for thyroiditis; MRL mice, which develop lupus; and Lewis (LEW/N) rats. A region on rat chromosome 10 that links to the innate carrageenan inflammation is syntenic with a region on human chromosome 17 that is known to link to susceptibility to a variety of autoimmune diseases and is also syntenic with one of the 20 different regions on 15 different chromosomes shown to link to inflammatory arthritis in other linkage studies. Several candidate genes within the rat chromosome 10 linkage region are known to have a role in hypothalamic CRH regulation as well as inflammation, including the CRH R1 receptor, angiotensin-converting enzyme, and STAT3 and STAT5a/5b. However, these candidate genes either show no mutation in the coding region and no differences in regulation between susceptible and resistant strains, or show a mutation in the coding region that does not seem to have a role in expression of the inflammatory trait. As in most complex illnesses and traits, the genotypic contribution to variance in the trait is small: about 35%, which is consistent with such multigenic and polygenic conditions.

Inbred rat strains provide a genetically uniform system that can be systemically manipulated to test the role of neuro-endocrine regulation of various aspects of immunity. Lewis (LEW/N) rats are highly susceptible to the development of a wide range of autoimmune diseases in response to a variety of proinflammatory/antigenic stimuli. Fischer (F344/N) rats are relatively resistant to development of these illnesses after exposure to the same dose of antigens or proinflammatory stimuli. These two strains also show related differences in HPA axis responsiveness. The inflammatory-susceptible LEW/N rats exhibit a blunted HPA axis response, compared with inflammatory-resistant F344/N rats with an exaggerated HPA axis response. Differences in the expression of hypothalamic CRH, pro-opiomelanocortin, corticosterone-binding globulin and glucocorticoid expression and activation have been shown in these two rat strains.

Disruptions of the HPA axis in inflammatory resistant animals, through genetic, surgical, or pharmacological interventions, have been shown to be associated with enhanced susceptibility to, or increased severity of, inflammatory disease [139,145-148]. Reconstitution of the HPA axis in these inflammatory-susceptible animals, either pharmacologically with glucocorticoids or surgically by intracerebral fetal hypothalamic tissue transplantation, has been shown to attenuate inflammatory disease.

Animal models of arthritis

Several animal models exist for RA in rodents. Lewis rats develop arthritis in response to streptococcal cell walls, heterologous (but not homologous) type II collagen in incomplete Freund’s adjuvant (IFA), and various adjuvant oils—including mycobacteria (MTB-AIA), pristine, and avridine, but not IFA alone. Inbred dark Agouti (DA) rats develop arthritis in response to heterologous and homologous type II collagen in IFA, cartilage oligomeric matrix protein, MTB-AIA, pristine, avridine, and ovalbumin-induced arthritis. DBA mice develop arthritis in response to type II collagen in complete Freund’s adjuvant. For specific reviews on animal models for RA, refer to reviews by Morand and Leech and Joe and Wilder.

A premorbid blunting of normal diurnal corticosterone levels in both Lewis and DA rats has been shown in animals susceptible to experimentally induced arthritis. In adjuvant-induced arthritis, chronic activation of the HPA axis is seen 7–21 days after adjuvant injection, together with loss of circadian rhythm. This chronic activation of the HPA axis was shown to be due to increased corticosterone secretion due to an increase in the pulse frequency of secretion in adjuvant-induced arthritis. During this chronic activation of the HPA axis, rats with adjuvant-induced arthritis are incapable of mounting an HPA axis response to acute stress (such as noise) but are still able to respond to an acute immunological stress. Adrenalectomy or glucocorticoid receptor blockade exacerbates the disease state and results in death or disease expression in surviving animals [139,166,167]. It has been suggested that mortality from such shock-like responses is due to the increased cytokine production that occurs in adrenalectomized animals exposed to proinflammatory stimuli.

In addition to the role of HPA axis dysregulation, a dual role for the sympathetic nervous system in animal models of RA has been suggested. Activation of β-adrenoceptors or A2 receptors by high concentrations of norepinephrine or adenosine results in increased intracellular concentrations of cAMP and anti-inflammatory responses, whereas activation of A2-adrenoceptors and A1 receptors by low concentrations of norepinephrine or adenosine results in proinflammatory events, such as the release of substance P. Consistent with this is the observation that β-adrenergic agonists attenuate RA in animal models. Rolipram, an inhibitor of the PDE-IV phosphodiesterase, an enzyme that degrades cAMP, has been shown reduce inflammation in several rodent models [170,172-174]. The effects of rolipram have also been suggested to be mediated by catecholamines or by the stimulation of the adrenal and HPA axis. There is also a loss of sympathetic nerve fibers during adjuvant-induced arthritis. The peripheral natural anti-inflammatory agent, vasoactive intestinal peptide, has been shown to reduce the severity of arthritis symptoms in the mouse model of collagen-induced arthritis.

In addition to the sympathetic nervous system, the parasympathetic nervous system is also important in immune regulation. A role of the cholinergic parasympathetic nervous system in an animal model of RA was suggested because direct stimulation of the vagus nerve was shown to inhibit the inflammatory response. Impairment of the cholinergic regulation also exacerbates an inflammatory response to adjuvant in the knees of rats.

Summary of animal model studies and therapeutic correlates

Thus, animal models for arthritis have shown a role for the HPA axis, sympathetic, parasympathetic, and peripheral nervous systems. They have shown the necessity of endogenous glucocorticoids in regulating the immune response after exposure to antigenic or proinflammatory stimuli, and severity of inflammatory/autoimmune disease or mortality after removal of these endogenous glucocorticoids by adrenalectomy or GR blockade. Animal models have enabled genetic linkage studies, which have demonstrated the multigenic, polygenic nature of such inflammatory diseases with genes on more than 20 different chromosomes being linked to inflammatory arthritis. Finally, animal models have shown defects in the sympathetic and parasympathetic nervous system in arthritis. These findings have led to the development and testing of novel therapies (see the penultimate section, ‘New therapies’).

Human studies

In humans, ovine CRH, hypoglycemia, or psychological stresses have been used to stimulate the HPA axis. In such studies, blunted HPA axis responses have been shown in a variety of autoimmune/
inflammatory or allergic diseases such as allergic asthma and atop dermatitis, fibromyalgia, chronic fatigue syndrome [188,189,191,192], Sjögren’s syndrome [2,193], systemic lupus erythematosus [2,194], multiple sclerosis, and RA [1,197-202]. Conversely, chronic stimulation of the stress hormone response, such as experienced by caregivers of Alzheimer’s patients, students taking examinations, couples during marital conflict, and Army Rangers undergoing extreme exercise, results in chronically elevated glucocorticoids, causing a shift from Th1 to Th2 immune response, and is associated with an enhanced susceptibility to viral infection, prolonged wound healing, or decreased antibody production in response to vaccination.

**Rheumatoid arthritis**

RA is more common in women than in men, with onset usually occurring between menarche and menopause. However, the incidence of RA becomes much less gender specific in elderly men and women. In women, RA activity is reduced during pregnancy but returns postpartum, suggesting a role for the hormones that are fluctuating at this time (cortisol, progesterone, and estrogen) in the regulation of RA activity [33,209-212].

Glucocorticoids have been used for therapy for RA since the 1950s, when the Nobel Prize was awarded for the discovery of this effect. They are effective because of their anti-inflammatory actions in the suppression of many inflammatory immune molecules and cells. In patients with RA, administration of glucocorticoids decreases the release of TNF-α into the bloodstream; however, there are many debilitating side effects including weight gain, bone loss, and mood changes.

**The HPA axis in RA**

Human clinical studies are much more difficult to perform than animal models. However, some evidence exists supporting the involvement of the HPA axis in RA. Alterations in the diurnal rhythm of cortisol secretion have been documented in patients with RA. An association between the cortisol diurnal cycle and diurnal variations in RA activity has been made, although it still remains to be determined whether this is cause or effect. One of the most pertinent observations for the regulation of RA by endogenous cortisol comes from a study in which RA was exacerbated by inhibition of adrenal glucocorticoid synthesis by the 11β-hydroxylase inhibitor metyrapone.

Several studies have looked for abnormalities in the HPA axis of patients with RA. In general, these point to an inappropriately low cortisol response. Subtle changes in cortisol responses have been reported in response to insulin-induced hypoglycemia. However, another study, also using insulin-induced hypoglycemia, described a blunted HPA axis in patients with RA. In one study, lower cortisol responses to surgical stress were shown in patients with RA compared with healthy controls and an inflammatory control group, whereas normal responses of ACTH and cortisol to ovine CRH were seen in the same patients; however, these results are complicated by the steroid therapy that these patients were taking. Other studies have shown increased peripheral ACTH levels in patients with RA without increases in cortisol, whereas other studies have shown a normal HPA axis in patients with RA. Some studies have suggested that, given the inflammatory state of RA, a normal cortisol response is in fact indicative of an under-responsive HPA axis. It has become generally accepted that lower than normal cortisol responses to stimulation are characteristic of RA [169,197,201,216,221,223,225-227]. Most recently Straub and colleagues have shown that the most sensitive indicator of blunted HPA axis responsiveness in early, untreated RA is an inappropriately low ratio of cortisol to IL-6 in these subjects.

Such defects in the stress response system are in agreement with patients’ descriptions of RA ‘flare up’ during stress, which are likely to be caused by imbalances of the neuroendocrine and immune systems induced by psychosocial stressors. It is worth noting that psychosocial stress is important in RA disease activity. However, this will not be reviewed here and readers are referred to reviews by Walker and colleagues and Herrmann and colleagues.

**Glucocorticoid receptors in RA**

Quantification of the numbers of GRs by ligand binding studies has produced contrasting results. In one study, normal or even slightly elevated numbers of GRs in peripheral blood mononuclear cells (PBMCs) were seen in untreated patients with RA, whereas other studies have shown a decrease in the number of GR molecules in the lymphocytes of patients with RA in comparison with controls. Others have also shown a downregulation of GR during early RA. Recently, Neeck and colleagues, evaluating the expression of GR by immunoblot analysis, showed a higher expression of GR in untreated patients with RA in comparison with controls but a decreased GR expression in glucocorticoid-treated patients with RA in comparison with controls. This has been confirmed by others. A polymorphism in the 5’ untranslated region of exon 9 of the GR gene, which is associated with enhanced stability of the dominant-negative splice variant, GRβ, has been shown in patients with RA. Enhanced expression of GRβ has also been shown in the PBMCs of steroid-resistant patients with RA. A polymorphism in the CRH gene has also been described as a susceptibility marker for RA in an indigenous South African population.

**Other hormone measures in RA**

Patients with RA also show abnormalities in other endocrine hormones. Like other inflammatory diseases, they have been shown to have low serum androgen levels but unchanged serum estrogen levels. Growth retardation is a phenomenon seen in juvenile RA, and an impairment of the GH axis has been shown in patients with active and remitted RA. An increased expression of IGF-1-binding protein, resulting in a decreased concentration of free IGF-1, was also observed in patients with RA. However, another study has attributed this difference in IGF-binding proteins to physical activity rather than inflammation.

An association between thyroid and rheumatoid disorders, such as RA and autoimmune thyroiditis, has been known for many years although little is known about the thyroid involvement in RA. One study has shown that patients with RA have increased free T4 levels, and consequently lower free T3, than normal controls, although other studies were unable to confirm low levels in T3 patients with RA. However, a higher incidence of thyroid dysfunction has been shown in women with RA.

**Sympathetic nervous system in RA**

The extent to which the sympathetic nervous system is involved in human RA is unclear. In one study, a decreased number of β-adrenoceptors in the PBMCs and synovial lymphocytes of patients with RA was described, suggesting a shift to a proinflammatory state. Regional blockade of the sympathetic nervous system in patients with RA has been described to attenuate some of the features of RA. Others were unable to confirm this result but found defects in other aspects of this signaling pathway. However, as in animal models, β-adrenergic agonists have been shown to...
For the sympathetic nervous system to be able to modulate inflammation in RA it is necessary for the synovial tissue to be innervated by sympathetic nerve fibers. In patients with long-term RA there is a significant decrease in sympathetic nerve fibers but an increase in substance P-producing sensory nerve fibers, suggesting a decrease in the anti-inflammatory effects of the sympathetic nervous system and an increase in the proinflammatory effects of the peripheral nervous system.

**Peripheral neuropeptides in RA**

Consistent with these changes in peripheral and autonomic innervation in RA are findings of altered peripheral neuropeptides in RA. Proinflammatory CRH is locally secreted in the synovium of patients with RA and at a lower level than in osteoarthritis. Human T lymphocytes have been shown to synthesize and secrete CRH. Inflammation in chronic RA has also been shown to be attenuated with the μ-opioid-specific agonist morphine. In animal models, infusion of substance P into the knee exacerbated RA.

**Summary of hormonal findings in RA**

Studies of patients with RA are difficult to interpret and some might be tainted by a prior use of glucocorticoids used generally in the treatment of RA. However, these studies have generally shown a defect in cortisol secretion after HPA axis stimulation, decreased androgen levels, a blunted GH response, and dysregulation of the thyroid response. In addition there is evidence of an impaired response of the sympathetic nervous system and enhanced levels of the peripheral proinflammatory neuropeptides CRH and substance P. In some cases, a decrease in the number of GRs has been shown in RA, or reduced glucocorticoid sensitivity has been observed due to GRβ overexpression, which is consistent with relative glucocorticoid resistance in some patients. Furthermore, a polymorphism of the GRβ associated with the enhanced stability of that receptor has also been shown in RA. It still remains to be fully determined whether these alterations in neuroendocrine pathways and receptors are involved in the pathogenesis of RA or whether they are a result of the inflammatory status of the disease.

**Conclusion**

The CNS and immune system communicate through multiple neuroanatomical and hormonal routes and molecular mechanisms. The interactions between the neuroendocrine and immune systems provide a finely tuned regulatory system required for health. Disturbances at any level can lead to changes in susceptibility to, and severity of, autoimmune/inflammatory disease. A thorough understanding of the mechanisms by which the CNS and immune systems communicate at all levels will provide many new insights into the bidirectional regulation of these systems and the disruptions in these communications that lead to disease, and ultimately will inform new avenues of therapy for autoimmune/inflammatory disease. Animal models of arthritis have shown changes in both the HPA axis and the sympathetic nervous system during inflammation. More importantly, these models have demonstrated the importance of endogenous glucocorticoids in the regulation of immunity and the prevention of lethality from an uncontrolled immune response. Furthermore, in both animals and humans, RA is associated with dysregulation of the HPA, HPT, HPG, and GH axes. There is also evidence of an impaired regulation of immunity by the sympathetic nervous system and of defects in glucocorticoid signaling. These principles are now being used to test novel therapies for RA based on addressing and correcting the dysregulation of these neural and neuroendocrine pathways.

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Stress

What you need to know:
Pregnancy is a stressful time for many women. You may be feeling happy, sad and scared—all at the same time. It’s okay to feel like you do.

Very high levels of stress may contribute to preterm birth or low birthweight in full-term babies. Examples of events that may be highly stressful include loss of a job, divorce, or death of a close family member.

What you can do:
Recognize that you do indeed feel stressed. Accepting the fact you are stressed and identifying the situations that cause you stress are the first steps in helping reduce it. You can also help reduce your stress by:

- Eating regularly and nutritiously and drinking lots of water.
- Resting when you can—and when your body needs it.
- Exercising (with your health care provider’s okay).
- Relaxing by meditating, listening to music or writing in a journal.
- Resisting any urges to drink alcohol, smoke or take herbal products or drugs (except those prescribed by your health care provider).
- Staying away from stressful people and stressful situations, when possible.
- Talking—to your partner, friends, relatives, health care professionals, and your employer. If you feel overwhelmed, talk with a trained counselor or other mental health professional.
- Going to all your prenatal care appointments. This will give you the reassurance that everything is okay with your baby or let your health care provider know about a problem while there is still time to do something about it. You’ll feel less stressed because you know you are doing the best for your baby.

February 2008
Program Description:
Stress associated with a life threatening illness contributes to poor adjustment and psychological and physiological consequences harmful to adaptation and recovery from surgical treatment. Cancer and its treatment are associated with considerable distress, impaired quality of life, poor mental health, and reduced physical function. This is particularly true for men with prostate cancer undergoing a radical prostatectomy (RP), the surgical treatment of prostate cancer. Recovery from RP is often associated with urinary and sexual dysfunction in addition to more common sources of stress associated with surgery. At least 50 percent of RP patients have permanent impotence and many experience prolonged periods of urinary incontinence. In addition to the distress associated with these quality of life changes, prostate cancer patients face the fear of recurrence, progression, and death. Recent research has found that psychosocial and psychoeducational interventions can increase quality of life and mental health of cancer patients, and may also improve immune status, pain indices, hospital costs, and length of survival. Despite the dramatic increase in research on psychosocial aspects of cancer and of interventions for cancer patients, relatively little work has considered prostate cancer or the specific impact of surgery for cancer. The proposed study will randomly assign prostate cancer patients undergoing RP to a pre-surgical stress management group, an attention control group, or a usual care control group. Dimensions of response to surgery and recovery will include measures of mental health and psychological status, quality of life, and immune, endocrine, and cardiovascular function, as well as pain, use of analgesic medication, and length of hospital stay post-surgery. This design will allow characterization of distress associated with prostate cancer and RP and examination of psychological, physiological, and quality of life changes associated with surgery and short- and long-term recovery. We will also evaluate a theoretical model developed to examine dispositional and environmental factors as predictors of response to surgery and long-term recovery. We hypothesize that pre-surgical stress management will reduce the negative impact of RP assessed by psychological, physiological, and quality of life measures.
Psychological Stress and Cancer: Questions and Answers

Key Points

- Psychological stress affects the body in many ways (see Question 2).
- A direct relationship between psychological stress and the development of cancer has not been scientifically proven (see Question 3).
- Researchers have suggested that psychological factors may affect cancer progression (increase in tumor size or spread of cancer in the body) in patients who have the disease (see Question 5).

Introduction

The complex relationship between physical and psychological health is not well understood. Scientists know that psychological stress can affect the immune system, the body's defense against infection and disease (including cancer); however, it is not yet known whether stress increases a person's susceptibility to disease (1).

What is psychological stress?

Psychological stress refers to the emotional and physiological reactions experienced when an individual confronts a situation in which the demands go beyond their coping resources. Examples of stressful situations are marital problems, death of a loved one, abuse, health problems, and financial crises (2).

How does stress affect the body?

The body responds to stress by releasing stress hormones, such as epinephrine (also called adrenaline) and cortisol (also called hydrocortisone). The body produces these stress hormones to help a person react to a situation with more speed and strength. Stress hormones increase blood pressure, heart rate, and blood sugar levels. Small amounts of stress are believed to be beneficial, but chronic (persisting or progressing over a long period of time) high levels of stress are thought to be harmful (1).

Stress that is chronic can increase the risk of obesity, heart disease, depression, and various other illnesses. Stress also can lead to unhealthy behaviors, such as overeating, smoking, or abusing drugs or alcohol, that may affect cancer risk.

Can stress increase a person’s risk of developing cancer?

Studies done over the past 30 years that examined the relationship between psychological factors, including stress, and cancer risk have produced conflicting results. Although the results of some studies have indicated a link between various psychological factors and an increased risk of developing cancer, a direct cause-and-effect relationship has not been proven (3, 4).

Some studies have indicated an indirect relationship between stress and certain types of virus-related tumors. Evidence from both animal and human studies suggests that chronic stress weakens a person's immune system, which in turn may affect the incidence of virus-associated cancers, such as Kaposi sarcoma and some lymphomas (5).

More recent research with animal models (animals with a disease that is similar to or the same as a disease in humans) suggests that the body's neuroendocrine response (release of hormones into the blood in response to stimulation of the nervous system) can directly alter important processes in cells that help protect against the formation of cancer, such as DNA repair and the regulation of cell growth (6).

Why are the study results inconsistent?

It is difficult to separate stress from other physical or emotional factors when examining cancer risk (3, 4). For example, certain behaviors, such as smoking and using alcohol, and biological factors, such as growing older, becoming overweight, and having a family history of cancer, are common risk factors for cancer. Researchers may have difficulty controlling the presence of these factors in the study group or separating the effects of stress from the effects of these other factors (3). In some cases, the number of people in the study, length of follow-up, or analysis used is insufficient to rule out the role of chance (4). Also, studies may not always take into account that cancer is not a homogeneous (uniform in nature) disease.

How does stress affect people who have cancer?

Studies have indicated that stress can affect tumor growth and spread, but the precise biological mechanisms underlying these effects are not well understood. Scientists have suggested that the effects of stress on the immune system may in turn affect the growth of some tumors (7). However, recent research using animal models indicates that the body's release of stress hormones can affect cancer cell functions directly (8).

A review of studies that evaluated psychological factors and outcome in cancer patients suggests an association between certain psychological factors, such as feeling helpless or suppressing negative emotions, and the growth or spread of cancer, although this relationship was not consistently seen in all studies (3). In general, stronger relationships have been found between psychological factors and cancer growth and spread than between psychological factors and cancer development (6).

Where can a person find more information about psychological stress?

Additional information about stress can be found on the National Institute of Mental Health's (NIMH) Web site at http://www.nimh.nih.gov on the Internet. The NIMH, a part of the National Institutes of Health, provides national leadership in the study of mental and behavioral disorders, including the causes and effects of psychological stress.

The National Women's Health Information Center (NWHIC), a service of the Office on Women's Health, provides information on stress and health on its Web site at http://www.womenshealth.gov on the Internet. In particular, the fact sheet Stress and Your Health provides answers to frequently asked questions about causes of stress, how women react to stress, and ways to handle stress. This resource is available at http://www.womenshealth.gov/faq/stress.htm on the Internet.
Psychoneuroimmunology: Stress Reduction To Prevent Cancer Recurrence

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Edited and reviewed By Professor of Medicine William Nelson IMUNE

International Journal of the Medical Science of Homeopathy

After the surgical removal of a malignant tumor, the chance that cancer will re-appear in a different location of the body remains high. But new research from Tel Aviv University, in a bold new field called Psychoneuroimmunology, may prevent those cancer cells from taking root again - and the key to the treatment is stress reduction.

A new study led by Prof. Shamgar Ben-Eliyahu, from Tel Aviv University’s Department of Psychology, has shown scientifically that psychological and physiological stress prior to, during and after surgery has a biological impact that impairs immune system functioning. This impairment bears down on disease progression, he says, especially at the critical point during oncological surgery when a primary tumor is being removed.

The study was published in the journal Brain, Behaviour, and Immunity (2007). The results are expected to influence cancer intervention programs in the future.

Effects of Fear

“The psychological stressors of surgery deal a blow to the immune system, but this is hardly discussed in the medical community,” says Prof. Ben-Eliyahu. “Ours is among the first studies to show that psychological fear may be no less important than real physiological tissue damage in suppressing immune competence.”

The surprising part of Prof. Ben-Eliyahu’s studies is that stress hormones such as adrenaline, which are released before and during surgery, “underlie much of the devastating effects of surgery on immune competence,” says Prof. Ben-Eliyahu.

Until now, doctors assumed that the immune system was weakened due to tissue damage and the body’s responses to it. A weak immune system is one of the major factors that promotes cancer metastases after an operation, explains Prof. Ben-Eliyahu.

“Timing is everything after cancer surgery,” says Prof. Ben-Eliyahu. “There is a short window of opportunity, about a week after surgery, when the immune system needs to be functioning maximally in order kill the tiny remaining bits of tumor tissue that are scattered around the body.”

An Early Boost

The main stress hormones that appear to have an impact on immune competence are released before and during surgery, Prof. Ben-Eliyahu has found. He is currently developing a novel intervention program, based on existing generic drugs, to block the influence of these hormones.

Pre-clinical studies in a 2005 study also published in Brain, Behaviour, and Immunity reveal that by blocking these stress hormones, cancer metastases in animal models could be reduced. In a

Selected References

• Reiche EM, Nunes SO, Morimoto HK. Stress, depression, the immune system, and cancer. The Lancet Oncology 2004; 5(10):617–625.

Related NCI materials and Web pages:

• National Cancer Institute Fact Sheet 10.3, Quitting Tobacco: Handling Stress ... Without Smoking (http://www.cancer.gov/cancertopics/factsheet/Tobacco/stress)
• Understanding Cancer Series: The Immune System (http://www.cancer.gov/cancertopics/understandingcancer/immunesystem)
• What You Need To Know About™ Cancer (http://www.cancer.gov/cancertopics/wyntk/overview)
• For more help, contact: NCI’s Cancer Information Service
  • Telephone (toll-free): 1–800–4–CANCER (1–800–422–6237)
  • TTY (toll-free): 1–800–332–8615
  • LiveHelp® online chat: https://cissecure.nci.nih.gov/livehelp/welcome.asp
Prof. Ben-Eliyahu and his students are now also trying to integrate stimulation of the immune system just before surgery and prevent its suppression. This may provide the immune system with an opportunity to eradicate cancer residuals after the surgical removal of the primary tumor, and before these residuals are re-established and become resistant to immunity, he says.

Prof. Ben-Eliyahu concludes, “By boosting the immune system and blocking its suppression by psychological and physiological stress, starting a day or two before surgery, during surgery and after surgery, we may be able to provide an intervention program that can extend people’s lives and potentially increase their chances for long-term survival.”

He plans on starting clinical trials within the next year or two.

Prof. Ben-Eliyahu is one of about 200 other scientists working in the novel and emerging field of Psychoneuroimmunology. It is an interdisciplinary study of the interaction between the psychological processes of the brain, and the nervous and immune systems of the human body. In this field, Prof. Ben-Eliyahu collaborates regularly with Prof. Gayle Page from the Johns Hopkins School of Nursing and other scientists from the United States and Israel. His work is supported by the U.S. National Institute of Health. In May, he plans on attending the Psychoneuroimmunology Research Society conference in Madison, Wisconsin.

Article adapted by Medical News Today from original press release.
emotional field, was the first satisfactory quantum description of a physical field and of the creation and annihilation of quantum particles.

QED involves a covariant and gauge invariant prescription for the calculation of observable quantities. Feynman’s mathematical technique, based on his diagrams, initially seemed very different from the field-theoretic, operator-based approach of Schwinger and Tomonaga, but Freeman Dyson later showed that the two approaches were equivalent. The renormalization procedure for eliminating the awkward infinite predictions of quantum field theory was first implemented in QED. Even though renormalization works very well in practice, Feynman was never entirely comfortable with its mathematical validity, even referring to renormalization as a “shell game” and “hocus pocus”. (Feynman, 1985: 128) QED has served as a role model and template for all subsequent quantum field theories. One such subsequent theory is quantum chromodynamics, which began in the early 1960s and attained its present form in the 1975 work by H. David Politzer, Sidney Coleman, David Gross and Frank Wilczek. Building on the pioneering work of Schwinger, Peter Higgs, Goldstone, and others, Sheldon Glashow, Steven Weinberg and Abdus Salam independently showed how the weak nuclear force and quantum electrodynamics could be merged into a single electroweak force.

Physical interpretation of QED

In classical optics light travels over all allowed paths, and their interference results in Fermat’s principle. Similarly, in QED, light (or any other particle like an electron or a photon) passes over every possible path allowed by apertures or lenses. The observer (at a particular location) simply detects the mathematical result of all wave functions added up, as a sum of all line integrals. For other interpretations, paths are viewed as non physical, mathematical constructs that are equivalent to other, possibly infinite, sets of mathematical expansions. According to QED, light can go slower or faster than c, but will travel at velocity c on average.[4]

Physically, QED describes charged particles (and their antiparticles) interacting with each other by the exchange of photons. The magnitude of these interactions can be computed using perturbation theory; these rather complex formulas have a remarkable pictorial representation as Feynman diagrams. QED was the theory to which Feynman diagrams were first applied. These diagrams were invented on the basis of Lagrangian mechanics. Using a Feynman diagram, one decides the mathematical result of all wave functions added up, as a sum of all line integrals. For other interpretations, paths are viewed as non physical, mathematical constructs that are equivalent to other, possibly infinite, sets of mathematical expansions. According to QED, light can go slower or faster than c, but will travel at velocity c on average[4].

QED doesn’t predict what will happen in an experiment, but it can predict the probability of what will happen in an experiment, which is how it is experimentally verified. Predictions of QED agree with experiments to an extremely high degree of accuracy: currently about 10–12 (and limited by experimental errors); for details see precision tests of QED. This makes QED the most accurate physical theory constructed thus far. Near the end of his life, Richard P. Feynman gave a series of lectures on QED intended for the lay public. These lectures were transcribed and published as Feynman (1985), QED: The strange theory of light and matter, a classic non-mathematical exposition of QED from the point of view articulated above.

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Recommendations for the management of migraine in paediatric patients.

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Migraine is a common and disabling condition in children and adolescents. The complexity of migraine on a pathogenetic and clinical level results from the interaction between biological, psychological and environmental factors. Appropriate management requires an individually tailored strategy giving due consideration to both pharmacological and non-pharmacological measures. Ibuprofen (7.5-10.0 mg/kg) and acetaminophen (15 mg/kg) are safe and effective, and should be considered for symptomatic treatment. Sumatriptan nasal spray (5 and 20 mg) is also likely to be effective, but at the moment, should be considered for the treatment of adolescents only. With reference to prophylactic drug treatment, the available data suggest that flunarizine (5 mg/day) is likely to be effective and pizotifen and clonidine are likely to be ineffective. The efficacy data regarding propranolol, nimodipine and trazodone are conflicting. Insufficient evidence is available on cyproheptadine, amitriptyline, divalproex sodium, topiramate, levetiracetam, gabapentin or zonisamide. The management of migraine in children needs an individualised therapeutic approach, directed to the whole person of the child, taking into account the developmental perspective and the high rate of psychiatric comorbidities. It is the authors’ opinion that for the prophylaxis of migraine, interventions such as identification and avoidance of trigger factors, regulation of lifestyle, relaxation, biofeedback, cognitive behavioural treatment and psychological or psychotherapeutic interventions (e.g., psychodynamics) could be much more effective than pharmacotherapy.

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Relationship between biofeedback and oxidative stress in patients with chronic migraine.

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Chronic migraine (1.5.1) is burdened with headache-related disability. During noxious stimulation, changes of cerebral blood flow enhance the release of oxygen free radicals that react with nitric oxide (NO). We investigated the role of biofeedback in limiting migraine disability by influencing oxidative stress. Peroxides, NO and superoxide dismutase (SOD) were analysed in 20 female subjects with chronic migraine and in 20 female healthy controls before and after biofeedback sessions. NO(x) levels (23.7 +/- 4.2 vs. 34.9 +/- 4.6 microm; P < 0.05) and SOD activity (6.5 +/- 1.0 vs. 8.0 +/- 0.7 U/ml; P < 0.05) were lower in migraine sufferers before treatment than in healthy controls, whereas peroxide levels (145.8 +/- 40.3 vs. 78.0 +/- 20.0 microm; P < 0.05) were higher in migraine sufferers before treatment than in healthy controls. In migraine sufferers NO(x) levels (23.7 +/- 4.2 vs. 31.3 +/- 7.1 microm; P < 0.05) and SOD activity (6.5 +/- 1.0 vs. 7.9 +/- 0.3 U/ml; P < 0.05) were lower before than after treatment, whereas peroxide levels (145.8 +/- 40.3 vs. 82.4 +/- 21.1 microm; P < 0.05) were higher before than after treatment. SOD serum activity correlated positively with NO(x) serum levels and negatively with peroxide serum levels in healthy controls and in chronic migraine sufferers before and after biofeedback. The mean Migraine Disability Assessment Score before biofeedback sessions was higher than after treatment (36.9 +/- 13.9 vs. 18.8 +/- 10.4; P < 0.001). The effectiveness of biofeedback in limiting chronic migraine may be related to muscular relaxation associated with decreased oxidative stress accompanied by psychological well-being.

PMID: 17725652 [PubMed - indexed for MEDLINE]
Abstract

Background
Lifestyle interventions are often recommended as initial treatment for mild hypertension, but the efficacy of relaxation therapies is unclear.

Objectives
To evaluate the effects of relaxation therapies on cardiovascular outcomes and blood pressure in people with elevated blood pressure.

Search strategy
We searched the Cochrane Library, MEDLINE, EMBASE, Science Citation Index, ISI Proceedings, ClinicalTrials.gov, Current Controlled Trials and reference lists of systematic reviews, meta-analyses and randomised controlled trials (RCTs) included in the review.

Selection criteria
Inclusion criteria: RCTs of a parallel design comparing relaxation therapies with no active treatment, or sham therapy; follow-up ≥8 weeks; participants over 18 years, with raised systolic blood pressure (SBP) ≥140 mmHg or diastolic blood pressure (DBP) ≥85 mmHg; SBP and DBP reported at end of follow-up. Exclusion criteria: participants were pregnant; participants received antihypertensive medication which changed during the trial.

Data collection and analysis
Two reviewers independently extracted data and assessed trial quality. Disagreements were resolved by discussion or a third reviewer. Random effects meta-analyses and sensitivity analyses were conducted.

Main results
29 RCTs, with eight weeks to five years follow-up, met our inclusion criteria; four were excluded from the primary meta-analysis because of inadequate outcome data. The remaining 25 trials assessed 1,198 participants, but adequate randomisation was confirmed in only seven trials and concealment of allocation in only one. Only one trial reported deaths, heart attacks and strokes (one of each). Meta-analysis indicated that relaxation resulted in small, statistically significant reductions in SBP (mean difference: -5.5 mmHg, 95% CI: -8.2 to -2.8, I² =72%) and DBP (mean difference: -3.5 mmHg, 95% CI: -5.3 to -1.6, I² =75%) compared to control. The substantial heterogeneity between trials was not explained by duration of follow-up, type of control, type of relaxation therapy or baseline blood pressure.

The nine trials that reported blinding of outcome assessors found a non-significant net reduction in blood pressure (SBP mean difference: -3.2 mmHg, 95% CI: -7.7 to 1.4, I² =69%) associated with relaxation. The 15 trials comparing relaxation with sham therapy likewise found a non-significant reduction in blood pressure (SBP mean difference: -3.5 mmHg, 95% CI: -7.1 to 0.2, I² =63%).

Authors’ conclusions
In view of the poor quality of included trials and unexplained variation between trials, the evidence in favour of causal association between relaxation and blood pressure reduction is weak. Some of the apparent benefit of relaxation was probably due to aspects of treatment unrelated to relaxation.
Risk Indices Associated with the Insulin Resistance Syndrome, Cardiovascular Disease, and Possible Protection with Yoga: A Systematic Review

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Objective: To conduct a systematic review of published literature regarding the effects of yoga, a promising mind-body therapy, on specific anthropometric and physiologic indices of cardiovascular disease (CVD) risk and on related clinical endpoints

Conclusions: Collectively, these studies suggest that yoga may reduce many IRS-related risk factors for CVD, may improve clinical outcomes, and may aid in the management of CVD and other IRS-related conditions. However, the methodologic and other limitations characterizing most of these studies preclude drawing firm conclusions. Additional high quality RCTs are needed to confirm and further elucidate the effects of standardized yoga programs on specific indices of CVD risk and related clinical endpoints.

Stress Reduction Dissertations


Abstract (Summary)

In this dissertation, a qualitative research design was employed to investigate the experience of eight adolescent bullies who participated in a pilot study of Mindfulness-Based Stress Reduction. This study was conducted at a juvenile corrections facility, and themes that arose from this unique sample were representative of the culture of the participants. This study explored the adolescents' behavioral and emotional experience as related to their mindfulness training and bullying behavior, and examined the feasibility of MBSR for adolescents and explored what modifications could make it more beneficial. Data analysis identified ten major themes and three minor themes addressing the question, “Which aspects of MBSR were helpful to the adolescent participants?” At least 75% of the participants described Better Interpersonal Relationships, Better Relationship with Self, Positive Physical Effects, Development of the Wise Mind, Increased Positive Emotions, Used Mindfulness as a Coping Skill, Improved Self-Management, Increased Affiliative Trust, Increased Emotional Intelligence and Increased Affective Coping as beneficial effects of their participation in mindfulness training. Fifty to 75% of the participants described Inclusion of Family/Improved Family Relations, Increased Control Over the Mind, and Increased Emotional Regulation. Results from the TRF showed several decreases in problematic behavior within individual participants including problems with conduct, attention, hyperactivity, externalizing behavior, oppositionality, and defiance. In terms of group change, increases were found in affective problems and somatic complaints following MBSR training. These preliminary results inform the applicability of MBSR to this unique sample.

Indexing (document details)
- Advisor: Ribner, Neil
- School: Alliant International University, San Diego
- School Location: United States -- California
- Keyword(s): Adolescent, Mindfulness-based stress reduction, MBSR, Bullies, Bullying, Probation, Mindfulness, Meditation
- Source: DAI-B 69/01, Jul 2008
- Source type: Dissertation
- Subjects: Behavioral sciences, Psychotherapy
- Publication AAT 3298902
- ISBN: 9780549428503

Document URL: http://proquest.umi.com/pqdweb?did=1472137021&Fmt=6&clientId=45714&RQT=309&VName=PQD
Healthy relationships: An HIV intervention for positives

Abstract (Summary)
The present study assessed Community Prevention Intervention Unit clients participating in Healthy Relationships in December of 2005 to December of 2006. Healthy Relationships was formulated from Social Cognitive Theory-based HIV prevention. This 5-week intervention integrates skills building, self-efficacy, and positive expectations about new behaviors in addition to stress reduction and sexual risk reduction techniques to elicit a behavior change. The study was undertaken to evaluate differences in attitudes, beliefs and behaviors regarding one’s HIV status and participation in Healthy Relationships. Gender differences among participants in Healthy Relationships were also measured. Subjects were evaluated utilizing pre- and post-questionnaires. Analyses revealed that there were significant differences in some risk behaviors, beliefs and attitudes. However, men and women did differ with regard to significant differences among disclosure.

Indexing (document details)
• Advisor: Caughy, Margaret
• Committee members: Vaeth, Patrice
• School: The University of Texas School of Public Health
• Department: Health Promotion & Behavioral Sciences Management
• School Location: United States -- Texas
• Source: MAI 46/05, Oct 2008
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• Subjects: Public health
• Publication AAT 1450307
• ISBN: 9780549467618

Mindfulness interventions in the treatment of substance and mood disorders

Abstract (Summary)
To test the effectiveness of a mindfulness based stress reduction program (MBSR) in the treatment of anxiety disorders, 82 Participants were drawn from the patient population of a small, rural non-profit community mental health center serving three economically depressed communities in Pinal County, Arizona. All study participants met federal poverty level criteria.

ANOVA’s were used to compare the MBSR (intervention) and TAU (control) groups, prettest and posttest results on a common measure of anxiety, the Stait-Trait Anxiety Inventory (STAI-S). STAI showed a significantly greater change as compared to the control group F (1, 50) = 5.31, p < .05.

Experiential avoidance is believed to play a key role in the acquisition of mindfulness. This study’s findings confirmed that a significant negative correlation exists, in the intervention group, between increased levels of posttest mindfulness and decreased levels of posttest experiential avoidance.

Two-tailed Pearson correlations were calculated for the intervention group, which showed a significant negative relationship (r = -.314, p = .05).

Empirical evidence of efficacy is a fundamental requirement for qualification as a Best Practice intervention (Baer, 2003). Increasingly state funding is tied to interventions, which met Best Practice criteria (ADHS, 2006). As a true experiment, the current research provides additional evidence, which supports MBSR moving from a “probably efficacious” designation (Baer, 2003) to fully the Best Practice standard in the treatment of anxiety disorders.

Indexing (document details)
• Advisor: Haussmann, Robert
• School: Northcentral University
• School Location: United States -- Arizona
• Keywords: Interventions, Mood disorders, Mindfulness, MBSR, Mindfulness-based, Substance disorders, Stress reduction
• Source: DAI-B 69/03, Sep 2008
• Source type: Dissertation
• Subjects: Behavioral sciences, Cognitive therapy
• Publication AAT 3308482
• ISBN: 9780549550488

Parent stress reduction through a psychosocial intervention for children diagnosed with Attention-Deficit/Hyperactivity Disorder

Abstract (Summary)
Children with Attention-Deficit/Hyperactivity Disorder (ADHD) experience significant difficulties in the domains of attention, hyperactivity, and impulsivity. This constellation of symptoms not only
has a negative impact on the child’s life by creating difficulties in school and peer relations, but also is associated with difficulties within the home. In fact, having a child with ADHD is correlated with significant increases in the amount of stress that parents experience. Studies have indicated that when parents of children with ADHD participate in parent training and when children receive medication, parent stress is decreased. The current study examines whether a child’s participation in a psychosocial treatment, specifically the Summer Treatment Program (STP), can have the same significant positive impact on parents’ experience of stress. Participants were parents of children participating in the Summer Treatment Program provided through a community mental health clinic.

Parents completed measures of parenting stress prior to and after their child participated in the STP. Measures of child behavior problems were also completed prior to and following the child’s participation in the STP. There was a significant decrease in the total amount of parenting stress that parents were experiencing after their child participated in the STP. Findings, however, were inconsistent as to whether or not child behavior improved. The results, however, do suggest that participation in the STP can have a positive impact on parent stress.

Reiki therapy in social work practice

Abstract (Summary)
This study explores the perspectives of individuals with reiki and social work credentials, or “practitioners”, regarding any benefits, risks, and barriers to the integration of reiki therapy and social work practice in the healthcare system. An organizational representative from each College of Social Workers and Social Service Workers, The Canadian Reiki Association, and

The Ontario Health Department was interviewed regarding their response to the prospect of integration and for the purpose of providing an organizational context to the practitioners’ responses. Practitioners identified benefits to integration such as relief of physical pain, relaxation and stress reduction, relief of emotional pain, increased mental clarity and self-awareness, increased receptivity to therapy, enhanced spiritual connection, and a sense of empowerment. The fit that was described between the two practices demonstrated complementary goals, values, and ethics of practice. Barriers to integration were described to be a lack of standardization in reiki and issues around credibility, financial costs of reiki, lack of education and scientific research about reiki, a Western mind-set, and issues regarding touch in practice. Such barriers demonstrated the impact of cultural differences and social structures due to a conservatism around the East-West paradigm clash and the struggle to establish and maintain boundaries within both CAM groups and within the conventional medical community. None of the participants saw any risks or dangers of integrating social work and reiki therapy. The responses of the organizational representatives demonstrated that the Canadian Reiki Association was very supportive of integration while the College and Ontario Health Department representatives took a more neutral and formalized position. These representatives cited the importance of adhering to standards of practice in their respective fields, which did not allow for an in-depth exploration of potential issues involved with integration.

Social support for coping with stress: A resource for parents of disabled children

Abstract (Summary)
Parents of physically and developmentally disabled children have more stress than parents of non-disabled children. Though there is much in the current literature that addresses how stress affects these parents, there is little in the current literature that specifically addresses stress reduction with this population. Using parent surveys from a local agency for disabled children and their
families and literature on stress reduction, a stress reduction manual was created for parents of disabled children. The parent manual was then reviewed by 3 professionals working with this population and suggestions were incorporated to improve the manual further. The completed manual addresses stress for parents of disabled children, stress reduction or management, and books and resources in Los Angeles County.

Indexing (document details)
• Advisor: Martinez, Tomas
• Committee members: Foy, David, Shepherd-Look, Dee
• School: Pepperdine University
• Department: Psychology
• School Location: United States -- California
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• Source: DAI-B 69/02, Aug 2008
• Source type: Dissertation
• Subjects: Psychotherapy

“The secret source of humor is sorrow...”: Humor as a coping mechanism in the dying process

Abstract (Summary)
Humor in the dying process is an elusive topic of study, for at its core, it offers many contradictions. One key to humor is that it embraces pain and suffering while alleviating it. This qualitative project is an examination of humor through the lenses of psychoanalytic, existential, cognitive-behavioral, behavioral, and sociological perspectives to understand the role of humor in the dying process. A particular form of humor, gallows humor, was examined to understand its role in coping with death.

This study explored the experiences of hospice care nurses with humor working in palliative care settings. Ten licensed nurses were interviewed using a semi-structured qualitative interview format. The interview was structured to elicit nurses experience of patient use of humor in the dying process. Additionally nurses’ experience of staff, and family use of humor was investigated as well as the use of gallows humor in the palliative care setting.

The nurses stated that they have all used and witnessed humor in the work they do with patients, families and fellow staff. An evolving typology of patients’ humor consisting of silliness, bodily function jokes and lightheartedness was established. Nurses consistently cited stress reduction, enhancing quality of life, and fostering acceptance of death, and building stronger alliances with the patients and their families as the functions of humor in their work.

The vast majority of the participants noted that humor is essential to the work they do, as it provides stress reduction and a necessary counterbalance to the bleak nature of their job.

Nurses identified examples of gallows humor in the work they do, particularly among staff, as a means of coping with anxiety associated with dying. Humor’s adaptive value in a terminally ill population is discussed in detail, as well as implications for mental health professionals working with this population.

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• Advisor: Berman, Stanley
• School: Massachusetts School of Professional Psychology
• School Location: United States -- Massachusetts
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THE RELATIONSHIP BETWEEN TEACHERS’ LOCUS OF CONTROL AND THE EFFECTIVENESS OF DIRECTED VERSUS SELF-DIRECTED STRESS REDUCTION

Abstract (Summary)
The present study investigated the effectiveness of two stress management programs designed to help urban teachers reduce stress. The major focus of this research concerned the effects of external versus internal locus of control on different stress reduction models. That is, the effectiveness of stress reduction programs may be dependent on how teachers perceive themselves in terms of degree of control over rewarding events in their environment.

Pretest and posttest measures of locus of control and anxiety were administered to the 85 teachers
participating in the study. The Rotter Internal-External Locus of Control Scale, State Trait Anxiety Inventory and the Subjective Stress Scale were the criterion measures. Teachers with extreme locus of control scores were randomly assigned to experimental groups (lecture-discussion workshop and self-directed training). The remaining teachers were assigned to the control group. The treatments utilized an educational stress skills format that emphasized a combination of cognitive coping skills and relaxation techniques designed to create an awareness of how to assess, prevent and manage stress.

It was hypothesized that: (a) the adjusted means on anxiety and stress of subjects in a stress reduction method matched with locus of control, that is, internals with the self-directed training and externals with the lecture-discussion workshop, will be significantly less than those subjects in the control group, and (b) the adjusted means on anxiety and stress of subjects in a stress reduction method matched with locus of control, that is, internals with the self-directed training and externals with the lecture-discussion workshop, will be significantly less than those subjects whose locus of control is not matched with treatment.

The results of a multivariate analysis of covariance revealed that there is a significant difference between the matched treatment groups and the control group on the dependent variable of stress and anxiety. Thus, the findings support the hypothesis that a comprehensive stress reduction program utilizing group or more individually oriented methods is effective in teaching individuals appropriate stress coping skills. However, the findings indicate that the interaction between type of treatment and locus of control of the individual for stress reduction is not significant. That is, the present findings indicate that locus of control is not an important factor in determining success in a stress reduction program as defined by the parameters and measurement procedures used in the study.

The present study represented an attempt to provide a comprehensive stress management program for teachers who may have either internal or external perceptions of the world and the way they receive reinforcement. Importantly, the data indicated that many teachers could be taught to become more aware of stress in their lives and manage it successfully with either direction or in a more self-directed method.

The implications for future study include: (a) development of stress management in service programs utilizing a self-directed format with provision for a peer-trainer component and support group, (b) replication of the present study with a more heterogeneous population of teachers including suburban as well as urban teaching populations to insure generalizability, (c) investigation of the effectiveness of specific stress management techniques and their interaction with the locus of control of subjects, (d) exploration of the role that peers and the instructor play in reinforcing stress reduction, (e) utilization of behavioral and physiological measures of stress and anxiety to enhance the measurement of interaction effects and stress reduction, and (f) investigation of the interaction between perceived expectancy for success in stress reduction, locus of control and treatment strategy.

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- School: University of Cincinnati
- School Location: United States -- Ohio

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SHORT-TERM EFFECTS OF JOGGING UPON STRESS REDUCTION


Abstract (Summary)
The Problem. Past findings have shown inconclusive evidence regarding the effect of jogging on stress reduction. The purpose of the study was to examine the relationship between jogging and stress reduction. Specifically, the objectives of the study were addressed as follows: (1) To determine if jogging, independent of any further treatment was itself sufficient to reduce stress. (2) To determine if beginning joggers show evidence of greater stress reduction benefits than advanced joggers. (3) To determine if female joggers show evidence of greater stress reduction benefits than male joggers. (4) To determine if older joggers show evidence of greater stress reduction benefits than younger joggers. (5) To determine if physically unfit joggers demonstrate evidence of greater stress reduction benefits than physically fit joggers. (6) To determine if anxiety prone joggers show evidence of greater stress reduction benefits than joggers who are not anxiety prone.

Method. The method used in this study was a quasi-experimental approach. A non-randomized control group, pretest, posttest design was employed. The subjects enlisted in this study were 62 volunteers divided into three groups; a control and two experimental groups were delineated according to their previous jogging experience. The two experimental groups consisted of 20 beginning and 22 advanced joggers. All subjects were administered A-State and A-Trait Scale of the State Trait Anxiety Inventory (STAI), systolic and diastolic blood pressure, and activity and resting pulse rate measures. After eight weeks of jogging, subject-joggers were retested on all the above stress measures.

Results. The results of the study generally supported the contention that jogging reduces stress. A one-way analysis of variance demonstrated differences between pre- and posttest stress measures for the experimental subjects. Further evidence demonstrated female joggers to evoke greater generalized stress reduction benefits than male joggers. However, there were no further significant interactions among independent variable groups of extent of conditioning, gender, age, physical condition, and anxiety proneness.
This study evaluated the effectiveness of two stress reduction programs. Fifty-three working women volunteered to be the study’s subjects. They were assigned to eight stress management groups by means of a modified randomization procedure. Subjects \( n = 17 \) in three of the training groups participated in a seven-session stress reduction program that employed the behavioral conditioning techniques of progressive relaxation and systematic desensitization. Subjects \( n = 18 \) in three other groups took part in a seven-session stress reduction program that involved instruction in the cognitive coping skills of time management, rational-emotive therapy, and assertiveness training. For both of the stress reduction programs the sessions were held weekly and most were about 50 minutes long. The subjects \( n = 18 \) in the remaining two training groups served as delayed treatment control subjects. Pretreatment and posttreatment testing sessions were held for all eight training groups. The instruments administered at these sessions were the Maslach Burnout Inventory, the Personal Strain Questionnaire, and the Work Schedule Questionnaire. Respectively these were used to assess emotional exhaustion, personal strain, and absenteeism, three outcome variables that are indicators of stress. Multivariate and univariate analyses of covariance were employed to evaluate the data. A comparison of the effects of the behavioral conditioning techniques program with those of the cognitive coping skills program was not significant at the multivariate level. A comparison of the combined effects of the two stress reduction programs with the effects of the delayed treatment control condition was significant at the multivariate level. At the univariate level the groups that received training had significant decreases in emotional exhaustion and personal strain relative to the control groups. There was no significant difference in absenteeism between the training program groups and the control groups. The conclusion drawn from the study was that both the behavioral conditioning techniques program and the cognitive coping skills program were effective in reducing stress and that neither program was more effective than the other.

**Administrative policy implications deriving from the effects of two non-cognitive classroom intervention techniques in stress reduction for inner-city elementary pupils**


**Abstract (Summary)**

A variety of relaxation techniques have been used with students in special populations as a way to remediate problem behavior. Research findings suggest that relaxation, geared to reduce anxiety, may improve behavior and attention. As a preventive measure the incorporation of stress-reduction in the classroom may be the proactive approach needed to render the classroom atmosphere more conducive to learning.

In the present study, two non-cognitive classroom intervention techniques: Progressive Muscle Relaxation (PMR) and Internal Focusing were used with one intact third grade classroom each. Both were contrasted with a third intact classroom as a control group. The study was conducted in one predominately Black inner-city elementary school. Thirty-seven students were assigned to three groups. Two groups were provided with twenty-four 20-minute stress reduction sessions twice a day for a period of four weeks.

In this study, the PMR technique proved to be more effective than either the Internal Focusing or Control Groups. Additionally, girls seemed to enjoy relaxation more than boys. The findings suggest that relaxation, geared to reduce anxiety, may improve behavior and attention. As a preventive measure the incorporation of stress-reduction in the classroom may be the proactive approach needed to render the classroom atmosphere more conducive to learning.

In the present study, two non-cognitive classroom intervention techniques: Progressive Muscle Relaxation (PMR) and Internal Focusing were used with one intact third grade classroom each. Both were contrasted with a third intact classroom as a control group. The study was conducted in one predominately Black inner-city elementary school. Thirty-seven students were assigned to three groups. Two groups were provided with twenty-four 20-minute stress reduction sessions twice a day for a period of four weeks.

In this study, the PMR technique proved to be more effective than either the Internal Focusing or Control Groups. Additionally, girls seemed to enjoy relaxation more than boys. The findings suggest that stress-reduction can be beneficial in decreasing the level of anxiety and improving the behavior and attention levels in the classroom among Black inner-city elementary students.
The effects of a wellness-oriented stress reduction program on perceived stress in manufacturing employees


Abstract (Summary)

The purpose of this quasi-experimental study was to compare the effects of a wellness-oriented stress reduction program which included information on nutrition, exercise, and stress reduction techniques to a wellness program that included information on nutrition and exercise, but no stress reduction techniques, on perceived stress levels in manufacturing employees. The experimental group (n = 37) received education in three areas: nutrition, exercise, and stress reduction techniques. The control group (n = 29) received education in two areas: nutrition and exercise.

It was hypothesized that subjects in the experimental group would demonstrate a greater change in levels of state and trait anxiety, as measured by pretest to posttest scores on the State-Trait Anxiety Inventory (STAI) than subjects in the control group. Subsidiary questions investigated demographic variables and compliance with program objectives.

The Wellness Works program was presented during a series of four one-hour seminars which met each week at two manufacturing facilities in Oconee County in Upstate South Carolina from February to April of 1996. Subjects also met for two additional meetings for data collection purposes.

The research hypothesis was tested using the ANOVA procedure. Results indicated that no mean scores were significantly different from pretest to posttest within or between the experimental or the control group. The researcher failed to accept the research hypothesis. However, marginal significance for all subjects (p =.0572) was reported on mean change scores for trait anxiety. This indicates that all subjects, regardless of group assignment, tended to report lower trait anxiety levels on the posttest than on the pretest.

Regression was used to investigate relationships between demographic variables and STAI change scores, and compliance with program objectives and STAI change scores. Significant findings included: (1) as age increased, the state anxiety difference scores decreased for subjects in the control group, and (2) married subjects reported significantly lower levels of trait anxiety than did single subjects regardless of group affiliation. No significant relationship was found for STAI scores and: (1) gender, (2) compliance with the nutrition and exercise objectives, or (3) compliance with the stress reduction objectives.

Stress, coping and binge eating: The role of outcome expectancies and cognitive schemas


Abstract (Summary)

This questionnaire study tested a causal model of binge eating that includes stress, avoidant coping, and two variables not yet examined in this empirical area: cognitive expectancies regarding eating as a means of coping with stress, and self-schema in the domain of dieting. College students (n = 445) participated in 2 1-hour experiment sessions. Dieting schema was assessed prior to the first experiment session. Subjects' positive, negative and stress-reduction eating expectancies and use of avoidant coping strategies were obtained at the first experiment session. One week later, stress and binge eating frequency were assessed for the intervening 7 days and a measure of binge eating severity was obtained. Two hierarchical multiple regressions and one logistic regression were performed to test the proposed model of binge eating. The proposed 3-way interaction of stress, avoidant coping and stress-reduction eating expectancies was significant for the logistic model predicting the occurrence of at least one binge episode. No other proposed interactions were significant. Hypothesized positive relations of stress with binge eating severity and of stress-reduction eating expectancies with binge eating severity and frequency were supported. Avoidant coping was not significantly related to binge variables in the final three models. Although not predicted, increased levels of dieting schema were significantly related to increased binge severity and increased likelihood of a binge episode. In addition, greater negative eating expectancies were significantly associated with more severe and frequent binge eating and increased likelihood of a binge episode. Theoretical and clinical implications of the findings are discussed.
A comparison of stress reduction and educational/problem-solving groups in a program for adult daughters caring for their elderly parents


Abstract (Summary)

Elder care is a growing practice area in today's aging society. The possible psychological and physical impact of long term care on the caregiver has been recognized by health and social service agencies and policy makers. Support groups are being used with increasing frequency to help caregivers cope with the stress of caring.

In this study a brief psychoeducational intervention focusing on the acquisition and application of behavioral and cognitive coping skills was offered to women who were caring for an elderly parent or parent-in-law. Stress inoculation training was the approach used to assist adult daughters in reducing the stress and strain experienced from their caregiving activities. The stress reduction approach involved exercises and role-playing activities during the eight consecutive sessions in addition to homework practice assignments.

Emphasis was placed on helping participants to cope more effectively with the caregiving situation by making it more manageable and by altering their outlook and responses to the situation so as to reduce stress. Time in each group session was divided to allow delivery of content on stress reduction, review of group members' experiences with using the stress reduction approaches, and the sharing of experiences of individual caregiving situations. Each week one to three participants had the opportunity to work on particular problems they were having with caregiving using a six step model of problem solving.

Evaluation of this intervention focused on the processes of change of the overall program development and its implementation. Audio recordings of the group sessions were analyzed to assess trends in the group discussions, common themes in caregiving activities, and concerns of the caregiver population. Caregiving themes were categorized into four systems: self, family, elder and environment. From these themes caregiver stresses were more clearly identified along with recommendations for more informed programming, practices and policies.

The effects of a stress reduction intervention on quality of life in psoriasis patients


Abstract (Summary)

A ten week stress-reduction intervention was conducted with fifty-five psoriasis patients. The two by four group design addressed the question of whether a stress reduction treatment would reduce levels of psoriasis-related stress, reduce levels of inflammation and improve levels of quality of life compared to a standard care control group. Outcome variables were evaluated at baseline, three weeks, six weeks, and ten weeks.

Study participants were adults 22-90 years of age who resided in Southern California. The mean age of the sample was 52 years old. Subjects were referred to the study by their dermatologist and were randomly assigned to either the treatment or the control group. All subjects met the following criteria: (1) a diagnosis of plaque psoriasis, (2) were at least 18 years of age, (3) had no serious medical conditions other than psoriasis, and (4) were fluent in English. Fifty-five individuals participated in the study, 27 of whom were in the treatment group and 28 in the control group.

The experimental group included a stress-reduction treatment that included education on the relationship between stress and psoriasis as well as information on a variety of stress-reduction techniques that included deep breathing, progressive muscle relaxation, and visualization. Participants in the treatment group were instructed to practice a relaxation technique at least
twice a day. The intervention was conducted via telephone and mail. The primary researcher phoned each participant throughout the study to answer any questions and to practice the relaxation techniques with the subject. Subjects were asked to discuss how their skin was doing and they were also reminded to return their questionnaires. The standard care control group received the same protocol without the stress-reduction intervention and they were phoned at the same points in the study that those in the treatment group were phoned.

To test the model of this study, multivariate analyses of variance (MANOVA) was conducted. Results indicated that there was not an interaction and there were no significant differences in levels of stress, inflammation, and quality of life between the stress-reduction treatment group and the control group. Results indicated that there were improvements in levels of stress, inflammation and quality of life across time for all subjects in the study. In addition, a correlation was conducted to analyze the relationship between stress and inflammation as well as stress and quality of life. Results indicated that stress and inflammation were moderately correlated, as well as stress and quality of life. Finally, multiple regression analyses were performed. Results suggest that psoriasis-related stress and inflammation were both found to predict quality of life, with stress being a stronger predictor of quality of life. Inflammation was found to be a partial mediator in the relationship between stress and inflammation as well as stress and quality of life.

Results

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- Advisor: Domenech Rodriguez, Melanie M.
- School: Utah State University
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- Keyword(s): Yoga (health), Stress management, African-American, Well being, Yoga, Intervention, Stress reduction, Athletes
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Biobehavioral effects of mindfulness-based stress reduction in HIV


Abstract (Summary)

This study explored the preventive impact of a brief Hatha yoga program on stress-reduction and enhanced wellbeing in a sample of healthy African American college athletes. African Americans suffer higher rates of hypertension and sudden cardiac death syndrome, both linked to stress. Study design was single case, with six replications, utilizing comparison of pre- and post-intervention scores on physiological and psychological indicators of distress and wellbeing. Findings were inconsistent across participants and measures, though generally included beneficial increases in positive affect (i.e., C = 0.567, Z = 2.071, p < 0.05) and perceived physical health (i.e., C = 0.489, Z = 1.721, p < 0.05). Increased fatigue over the course of the semester may have confounded results. Given the brevity and cost-effectiveness of the intervention, limited positive results suggest more intensive studies are warranted.

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Yoga as an intervention for stress reduction and enhanced wellbeing in African American athletes


Abstract (Summary)

This study explored the preventive impact of a brief Hatha yoga program on stress-reduction and enhanced wellbeing in a sample of healthy African American college athletes. African Americans suffer higher rates of hypertension and sudden cardiac death syndrome, both linked to stress. Study design was single case, with six replications, utilizing comparison of pre- and post-intervention scores on physiological and psychological indicators of distress and wellbeing. Findings were inconsistent across participants and measures, though generally included beneficial increases in positive affect (i.e., C = 0.567, Z = 2.071, p < 0.05) and perceived physical health (i.e., C = 0.489, Z = 1.721, p < 0.05). Increased fatigue over the course of the semester may have confounded results. Given the brevity and cost-effectiveness of the intervention, limited positive results suggest more intensive studies are warranted.

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- School: Utah State University
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Biobehavioral effects of mindfulness-based stress reduction in HIV


Abstract (Summary)

There have been dramatic improvements in the treatment of HIV-infection in the past decade, however biopsychosocial factors such as stress and the emergence of drug-resistant strains of HIV have been found to diminish the efficacy of treatments in HIV-infected adults. The present study examined whether mindfulness meditation training could be effective in delaying HIV progression in HIV-positive adults in Los Angeles, California. A randomized single-blind trial was conducted to assess the effects of a standardized 8-week mindfulness meditation training program, called Mindfulness-Based Stress Reduction (MBSR), versus a one-day MBSR seminar. Thirty-nine (N=39) participants were randomized to the 8-week MBSR program (N=25) or to the one-day MBSR program (N=14). CD4 + T lymphocytes and measures of HIV-related quality of life, trait
mindfulness, and psychological distress were collected at pre-test and post-test. In the intent-to-treat sample, participants in both MBSR programs evidenced significant improvements in HIV-related quality of life, trait mindfulness, and psychological distress. In testing the effects of MBSR on HIV progression, participants in the 8-week MBSR program showed a maintenance of CD4+ T lymphocytes, compared to declines in CD4+ T lymphocytes observed in the one-day MBSR program participants (p < .05). Further, a linear dose-response relationship was observed between greater mindfulness meditation MBSR adherence (the number of MBSR classes attended and the amount of mindfulness meditation home practice) and higher CD4+ T lymphocytes at post-test (p ‘s < .06). These findings demonstrate that mindfulness meditation training can delay HIV progression in HIV-infected adults, indicating a potential role for mindfulness meditation as a cost-effective and easily implemented adjunct treatment for HIV-infection.

Differences in perceived stress, affect, anxiety, and coping ability among college students in physical education courses


Abstract (Summary)

Because college students are a unique group with distinct environmental, situational, and interpersonal stressors, they are an important population for studying potential stress management techniques. Since physical activity is a renowned means of stress reduction, a logical area for exploration is whether college students’ engagement in various forms of physical activity courses is related to improvements in individual perceptions of health-related constructs from the start of a course until its end. The purpose of this research was to understand whether college students who were enrolled in various physical education courses differentially self-report perceived stress, anxiety, coping ability, and affect after the conclusion of their courses. Specifically, this study examined whether these differences existed between students enrolled in yoga classes and those who were enrolled in other Kinesiology courses such as weight lifting, aerobics, and golf.

This cross-sectional exploratory study involved a self-administered questionnaire that was administered at the end of Summer 2006 semester. 108 students met inclusion criteria. Survey sections addressed each of the independent and dependent variables identified for the study and included the following reliable and valid survey instruments: Perceived Stress Scale, Brief COPE, Inventory of College Students Recent Life Experiences, Positive and Negative Affect Scales and State Trait Anxiety Inventory. The final section of the survey collected student characteristic and attitudinal information. Contrary to the main hypothesis that students enrolled in yoga classes would report less perceived stress, they actually reported significantly more perceived stress than their counterparts (p < .002). However, yoga students reported using more positive coping strategies over the past month than nonpractitioners (p < .008). More research needs to be conducted with pre-and post-tests between students or other population groups who practice yoga in order to understand whether yoga practice may be a factor in reducing stress over time. The observations from this study suggest that yoga may be a unique type of physical activity that may be ‘sought out’ by high-stressed persons or those wishing to learn strategies to cope with their stress.

Effects of massage therapy and touch on quality of life outcomes for autologous stem cell transplant patients

**Abstract (Summary)**

**Background.** Patients with cancer undergoing autologous stem cell transplantation (ASCT) endure a series of stressors and adverse symptoms throughout treatment, resulting in greatly impaired quality of life (QoL).

**Objectives.** To investigate the immediate and cumulative effects of massage on stress, relaxation, and comfort, explore effects of massage on anxiety, pain, and QoL outcomes, and identify the benefits of and barriers to patient acceptance of massage during phases of the ASCT process in individuals undergoing ASCT for cancer.

**Methods:** This pilot project used a mixed methods, unmasked, prospective, randomized experimental design. Baseline demographics and history, health-related QoL, state anxiety, perceived stress, comfort, and relaxation levels, pain, and social support were assessed. Descriptive statistics and graphing techniques were used to analyze the data.

**Results:** An immediate effect in stress reduction, increased relaxation, and increased comfort were identified post massage. Cumulative effects of massage over transplant phases were not seen in the massage group. Participants in the massage group also reported lower anxiety scores across the transplant phases and lower affective and sensory pain scores during hospitalization following transplant than those in the SMC alone group. Perceived benefits of massage for the participants included improvement in symptoms that they had been experiencing prior to undergoing ASCT as well as their current treatment-related symptoms.

**Conclusions:** Supportive care massage can have immediate effects on stress, comfort, and relaxation and improve treatment-related symptoms for patients undergoing ASCT.

**Effects of exposure to plants and nature on cognition and mood: A cognitive psychology perspective**


**Abstract (Summary)**

Two theories posit the restorative benefits of exposure to plants and natural settings, either in the form of stress reduction and improved mood, or through enhancement of cognitive performance, specifically attention processes. Research conducted on the latter area has used a wide variety of tasks to measure attention, often without consideration to underlying cognitive processes. The main purpose of this research was to examine the effects of natural stimuli on cognition and mood from a cognitive science perspective, using measures that assess specific underlying cognitive processes. The secondary objectives of the research were to explore the effect of natural stimuli on subjective well-being and examine whether different types of exposure would have distinct impacts on cognition and mood.

Four experimental studies were conducted in order to examine three exposure types: (1) window views of nature vs. buildings vs. control, (2) plants vs. other embellishments, and (3) two studies comparing the interaction with living plants to viewing pictures of plants. Dependent variables consisted of tasks used in the cognitive sciences to measure underlying cognitive processes of inhibition, working memory, creative problem solving, and sustained attention. Verbal working memory was measured using the Backwards Digit Span task and the n-back task. Sustained attention was assessed using a vigilance task. Executive attention processes of inhibition and creative problem solving were measured by the Stroop Task, and either the Remote Associates Test or the Abbreviated Torrance Test for Adults, respectively. Subjective mood state was examined using the Profile of Mood States - Short Form and the Positive and Negative Affectivity Scale.

Quantitative statistical analyses revealed the use of dependent measures assessing specific cognitive processes produces results different from previous operationalizations of attention employed in other studies. Window views of nature enhanced creative problem-solving performance more than the building view or ‘no-view’ control, but did not influence sustained attention. Participants exposed to plants versus other office embellishments did not show better performance on a working memory task. In the majority of the studies, mood state was unaffected. Overall, the results suggest that more precise operationalizations of attention are required.
Effects of mindfulness-based cognitive therapy on the psychological and behavioral symptoms of hypothyroidism


Abstract (Summary)

Hypothyroidism is an endocrine disorder that can have concomitant symptoms of depression and anxiety, and decreases overall quality of life. Mindfulness- based programs emphasize an open mind, a nonjudgmental view, and an attitude of acceptance toward discomfort and negative private events. A mindfulness-based treatment program was used to encourage participants with hypothyroidism to have a meaningful life in spite of the presence of physical and/or psychological distress.

Mindfulness-Based Stress Reduction (MBSR) was initially developed from the work of Jon Kabat-Zinn (1990). Segal, Williams, and Teasdale (2002) included the addition of cognitive components and exercises into the MBSR program, and developed Mindfulness-Based Cognitive Therapy (MBCT). The 8-week MBCT program served as the independent variable in this study.

A modification to the nonconcurrent, multiple baseline design (non-random assignment) across participants was utilized in this study. There were three treatment groups, and a total of 8 participants completed the treatment program. Dependent measures included the Beck Depression Inventory – Second Edition (BDI-II), the State Trait Anxiety Inventory (STAI; State and Trait scales), the Action and Acceptance Questionnaire (AAQ), the Mindful Attention Awareness Scale (MAAS), the Paced Auditory Serial Addition Task, weekly pedometer ratings, and the Quality of Life Inventory (QOLI).

Treatment results were evaluated through visual inspection of trends in the data. In addition, autocorrelation functions and critical values were obtained for each participant on the dependent measures, and ipsative z score calculations were used to determine statistical significance. Two hypotheses were largely supported after inspection of the results; participants did demonstrate decreases in depression scores on the Beck Depression Inventory - Second Edition, as well as increases in quality of life scores on the Quality of Life Inventory (QOLI).

Mindfulness meditation teaches an increase in awareness and knowledge of formal and informal meditation techniques, and results in sensitization toward unpleasant thoughts and emotions and eventual acceptance of those private events. Results were discussed in terms of varying effectiveness of mindfulness meditation on psychological symptoms of hypothyroidism. The distinction between symptom reduction and quality of life was also discussed in light of the many

verbal reports regarding the positive effects of the treatment by all participants.

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- Advisor: Scardapane, Joseph R.
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Mindfulness and ruminative thinking: Does mindfulness training lead to reductions in the ruminal thinking associated with depression?


Abstract (Summary)
The purpose of this pilot study was to test whether completion of a Mindfulness-Based Stress Reduction (MBSR; Kabat-Zinn, 1982, 1990) program would associate with increases in mindfulness, and reductions in rumination in a nondepressed sample. Mindfulness Training has been found to prevent depressive relapse in chronically depressed patients participating in Mindfulness Based Cognitive Therapy (MBCT; Ma & Teasdale, 2004; Teasdale et al., 2000). In addition, MBSR has been found to reduce rumination in patients with lifetime mood disorders (Ramel, Goldin, Carmona & McCuaid, 2004). While the small sample (N = 7) and resulting low power could not offer any conclusive answer to the question posed in the title, some interesting preliminary results were found nevertheless. Completers of the MBSR class did show increases in mindfulness, and decreases in rumination and depression, as hypothesized. In addition, higher levels of mindfulness were found to associate with greater decreases in rumination. Implications of these findings are discussed and recommendations for future research are offered.

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• Advisor: Wilson, Kimberly A.
• Committee members: Koopman, Cheryl, Ong, Jason
• School: Pacific Graduate School of Psychology
• Department: Psychology
• School Location: United States -- California

Mindfulness-based yoga during pregnancy: A pilot study examining relationships between stress, anxiety, sleep, and pain


Abstract (Summary)
The purpose of this study was to investigate the feasibility and effectiveness of a “mindful-yoga” intervention for healthy pregnant women that blended elements of Mindfulness-Based Stress Reduction and Iyengar style prenatal yoga, on stress, anxiety, sleep, and pain; to estimate statistical power and sample size for a larger study; and to establish whether the treatment is effective for second or third trimester women. The effects of variables on mindful-yoga were studied over time, comparing baseline (Time1) and post-intervention (Time2) data in a single treatment group of 19 English-speaking nulliparous women with healthy pregnancies, 17 of whom adhered to the intervention that met for seven weekly sessions.

Data were analyzed with descriptive statistics, correlations, parametric and nonparametric paired comparisons, and effect sizes. Participants were well-educated, middleclass, and planning vaginal birth. Although no one was currently being treated for psychiatric disorders, nearly 30% had a history of depression or anxiety.

The intervention resulted in higher scores for two facets of mindfulness (Observing and Nonreacting). From Time1 to Time2, third trimester participants demonstrated significant reductions in perceived stress and trait anxiety. Second trimester women demonstrated improvements in pain and sleep. In contrast, the third trimester group experienced worse pain and sleep as pregnancy progressed. To control for gestation, Time1 data for the 8 women who began mindful-yoga in the third trimester (26.5 weeks ±2.3) were compared with Time2 data for the 9 women who began mindful-yoga in the second trimester (27.1 weeks ±4.1). Second trimester women at Time2 experienced improved sleep (fewer night awakenings and less wake time during the night) as measured by wrist actigraphy compared to third trimester group baseline data.

This study demonstrated important clinical improvements in sleep and pain for women who began mindful-yoga in their second trimester. Mindful-yoga intervention merits further research for reducing perceived stress and anxiety and second trimester sleep enhancement and pain reduction. The mechanisms of mindful-yoga on stress appraisal, anxiety, sleep, and pain were

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not clearly linked to mindfulness, and further studies are required to develop theoretical linkages between mindful-yoga and symptom reduction during pregnancy.

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- Advisor: Lee, Kathryn A.
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Motivational interviewing with late-adolescent/college underage drinkers: An investigation of therapeutic alliance


Abstract (Summary)
Many college-bound late adolescents increase their substance use during their first years of college. Recent studies with late adolescents have found that receipt of a brief motivational interviewing (MI) intervention resulted in decreases in their substance use and related problems. However, despite its efficacy, the mechanisms underlying MI remain unknown.

This study examined the role of therapeutic alliance and empathy in MI with a late-adolescent substance-using sample. It was predicted that client ratings of alliance would predict behavior change. In addition, it was posited that agreement between therapist and client ratings of alliance would correspond with greater behavior change. Finally, this study explored participants’ attitudes towards and desires for therapy, and their reasons for substance use.

For the initial assessment, exploratory analyses with the full sample (N =136) revealed that if they went to therapy, most participants would like assistance with stress reduction and problem solving, along with improving relationships and health. While few concerns about substance use emerged, participants stated that they generally drink to have a good time.

For the second component, 55 participants were randomized into an MI (n = 40) and no-intervention control group (n =15), based upon an endorsement of high levels of binge drinking and/or alcohol-related problems. Correlations, linear regression, and MANOVA were employed to evaluate the hypotheses. In contrast with predictions, no significant trends emerged surrounding therapeutic alliance and empathy. Notably, both the MI and the control sample evidenced reductions in substance use and related problems, but without a clear pattern emerging for either group. Post-hoc analyses investigated the possible influence of various factors upon the findings. However, no trends emerged through these analyses.

In conclusion, several theories were proposed to explain the effects found. Specifically, the selection criteria for the sample, lack of this sample’s substance use severity, the length follow-up period, semester effects, age of the sample, reporting error, size of the control group, and number of MI sessions were proposed as possible confounding factors. In addition, the importance of future explorations of the efficacy of MI and other empirically-supported interventions across developmental periods and risk-taking behaviors was underscored.

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Multiple perspectives: Health effects of a mindfulness-based stress reduction intervention in the Yukon


Abstract (Summary)
This quasi-experimental study explores health related change in Yukon adults who participate in a mindfulness-based stress reduction program (MBSR). Participants (n=30) were randomly assigned to wait-list control or intervention and 23 participants were purposively assigned to a non-equivalent control group (NECG).
Participants provided demographic data, blood pressure/pulse readings, completed the Mindful Attention Awareness Scale (MAAS), Symptoms of Stress Inventory (SOSS), Index of Core Spiritual Experiences (INSPiRiT) and Multi-Dimensional Health Locus of Control (MHLHC). Qualitative measures included participant diaries and individual interviews. Mean SOSS scores decreased significantly in the intervention group, p<0.05, and NECG, p<0.05, during the first program. A significant decrease in participant stress symptoms was noted by third parties, p<0.01. Qualitative data suggest MBSR can be a useful tool for self care associated with improved coping. Design limitations prevent the assumption of causality but further investigation of the relationship between MBSR and health related change is warranted.

Abstract (Summary)
This quasi-experimental psychotherapy outcome study assessed the effects of participation in an 8-week Mindfulness-Based Stress Reduction (MBSR) intervention on rumination, psychological distress, and medical symptoms. Members of ongoing MBSR groups at 3 San Francisco Bay Area hospitals volunteered to participate. A heterogeneous sample composed of 32 adults (21 women and 11 men) ages 20-71 completed pre- and post-intervention measures including the Mindful Attention Awareness Scale (MAAS) (K. W. Brown & R. M. Ryan, 2003), the Brief Symptom Inventory 18 (BSI-18) (L. R. Derogatis, 2001), the Short Response Style Questionnaire (SRSQ) (W. Treynor, R. Gonzalez, & S. Nolen-Hoeksema, 2003), and the Medical Symptom Checklist (MSCL) (J. W. Travis, 1971). This research was intended to replicate and extend aspects of J. Kabat- Zinn’s work on MBSR and S. Nolen-Hoeksema’s work on rumination.

Results revealed significant reductions in rumination***, depression**, anxiety**, psychological distress**, and medical symptoms*** and a significant increase in mindfulness**. Findings showed significant positive correlations between rumination and depression* and significant negative correlations between mindfulness and rumination**, anxiety***, psychological distress*, and medical symptoms**. Rumination significantly mediated the effects of mindfulness induction of different levels of stress and directed attentional fatigue, no support was found for the hypothesis that preferences for nature are associated with restorative need. Some recently published studies report results seemingly discordant with those found here; possible explanations for this discrepancy are discussed in terms of the stimuli used, restorative need generated, and the statistical analyses employed.

Nature and the restoration-preference connection: A multi-method investigation

Abstract (Summary)
Theories, research, and folklore converge in support of two assertions: people generally like nature (preference); experiencing natural landscapes can be good for us (restoration). This thesis examined whether preferences for nature are stronger when most benefit is potentially afforded; i.e., when experiencing stress (stress reduction theory, e.g., Ulrich, 1983) or attentional fatigue (attention restoration theory, e.g., Kaplan & Kaplan, 1989). The general hypothesis preference for nature is associated with restorative need was tested using a multi-method approach (indirect free response questionnaire; experimental studies with explicit and implicit measures). The questionnaire study uniquely examined within-participant place preferences across a range of mood states (positive as well as negative). Experimental studies were distinctive in using as stimuli images that were preference-matched across category (nature; human-influenced) at baseline. Restorative need was manipulated either within-participant (recall of experiencing 7 different moods) or between-participant (experimentally induced stress, relaxation, or directed attentional fatigue). Although the studies were well designed and manipulation checks confirmed successful
on depression*. (One asterisk* indicates p < .05, two asterisks** indicate p < .01, and three asterisks*** indicate p < .001.)

Findings support S. L. Shapiro, L. E. Carlson, J. A. Astin, and B. Freedman’s (2006) recent proposal that mindfulness is a central feature of MBSR and is partially responsible for the positive outcomes observed in the MBSR program. This study also provides a novel contribution to the literature by specifying and significantly demonstrating the mediational path between mindful awareness and decreases in rumination and depression in a heterogeneous community sample. The implications of this finding elucidate one of the potential therapeutic mechanisms of mindfulness.

The perceived effectiveness of a mindfulness-based stress reduction program on improving quality of life in cancer patients: A pilot study


Abstract (Summary)

This pilot study shed light on the feasibility and potential benefits of utilizing a mindfulness-based stress reduction (MBSR) program as an adjunct to cancer treatment. It explored whether MBSR, a systematic intervention method used in a cancer outpatient population at the Wellness Community in Walnut Creek, California, is associated with improved mindfulness skills and quality of life in cancer patients, and which particular domains of quality of life are affected by the intervention. This study also predicted that changes in mindfulness scores would positively correlate with changes in quality of life scores. However, given the low statistical power due to small sample size, there was likely not sufficient power to detect an effect. These preliminary findings suggest that MBSR can lead to perceived enhancements in quality of life and mindfulness skills among cancer patients. Future research in cancer populations is necessary to further delineate the relationships between MBSR, mindfulness, and quality of life.

Cultivating sacred moments: Implications on well-being and stress


Abstract (Summary)

The sacred in life has attributes long believed to promote well-being. This research provides a theoretical, empirical, and qualitative examination of the role of cultivating sacred moments in daily life on subjective well-being (SWB), psychological well-being (PWB), and stress. Seventy-three participants, (68% women, 32% men; 71% Caucasian, 11% Chinese), 87% living within the United States, between the ages of 18 to 54, were randomly assigned to one of two groups: (a) an intervention group who were instructed in cultivating sacred moments for a minimum of 5 minutes a day, for 5 days a week, for 3 weeks, or (b) a treatment-based control group who were instructed in writing about daily activities for a minimum of 5 minutes a day, for 5 days a week, for 3 weeks.
Findings indicate that for these participants, the intervention effectively increased scores on assessments that measured satisfaction with life, positive- affect and negative-affect, and 5 out of 6 subscales that measured psychological well-being (PWB), including: positive relations with others, autonomy, environmental mastery, purpose in life, and self-acceptance, stress- reduction, and the occurrence of daily spiritual experiences. The intervention also effectively increased the participants’ self-reported levels of connection with self, others, and spirit, increased self-reported awareness of the sacred in daily life, increased self-reported feelings of well-being, and reduced self-reported stress. Although the control group also had significant change in the same assessments as the intervention group, further analysis found that after the 3-week intervention, the intervention group had a significantly greater positive effect in measures of life satisfaction and stress-reduction. Furthermore, the 6-week follow-up showed that the intervention group maintained a greater impact on the measure of life satisfaction than the control group after intervention had ended. Future research is needed to address potential long-term effects of cultivating sacred moments in daily life.

*This dissertation is a compound document (contains both a paper copy and a CD as part of the dissertation). The CD requires the following system requirements: Adobe Acrobat.

**Exploration of psychological and spiritual well-being of women with breast cancer participating in the Art of Living program**


**Abstract (Summary)**

The purpose of this study was to explore the psychological and spiritual well-being of women diagnosed with breast cancer who participated in a yoga-based stress-reduction program known as the Art of Living program. The mixed-method design involved the participation of 26 women, diagnosed with breast cancer within the past 5 years, in an 8-day yoga-based stress reduction course that includes yogic breathing techniques known as Sudarshan Kriya Yoga (SKY), as well as other processes that draw on yoga principles. Demographic and medical history variables were assessed at the time of recruitment, and standardized measures of quality of life, spiritual well-being, perceived stress, and positive states of mind were assessed 2 weeks prior to the beginning of the program, on the first day of the 8-day course, on the last day of the course, and following the 5-week maintenance period. In-depth semistructured interviews were conducted with a subsample of 12 women following the 5-week maintenance period. The results demonstrate a significant (p < 0.0001) improvement in scores of all measurements after the 8-day Art of Living course and after the 5 weeks maintenance period. Effect sizes of all measurements were considered large. Results indicate that these effects were not due to maturational changes. Qualitative results demonstrated that the breast cancer experience was associated with distress and challenges, as well as growth and transformation. Qualitative themes indicated that the participation in the Art of Living program was associated with enhanced sense of spirituality, experiences of self-exploration, self-transcendence, and psychospiritual transformation. These pilot data represent a preliminary investigation of the relationship between mind-body-spirit, yoga-based practices, and psychospiritual well-being of women with breast cancer, highlighting the need for further controlled studies in this area.

**Impact of stress and negative mood on mother and child: Attachment, child development and intervention**


**Abstract (Summary)**

Stress and negative mood during pregnancy and postpartum are risk factors for poor fetal development, childbirth outcomes, and negatively impact mother-infant attachment and child...
Physical inactivity among midlife women: Understanding norms, goals, and behavior


Abstract (Summary)
Background and aims. Regular physical activity reduces the risk of developing many conditions that are at epidemic proportions, and that women have a higher risk of developing than men (e.g., obesity, diabetes, depression). Unfortunately, maintaining a physically active lifestyle is among the most challenging endeavors for many adults, and midlife women are less active than men. Exercise is commonly promoted as a way to control body weight. While promoting exercise for weight-related goals may seem appropriate, our previous data suggest this approach may actually lead to decreased exercise participation among women in midlife. The overall aim of this research was to study midlife women’s physical activity goals and identify which goals may help and which may hinder sustaining physical activity. Methods. Four hundred participants were randomly selected from a sample of 843 women (40–60 years old) who worked in administrative jobs at the University of Michigan. Longitudinal data were collected at three time points. Results. There was a 71% response rate at baseline (n = 275), and 97% and 87% retention rates at the one-month and one-year post-baseline data collections, respectively. Participants exercised mainly for five reasons: (1) Health (40%); (2) Weight Loss (21%); (3) Stress Reduction (14%); (4) Sense of Wellbeing (12%); and (5) Weight Maintenance/Toning (11%). Participants with both weight-loss and health-related goals participated in significantly less physical activity than those with goals related to sense of wellbeing or stress reduction. Discussion. These data indicate that midlife women with the most frequently endorsed exercise goals (i.e., weight loss, health) are less motivated than those with goals related to stress reduction or sense of wellbeing. Moreover, women with weight loss and/or health-related goals participate in the least amount of physical activity overtime. These findings may seem counter-intuitive given that these exercise goals are the most commonly endorsed by public awareness campaigns and healthcare practitioners. Therefore the findings of this study suggest that clinicians and social marketers aiming to increase participation among midlife women might be more successful if they promote physical activity as a means to enhance “quality of life” rather than to lose weight or promote health.

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Physical inactivity among midlife women: Understanding norms, goals, and behavior


Abstract (Summary)
Background and aims. Physical inactivity among pregnant women affects not only the mother’s health but also the health of the developing fetus. There is increasing evidence that the stress levels of pregnant women impact fetal and neonatal development, and that maternal distress during pregnancy can interfere with the development of functional neural connections in the newborn. Whether on a social, intrapsychic, or biological level, the experience of distress in pregnant mothers leads to a compromised ability for the mother to remedy distress and results in difficulty regulating distress in the mother-infant dyad. This subsequently leads to difficulty attending to the infant’s needs (Buitelaar, Huizink, Mulder, de Medina, & Visser, 2003) and interferes with attachment.

Research in this area is multi-faceted yet it has largely focused on the effects of stress on pregnant women’s lives and less on interventions to improve these conditions. A review of the literature including empirical research and theoretical writings clarifies the neuro-biological and behavioral effects of stress, but more importantly, it evaluates existing interventions and the application of Mindfulness Based Stress Reduction (MBSR) during pregnancy.

Published articles from scientific and clinical peer-reviewed journals were reviewed involving qualitative and quantitative studies. Data bases including Medline, PubMed, and PsychInfo, spanning the period of 1980-2005 were sources for articles. Primary topics and concepts such as pregnancy, depression, stress, interventions, and MBSR were searched separately and in combination. This study culminates in an integrative analysis that addresses the theoretical plausibility of a new preventative intervention approach for mothers based on the results of the analysis of the existing literature. The presentation is an analytic and narrative presentation of the literature used to then generate a conceptual integrative analysis that may result in the development of a new proposal for preventative intervention.

MBSR was evaluated for preventing and decreasing maternal distress by increasing mothers’ abilities to tolerate difficult affect and manage stress as well as facilitating greater mother-infant attunement and attachment, thus bolstering healthy child development. It was concluded that the existing literature provides a basis for utilizing MBSR with pregnant women as preventative intervention for subsequent negative effects of maternal stress on prenatal, childbirth, attachment, and later infant development outcomes. Clinical and empirical research is required in order to further evaluate and substantiate these claims.

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Psychosocial predictors of glycemic control in underserved Type 2 diabetics


Abstract (Summary)

Type 2 diabetes is a chronic metabolic disease that can be maintained with adjustments in lifestyle and medical intervention that has been proven to minimize complications that occur over time if the disease is not controlled. The benchmark of determining diabetic status is maintenance of glycemic control, which frequently involves radical lifestyle changes, medication management, and stress reduction. Incidence of Type 2 diabetes in underserved minority populations is increasing rapidly; subsequently, those lacking financial resources, medical insurance coverage, education, and family support have even lower rates of glycemic control. Psychological, social, and physical stressors contribute negatively to treatment adherence and overall disease outcome. Uninsured/underinsured minorities have more difficulty achieving and maintaining glycemic control and therefore have poorer overall diabetes outcomes when compared with diabetics who have adequate resources. In order to improve long-term treatment prognosis in this population, current methods of assessing psychosocial factors should be tailored to meet the special needs of this population. The purpose of the current study aimed to investigate the relationship between control of Type 2 diabetes and psychosocial factors in a group of uninsured/underinsured diabetic individuals receiving care at an urban public hospital. Medical records, demographic data, and information obtained from self-report instruments were collected at initial outpatient visits. The current study involved analysis of three self-report instruments designed to measure emotional, psychiatric, and general difficulties involved in maintaining the recommended diabetic lifestyle. From the 62 participants who met the inclusion criteria, completed the questionnaires and self-reports instruments, a total of 50 participants were randomly assigned to either a control or experimental group. These 50 participants were assigned to either a single session of Motivational Interviewing (MI) or psychiatric intake interview/treatment as usual (TAU) in order to determine the effect of brief MI on glycemic control and readiness to change health related behaviors. Information gathered from the remaining 12 participants was included in all but the MI/TAU data analyses. All participants completed questionnaires and self-report instruments of the Problem Areas in Diabetes (PAID), Brief Symptom Inventory (BSI), Stages of Change (SOC), and Diabetes Knowledge Test (DKT). Data was examined using regression and correlation models to investigate the predictive value of psychosocial factors on glycemic control. Results of this study did not successfully demonstrate a significant relationship between glycemic control (HbA1c) emotional stress; psychiatric symptoms and general problems related to diabetes in the population sampled nor did they illustrate a significant relationship between glycemic control and readiness to change health related behaviors or additional variables such as employment status, and activity level.

Cultural factors affecting the current findings are discussed along with the importance of exploring ethnic variables related to lifestyle changes and limitations of current treatment protocols. Recommendations for future research including underserved minority populations are addressed.

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Stress reduction in a community sample: A comparison of mindfulness and progressive muscle relaxation


Abstract (Summary)

This study sought to test the effectiveness of a five-week mindfulness-based stress reduction (MBSR) intervention compared to a five-week progressive muscle relaxation (PMR) intervention. The relative effects of these interventions on psychological distress and sense of coherence (SOC) were compared, and changes in the core components of mindfulness and relaxation were examined. Results indicated that participants in both interventions experienced similar levels of reductions in stress and psychological symptoms, as well as increases in SOC. Participants in the MBSR group were twice as likely as those in the PMR group to practice skills at home. Greater frequency of home practice of stress management skills was predicted to results in enhanced outcomes for both conditions, but was only found to be related to reductions in trait anxiety for the PMR group. Although MBSR did not emerge as clearly superior to PMR, results of this study suggest that a brief version of MBSR is at least as effective as PMR as stress management intervention. Findings and limitations of the present study are discussed, and suggestions are made for future MBSR research.
The effect of therapeutic touch on fibromyalgia pain and anxiety


Abstract (Summary)

Most persons with fibromyalgia syndrome (FS) experience uncontrolled pain. The currently used combination of treatments for FS pain, which include medications, exercise, and stress reduction, has been only moderately effective. Therapeutic touch (TT) is one therapy used by those with FS. Using Rogers’ model, the purpose of this study was to determine the effect of therapeutic touch (TT) on FS pain and anxiety. A randomized, pretest-posttest, crossover design was used. Forty-two of 46 persons with FS pain completed this study. Participants were randomly assigned to two different sequencing of interventions: (1) TT followed by the placebo or (2) the placebo followed by TT. The Krieger-Kunz TT method was used. A mattress pad was used as the placebo intervention. Pretreatment and posttreatment measures of pain (visual analogue scale), tender point pain threshold (pressure gauge algometry), and anxiety (State-Trait Anxiety Inventory) were obtained. Measures of autonomic nervous system (ANS) activation including blood pressure, pulse, and respiratory rate were also obtained. A univariate analysis of variance (ANOVA) was conducted to test each of the hypotheses. During the TT condition participants experienced greater reduction in pain (p = .001), and anxiety (p < .001) than during the placebo condition. No significant differences were found in pulse, systolic and diastolic blood pressure, and respiratory rate; pressure pain threshold at five paired tender point sites typically found in those with FS; and two control points. These findings provided mixed support for the assertions in Rogers’ theory. The most important recommendation for nursing is that nurses can help their FS patients manage their pain and anxiety by recommending TT as an effective therapy. Nurses can also pursue education and training in using the Krieger-Kunz method of TT so they can administer TT in inpatient and outpatient settings.
The practice of mindfulness meditation to alleviate the symptoms of chronic shyness and social anxiety


Abstract (Summary)
The purpose of this dissertation was to study the effect of the practice of Mindfulness Meditation (MM) in alleviating the symptoms of chronic shyness and social anxiety across the physiological, cognitive, affective, and behavioral domains. Shyness is characterized by extreme and anxious attention to the self in social situations resulting in nervous and unbefitting behaviors, in addition to emotional and cognitive suffering. MM involves directing awareness towards the present while focusing attention on the breath, or on experiences as they arise. This research study used a 2x2 Multivariate Analysis of Variance (MANOVA) mixed-group design with 22 participants (10 Treatment Group; 12 Control Group) assigned randomly to each condition. Participants in the Treatment Group participated in an online version of Jon Kabat-Zinn's 8-week Mindfulness-Based Stress Reduction (MBSR) program. Prior and consequent to the intervention, the participants of both groups completed assessments to measure shyness, social anxiety, mindfulness, anxiety, depression, and satisfaction with life. As predicted, the Treatment Group exhibited significant differences in all measures, with the exception of depression and satisfaction with life, which presented a trend. No such differences were observed in the control group. This supports predictions that increases in mindfulness lead to reductions in shyness, social anxiety, and anxiety in general. This study contributes to the development of the field of transpersonal psychology because it explores the alleviation of psychological suffering through the use of the spiritual practice of meditation and the altered states of consciousness associated with this practice. Mindfulness practice appears to be a promising alternative technique for individuals that are too shy to seek help or an adjunct to psychotherapy.
Stress is the most incipient killer of people today. Stress is responsible for 70 to 80 percent of the disease in America. Stress reduction is a must in today’s society for longevity, health and happiness. Below are some simple rules for fighting this unseen killer.

1. Stress awareness begins with recognition or awareness. Our stress inventory provides insight into the amount of stress in our lives. As we become aware of stress, we can begin to deal with it. The “ostrich” technique of stress reduction never works.

2. Humans resist change. Whether change occurs in the body, mind, social, spirit or environment, most humans will resist. To learn to relax, we must learn to break our old habits of stress reaction and substitute more productive reactions such as clear thinking, calm headed and relaxed understanding. To change requires perseverance, positivity, proper goals and beneficial rewards. Whether changing eating habits, exercise routines, stress reactions or social skills, change requires work, but the rewards of a healthy body and mind for you and your family are worth it.

3. Stop addictive behavior. Whether it is coffee, soda, sugar, heroin, cocaine, alcohol, etc. an addiction is an addiction. Addiction to stimulants will always rob health and always cause disease. If you care for your children, you would fight to stop them from using heroin. But so often we let them indulge in potato chips, candy bars, tobacco, etc. The seeds of addictive behavior stem from “stimulation dependency” in our youth. If we are to truly conquer drugs, then we must stop addiction to stimulation or depression early in life. To stop addiction break it’s bond as early as possible. Just say no, if you really care.

4. Relax after meals. Allow at least 30 minutes after a meal to relax with comfortable music (not hard rock and roll), good spiritual books (not tax literature), good conversation (not argumentation), or some other relaxing diversion. Do not lie down. Sitting, standing or a light walk is recommended. Let your body focus on digestion for the best effect.

5. Allow one to two hours for worry or think time per day. Make this a quality think time to completely analyze your problems and concerns. Any more than 2 hours a day and your mind will distort the problem and not produce a solution. Excessive worry will produce more problems and more worry until this violent spiral results in disease. Use your quality think time to develop quality solutions you can act on to really help you solve your problems and concerns.

6. Take 30 minutes a day for relaxation and silent reflection. Concentrate on calmness, acceptance, relaxation, health, peace, stillness, etc. Save your active thinking for later. Let this still time be one for producing calmness. Wear comfortable clothing, find a quiet spot and let those around you know how important this time is to you.

7. During this quiet time, relax tense muscles. Breathe deeply and slowly. Calm and relax your mind as you detach yourself from the turmoil of the day. Let go of your troubles and fill your thoughts with positive thoughts. Use this daily experience to foster your mind and body develop your inner health.

8. Remember, laughter is the best medicine.

9. Learn the laws of good health.
Stress: Brain Yields Clues About Why Some Succumb While Others Prevail

Discovery of resistance mechanisms in mouse brain may lead to help for stress-related mental illness in humans

Results of a new study may one day help scientists learn how to enhance a naturally occurring mechanism in the brain that promotes resilience to psychological stress. Researchers funded by the National Institutes of Health’s National Institute of Mental Health (NIMH) found that, in a mouse model, the ability to adapt to stress is driven by a distinctly different molecular mechanism than is the tendency to be overwhelmed by stress. The researchers mapped out the mechanisms — components of which also are present in the human brain — that govern both kinds of responses. In humans, stress can play a major role in the development of several mental illnesses, including post-traumatic stress disorder and depression. A key question in mental health research is: Why are some people resilient to stress, while others are not? This research indicates that resistance is not simply a passive absence of vulnerability mechanisms, as was previously thought; it is a biologically active process that results in specific adaptations in the brain’s response to stress.

Results of the study were published online in Cell, on October 18, by Vaishnav Krishnan, Ming-Hu Han, PhD, Eric J. Nestler, MD, PhD, and colleagues from the University of Texas Southwestern Medical Center, Harvard University, and Cornell University.

Vulnerability was measured through behaviors such as social withdrawal after stress was induced in mice by putting them in cages with bigger, more aggressive mice. Even a month after the encounter, some mice were still avoiding social interactions with other mice — an indication that stress had overwhelmed them — but most adapted and continued to interact, giving researchers the opportunity to examine the biological underpinnings of the protective adaptations.

“We now know that the mammalian brain can launch molecular machinery that promotes resilience to stress, and we know what several major components are. This is an excellent indicator that there are similar mechanisms in the human brain,” said NIMH Director Thomas R. Insel, MD.

Looking at a specific part of the brain, the researchers found differences in the rate of impulse-firing by cells that make the chemical messenger dopamine. Vulnerable mice had excessive rates of impulse-firing during stressful situations. But adaptive mice maintained normal rates of firing because of a protective mechanism — a boost in activity of channels that allow the mineral potassium to flow into the cells, dampening their firing rates.

Higher rates of impulse-firing in the vulnerable mice led to more activity of a protein called BDNF, which had been linked to vulnerability in previous studies by the same researchers. With their comparatively lower rates of impulse-firing, the resistant mice did not have this increase in BDNF activity, another factor that contributed to resistance. The scientists found that these mechanisms occurred in the reward area of the brain, which promotes repetition of acts that ensure survival. The areas involved were the VTA (ventral tegmental area) and the NAc (nucleus accumbens).

In a series of experiments, the scientists extended their findings to provide a progressively larger picture of the vulnerability and resistance mechanisms. They used a variety of approaches to test the findings, strengthening their validity.

• “The extensiveness and thoroughness of their research enabled these investigators to make a very strong case for their hypothesis,” Insel said.

For example, the researchers showed that the excess BDNF protein in vulnerable mice originated in the VTA, rather than in the NAc. Chemical signals the protein sent from the VTA to the NAc played an essential role in making the mice vulnerable. Blocking the signals with experimental compounds turned vulnerable mice into resistant mice. The scientists also conducted a genetic experiment which showed that, in resistant mice, many more genes in the VTA than in the NAc went into action in stressful situations, compared with vulnerable mice. Gene activity governs a host of biochemical events in the brain, and the results of this experiment suggest that genes in the VTA of resilient mice are working hard to offset mechanisms that promote vulnerability.

Another component of the study revealed that mice with a naturally occurring variation in part of the gene that produces the BDNF protein are resistant to stress. The variation results in lower production of BDNF, consistent with the finding that low BDNF activity promotes resilience. The scientists also examined brain tissue of deceased people with a history of depression, and compared it with brain tissue of mice that showed vulnerability to stress. In both cases, the researchers found higher-than-average BDNF protein in the brain’s reward areas, offering a potential biological explanation of the link between stress and depression.

• “The fact that we could increase these animals’ ability to adapt to stress by blocking BDNF and its signals means that it may be possible to develop compounds that improve resilience. This is a great opportunity to explore potential ways of increasing stress-resistance in people faced with situations that might otherwise result in post-traumatic stress disorder, for example,” said Nestler.

• “But it doesn’t happen in a vacuum. Blocking BDNF at certain stages in the process could perturb other systems in negative ways. The key is to identify safe ways of enhancing this protective resilience machinery,” Nestler added.

For more information about posttraumatic stress disorder and depression, visit the NIMH web site at:

• http://www.nimh.nih.gov/health/topics/depression/index.shtml

The National Institute of Mental Health (NIMH) mission is to reduce the burden of mental and behavioral disorders through research on mind, brain, and behavior. More information is available at the NIMH web site: http://www.nimh.nih.gov/.

The National Institutes of Health (NIH) — The Nation’s Medical Research Agency — includes 27 Institutes and Centers and is a component of the U.S. Department of Health and Human Services. It is the primary federal agency for conducting and supporting basic, clinical and translational medical research, and it investigates the causes, treatments, and cures for both common and rare diseases. For more information about NIH and its programs, visit www.nih.gov.

Stress: The Different Kinds of Stress

Stress management can be complicated and confusing because there are different types of stress—acute stress, episodic acute stress, and chronic stress—each with its own characteristics, symptoms, duration, and treatment approaches. Let’s look at each one.

Acute Stress
Acute stress is the most common form of stress. It comes from demands and pressures of the recent past and anticipated demands and pressures of the near future. Acute stress is thrilling and exciting in small doses, but too much is exhausting. A fast run down a challenging ski slope, for example, is exhilarating early in the day. That same ski run late in the day is taxing and wearing. Skiing beyond your limits can lead to falls and broken bones. By the same token, overdoing on short-term stress can lead to psychological distress, tension headaches, upset stomach, and other symptoms.

Fortunately, acute stress symptoms are recognized by most people. It’s a laundry list of what has gone awry in their lives: the auto accident that crumpled the car fender, the loss of an important contract, a deadline they’re rushing to meet, their child’s occasional problems at school, and so on.

Because it is short term, acute stress doesn’t have enough time to do the extensive damage associated with long-term stress. The most common symptoms are:

- emotional distress—some combination of anger or irritability, anxiety, and depression, the three stress emotions;
- muscular problems including tension headache, back pain, jaw pain, and the muscular tensions that lead to pulled muscles and tendon and ligament problems;
- stomach, gut and bowel problems such as heartburn, acid stomach, flatulence, diarrhea, constipation, and irritable bowel syndrome;
- transient over arousal leads to elevation in blood pressure, rapid heartbeat, sweaty palms, heart palpitations, dizziness, migraine headaches, cold hands or feet, shortness of breath, and chest pain.

Acute stress can crop up in anyone’s life, and it is highly treatable and manageable.

Episodic Acute Stress
There are those, however, who suffer acute stress frequently, whose lives are so disordered that they are studies in chaos and crisis. They’re always in a rush, but always late. If something can go wrong, it does. They take on too much, have too many irons in the fire, and can’t organize the slew of self-inflicted demands and pressures clamoring for their attention. They seem perpetually in the clutches of acute stress.

It is common for people with acute stress reactions to be over aroused, short-tempered, irritable, anxious, and tense. Often, they describe themselves as having “a lot of nervous energy.” Always in a hurry, they tend to be abrupt, and sometimes their irritability comes across as hostility. Interpersonal relationships deteriorate rapidly when others respond with real hostility. The work becomes a very stressful place for them.

The cardiac prone, “Type A” personality described by cardiologists, Meter Friedman and Ray Rosenman, is similar to an extreme case of episodic acute stress. Type A’s have an “excessive competitive drive, aggressiveness, impatience, and a harrying sense of time urgency.” In addition there is a “free-floating, but well-rationalized form of hostility, and almost always a deep-seated insecurity.” Such personality characteristics would seem to create frequent episodes of acute stress for the Type A individual. Friedman and Rosenman found Type A’s to be much more likely to develop coronary heart disease than Type B’s, who show an opposite pattern of behavior.

Another form of episodic acute stress comes from ceaseless worry. “Worry warts” see disaster around every corner and pessimistically forecast catastrophe in every situation. The world is a dangerous, unrewarding, punitive place where something awful is always about to happen. These “awfulizers” also tend to be over aroused and tense, but are more anxious and depressed than angry and hostile.

The symptoms of episodic acute stress are the symptoms of extended over arousal: persistent tension headaches, migraines, hypertension, chest pain, and heart disease. Treating episodic acute stress requires intervention on a number of levels, generally requiring professional help, which may take many months.

Often, lifestyle and personality issues are so ingrained and habitual with these individuals that they see nothing wrong with the way they conduct their lives. They blame their woes on other people and external events. Frequently, they see their lifestyle, their patterns of interacting with others, and their ways of perceiving the world as part and parcel of who and what they are.

Sufferers can be fiercely resistant to change. Only the promise of relief from pain and discomfort of their symptoms can keep them in treatment and on track in their recovery program.

Chronic Stress
While acute stress can be thrilling and exciting, chronic stress is not. This is the grinding stress that wears people away day after day, year after year. Chronic stress destroys bodies, minds and lives. It wreaks havoc through long-term attrition. It’s the stress of poverty, of dysfunctional families, of being trapped in an unhappy marriage or in a despiged job or career. It’s the stress that the never-ending “troubles” have brought to the people of Northern Ireland, the tensions of the Middle East have brought to the Arab and Jew, and the endless ethnic rivalries that have been brought to the people of Eastern Europe and the former Soviet Union.

Chronic stress comes when a person never sees a way out of a miserable situation. It’s the stress of unrelenting demands and pressures for seemingly interminable periods of time. With no hope, the individual gives up searching for solutions.

Some chronic stresses stem from traumatic, early childhood experiences that become internalized and remain forever painful and present. Some experiences profoundly affect personality. A view of the world, or a belief system, is created that causes unending stress for the individual (e.g., the world is a threatening place, people will find out you are a pretender, you must be perfect at all
times). When personality or deep-seated convictions and beliefs must be reformulated, recovery requires active self-examination, often with professional help.

The worst aspect of chronic stress is that people get used to it. They forget it’s there. People are immediately aware of acute stress because it is new; they ignore chronic stress because it is old, familiar, and sometimes, almost comfortable.

Chronic stress kills through suicide, violence, heart attack, stroke, and, perhaps, even cancer. People wear down to a final, fatal breakdown. Because physical and mental resources are depleted through long-term attrition, the symptoms of chronic stress are difficult to treat and may require extended medical as well as behavioral treatment and stress management.

Adapted from The Stress Solution by Lyle H. Miller, Ph.D., and Alma Dell Smith, Ph.D.

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Stress and Asthma

When stress levels go up, asthma symptoms can go into overdrive. What’s the link, and how can asthma and anxiety be managed?

By Heather Hatfield

WebMD Feature

Reviewed by Charlotte E. Grayson Mathis, MD

When stress levels start to creep upward -- whether it's over bills, work, or your kids -- jam-packed calendar -- asthma symptoms can kick into overdrive. As the wheezing and coughing gets worse, your health becomes one more reason to worry. Asthma and anxiety make for a vicious circle, and one that can spiral downward quickly.

"Asthma is triggered by many things, and one of them is stress," says Pramod Kelkar, MD, a fellow with the American Academy of Asthma Allergy and Immunology (AAAAI).

"So look at the big picture: just as you manage exposure to triggers like cigarette smoke and pet dander to keep symptoms from getting worse, stress -- as a trigger -- needs to be managed as well."

Stress and Asthma: What’s the Connection?

"Stress can affect the cardiovascular, gastrointestinal, musculoskeletal, immune, and central nervous systems," says Paul Rosch, MD, president of the American Stress Institute. "In fact, it's difficult to think of any disorder in which stress has not been shown to have an aggravating role. Asthma is no exception.

Stress can create strong physiologic reactions that lead to airway constriction and changes in the immune system, which can worsen asthma symptoms.

"The mechanism between asthma and anxiety is many-fold," says Kelkar, a physician at Allergy and Asthma Care in Maple Grove, Minn. "Uncontrolled emotions can work the nerves and cause constriction of muscles, like the smooth muscles of the airways in the lungs. They tighten up and constrict, which can worsen wheezing, coughing, and chest tightness in people with asthma."

Although stress and anxiety start in your mind, asthma is a physical disease of the lungs.

"It is important to note that asthma is not a psychosomatic disease," Kelkar tells WebMD. "It’s not in your head. Stress can trigger symptoms if you already have the disease, but if you don’t have it, stress does not all of a sudden cause a person to develop the disease of asthma."

The Brain’s Impact on Asthma and Stress

The brain-body link between asthma and anxiety is starting to be better understood. Led by researchers from the University of Wisconsin, a group of scientists found that certain areas of the brain cause worsening asthma symptoms when a person is under stress.

Researchers exposed a group of people with mild asthma to triggers that caused both inflammation and muscle constriction. When symptoms flared, the participants were asked to read words that
were either emotionally charged, such as “lonesome”; neutral, such as “curtains”; or asthma-related, such as “wheezing.”

They found that the words linked with asthma increased inflammation and activity in parts of the brain that control emotions.

The results, published in the Proceedings of the National Academy of Science, show a possible link between emotions and asthma. Although it’s only preliminary research, it does start to connect the dots. Until researchers find a clear link between anxiety and asthma, keep symptoms in check by managing stress and treating asthma with appropriate medication.

Persistent asthma means you have symptoms more than once a week, but not constantly. Treating persistent asthma requires long-term maintenance therapy, such as an inhaled corticosteroid, plus rescue therapy when something triggers symptoms. And when your symptoms are out of control, an anti-inflammatory, such as the oral steroid prednisone, might be necessary. The problem is that prednisone can cause mood swings as a side effect, adding fuel to the anxiety fire.

“The good news is that prednisone is only a short-term treatment,” explains Kelkar. “When a course of oral steroids ends, a person should go back to a long-term maintenance therapy like inhaled steroids, which do not have an impact on mood and anxiety.”

Sometimes a long-term asthma medication doesn’t work well, and wheezing and chest tightness occur all too often. Then, a vicious circle can begin, where anxiety worsens asthma, and asthma worsens anxiety, says Kelkar.

The solution is to talk to a health-care provider about your symptoms, triggers, and stress. Also discuss other treatment options that can help get your asthma under control again.

Managing Asthma and Anxiety

“There are numerous stress-reduction techniques, ranging from meditation, yoga, and Pilates to jogging, listening to music, and hobbies,” says Rosch. “You have to find out what works best for you.”

Here are stress-reduction tips from the Cleveland Clinic. They can help you make anxiety one less asthma trigger for you to worry about:

- Eat right and exercise. Exercise is a great way to let go of stress. Also, eat right and avoid junk food, coffee, and soda -- which can make you feel drained after the sugar-high and caffeine effects wear off. This can help your overall health, give you more energy to combat stress, and put you in a better position to manage asthma.
- Get by with a little help from your friends and family. When it comes to asthma and anxiety, no one should go it alone. Having support from your loved ones can help you tackle stressful situations. They can provide an emotional hand when things get tough as well as offer friendly reminders when it’s time to take your medication.
- Get a good night’s sleep. Sleep helps you recharge your batteries -- physically, emotionally, and even cognitively -- according to the National Sleep Foundation. Without a solid night’s sleep, mood, behavior, and performance can be affected, and so can asthma.

- Keep your mind free of stressful thoughts. Use the power of positive thinking to keep your mind going in the right direction. When you feel anxious about something, try to stay positive. How you think and what you think both play a role in managing stress levels.
- Identify your stressors. What stresses you out? Is it money, your mother-in-law, a hectic lifestyle? Once you know what your stress triggers are, work on resolving them. If you can’t do it on your own, get help from a professional. This might be a financial counselor, psychologist, or family therapist. Link your health-care providers together, as well. Let your allergist know that stress is a trigger, so she or he can keep your anxiety in mind when treating your symptoms.
- Don’t try to do it all. Manage your time wisely. Don’t cram two days’ worth of errands into one day. If you know you need to get everything done before a deadline, delegate so you can take some time for yourself. With more hands pitching in, you can avoid being overburdened.
- Say ohm. Practicing relaxation exercises can help lessen the negative effects of stress and asthma. Try deep breathing, progressive muscle relaxation, and clearing negative thoughts.
Stress and Deprivation

Long Island Expressway.
The stress of everyday life often begins with the drive to work.

During the same few decades which saw great advances in the understanding of placebos, psychosomatic medicine also underwent significant changes, both in the research and clinical field and in the wider area of popular interest. The most important changes centered on the virtual abandonment of ideas about the role of unconscious emotions, early childhood experiences, and personality peculiarities—all derived from psychoanalysis. These ideas were replaced by a focus on manifest emotions, current life situations, and the socio-environmental circumstances in which disease occurred. Scientists often stated the newer formulations in terms of maladaptation and loss or, more commonly, “stress” and “deprivation.” Researchers drew from physiological theory and experiment and extended their concepts to all diseases, not just the classic “psychosomatic seven” (which included peptic ulcer, asthma, hypertension, and hyperthyroidism). Yet at the same time scientists broadened the range of emotion-disease connections, the once almost unquestioned presumption of psychogenic etiology for the “psychosomatic” diseases gave way to an increasingly somatic orientation. In the realm of therapy and disease management, individual psychotherapy was replaced by stress reduction, structured mobilization against feelings of loss and loneliness, and increased reliance on the therapeutic options of biomedicine.

The decline in the medical popularity of psychoanalysis, evident in the late 1950s and continuing in the 1960s and 1970s, set many of these changes in motion. Leading researchers submitted analytically-based theories of peptic ulcer, asthma and ulcerative colitis to searching criticism and substantial revision. Therapeutic approaches relied more and more on new drugs and medical interventions and less and less on psychodynamic psychotherapy. In the most dramatic case, scientists recently attributed the cause of peptic ulcer to a spiral bacterium, best managed clinically with antibiotics. This new movement even attacked conversion hysteria—one of the major contributions of Freud and a mainstay of psychosomatic theory. Several important critics started picking at the loose and unreflective consensus that had come to surround symbolically interpreted hysteria. One of the most influential critics, the respected neurologist Eliot Slater, in a widely noted paper published in 1965, called the diagnosis of conversion hysteria “a disguise for ignorance and a fertile source of clinical error.”

This discrediting of psychoanalysis created a widening gap in psychosomatic thought that was steadily filled by a variety of theoretical alternatives. These concepts rested on more directly observable and less arcane linkages between emotions and the onset of disease. However much these theoretical alternatives differed, they had in common a psychobiological orientation, in the sense that they were clearly based on notions of holistic body and mind response of the total human organism to various stimuli, threats and assaults from its environment. A common origin explained the similar orientation of these new theoretical approaches, for they all derived in some sense from the fundamental work of early twentieth century Harvard physiologist Walter B. Cannon. Cannon’s general program was to show how the biological organism automatically mobilized its physiological and biochemical resources by a built-in “wisdom of the body,” to defend itself against real or threatened assault. As an example of defensive mobilization, he explained in Bodily Changes in Pain, Hunger, Fear and Rage (1915), the organism responds to fear and rage as though preparing for fight or flight, by shutting down energy-storing functions and activating energy-releasing ones. In the 1940s, psychosomatic investigator Harold G. Wolff and his associates at Cornell Medical School incorporated many of Cannon’s ideas. Wolff then moved from a model of organismic self-defense directly borrowed from Cannon to a generalized notion of “stress and disease,” according to which disease was the “inept” version of a normally “apt protective reaction pattern” that allowed the human organism to mobilize against stressful situations or events.
Hans Selye
The Physiology and Pathology of Exposure to Stress, Montreal, 1950

Stress became a leading new idea in psychosomatic theory in the 1950s and Hans Selye emerged as its best known and most effective proponent. Selye was a Vienna-born, Prague-trained physician and biochemist who settled in Montreal in the 1930s and wrote the leading endocrinology textbook in 1947. In 1950 he published a 1,025-page monograph entitled The Physiology and Pathology of Exposure to Stress, in which he elaborated ideas he had been developing since 1936 on what he called the “General Adaptation Syndrome.” Selye’s theory was that various “stressors” (cold, heat, solar radiation, burns, “nervous stimuli”) produce a generalized, stereotyped response in the biological organism as it works to “perform certain adaptive functions and then to reestablish normalcy.” As the organism automatically mobilizes its defense mechanisms, the hypothalamus (a nerve center at the base of the brain) is excited first. Later, after a chain of effects, the adrenal glands produce “corticoid” hormones. Corticoid hormones cause a characteristic set of somatic reactions including the development of gastrointestinal ulcers.

Due largely to their synthetic scope, Selye’s ideas swept the field and exerted an enormous influence. As F.L. Engel noted in 1956, “(Selye’s theory of stress and the diseases of adaptation) has permeated medical thinking and influenced medical research in every land, probably more rapidly and more intensely than any other theory of disease ever proposed.” The “stress syndrome” became even more popular and widely known in the sixties, partly because of its appeal as a replacement for older, increasingly discredited psychoanalytically-based psychosomatic theories and partly due to Selye’s charisma and prodigious output. He published forty books and over 1,700 scientific papers in the course of his career. Selye was frequently quoted throughout medicine, nursing, and other health fields, and his fame spread to the wider culture, a reputation he deliberately cultivated by publishing such books for the general reader as The Story of the Adaptive Syndrome (1952), The Stress of Life (1956 and 1976), and Stress Without Distress (1974). Yet by the 1970s there was discord in the field of stress research as Selye conceived it. Growing confusion and controversy riddled theory and experiment. Some critics blamed Selye for having caused a great deal of it with his conceptual inconsistencies and his shifting and sometimes contradictory formulations.

One major alternative challenged the stress model during the height of its initial popularity. George Engel and his colleagues at the University of Rochester Medical Center developed a theory they ultimately called “conservation-withdrawal.” Like Selye, Engel and his associates focused on psychobiological threats to an individual’s well-being. But instead of considering threats as “stressors” that elicited defensive and protective behaviors from the hyperaroused organism, the Rochester group conceptualized the most important of these behaviors in terms of “losses” and “deprivations” that caused the organism to become withdrawn, depressed and shut-down. The Rochester group was generally attuned to psychoanalytic theory and remained committed to preserving a place for it even in psychosomatic medicine. They thus developed a complex scheme framed in terms of disrupted relationships between individuals, affects of “helplessness” and “hopelessness,” and a state of “conservation-withdrawal” in which physiological function was depressed to the point of creating a “final common pathway” to illness and death.

Monitoring Monica

Monica’s gastric (stomach) secretions, Engel and his associates found that physiological activity increased sharply, not only in the presence of food, but in the course of Monica’s interactions with other trusted human beings. Joyful reunions following separation were associated with especially copious secretions. At the same time, when Monica emotionally disengaged and withdrew—for example, in the presence of a stranger—there was a pronounced shutdown of physiological activity. In a sense, the body “withdrew” also, as if trying to conserve resources.
The Rochester group’s work grew at the juncture between clinical studies on such diseases as leukemia and ulcerative colitis57 and a naturalistic experiment on an infant, “Monica,” who was fortuitously admitted to Rochester’s Strong Memorial Hospital during the course of their work.58 Monica had been born with a blockage in her esophagus, which required that two surgical openings be made, one in her neck to drain anything she took by mouth and one in her stomach through which she could be fed. Monica did not do well and was admitted to the hospital at fifteen months in a dangerous condition. While she was being nursed back to health, Engel and his associates designed a study in which they measured her gastric secretion continuously and correlated their observations with Monica’s moods. They found that Monica’s physiological activity increased when she was engaged with the members of the group, whether joyfully or angrily, and especially on reunion after separation. By contrast, her gastric secretion ceased entirely, and even became unresponsive to histamine (which normally stimulates gastric secretion), when she withdrew physically and emotionally from a stranger who replaced the familiar members of the group. Monica’s behavior made sense as a psychological and physiological shutdown that served to conserve her organismic resources. It also helped put into perspective the separately collected clinical data on patients who articulated feelings of “giving up” or being “given up” shortly before the onset or exacerbation of a variety of somatic diseases.59

By the 1970s the psychosomatic field thus had a pair of new concepts, one emphasizing stress-induced hyperarousal and the other deprivation-caused hypoarousal. A major achievement of the next decade was the merger of this pair of ideas into one model of socio-environmental challenge and response and the connection of that model with other streams of work focused on “life change events” (divorce, bereavement, and job loss) and “social stressors” (high intensity living and work situations and major social dislocations from normal support networks).60 The seventies were also notable for the application of progressively more sophisticated biostatistical techniques and more rigorous epidemiological study designs.61 Striking landmarks were Sidney Cobb and Robert M. Rose’s study of “Hypertension, Peptic Ulcer, and Diabetes in Air Traffic Controllers,” the 1973 conference in New York City on “Stressful Life Events,” John Cassell’s Wade Hampton Frost Lecture of 1976 at the American Public Health Association on “The Contribution of the Social Environment to Host Resistance,” and David Jenkins’s report in the New England Journal of Medicine the same year of substantial evidence confirming the significance of the “Type A” behavior pattern as a risk factor for coronary artery disease.62 Although there were critics of some of this new work in psychosomatic medicine, the strong consensus in the 1970s—both within the psychosomatic field and more broadly in science and medicine—was that studies on the relationship between social support, life stress, and disease onset were significant and very promising for the future.63 It was well established in the popular imagination that the stress of modern life, work-related tension and anxiety, and devastating tragedy accompanied by the loss of community could lead to very severe health consequences.

The chief and primary cause of ... [the] very rapid increase of nervousness is modern civilization, which is distinguished from the ancient by these five characteristics: steampower, the periodical press, the telegraph, the sciences, and the mental activity of women.

George M. Beard

American Nervousness, Its Causes and Consequences, 1881

Also notable in the seventies was the translation of new theoretical insights into practical intervention strategies, sometimes actively promoted by the researchers themselves. Thus, Meyer Friedman and Ray Rosenman, the physicians who initially defined the Type A concept, published a popular book which included practical chapters on how to “reengineer” one’s daily life and develop “drills” to replace old and harmful habits.64 Similarly, Harvard’s Herbert Benson promoted a simple, “noncultic” technique to elicit the “relaxation response” as a counter to the stress-induced “emergency response.” He showed that physicians could teach the relaxation response to patients as either a preventive or therapeutic strategy. 65 Several other investigators introduced “biofeedback” techniques (in which various physiological variables such as heart rate and muscle tension were displayed to the patient) as practical clinical methods for managing hypertension and a variety of other conditions. 66
In 1987 the Volvo Truck Corporation initiated a significant effort to improve the environment of its factories and alter the assembly process. Scientists documented blood pressure, stress hormones and attitudes of workers before and after restructuring the way car and truck engines were put together and found that after the changes, perceived stress, blood pressure and epinephrine levels of the employees decreased and morale increased.

In work settings, employers introduced timeouts for stress-reducing exercise sessions and even redesigned the production process itself. Of course, the time-honored “vacation in the country” or “stay at the spa” remained popular outlets for people’s accumulated tension. But in a period sensitive to the importance of loss as well as overload, health practitioners introduced newer interventions to affiliate isolated and vulnerable people with one another through support groups, to provide them with beloved objects of affection, and to encourage shared group solidarity of great symbolic and emotional significance. If stress and deprivation could cause disease, relaxation and reconnection may be able to cure it or, at least, mitigate its effects.

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Part 1

One of the major goals of parenting is to protect a child from harm and, thereby, promote survival. Part of this process involves teaching the child the social and adaptive skills required for independence while maintaining interconnectedness with others. The child is an active participant in this process, learning some skills with greater ease than others, and through his or her growth and development providing satisfaction to parents.

Everyone agrees that parenting is difficult in even the most ideal of circumstances. It involves tremendous amounts of time and emotional energy, and yet, many of us take on this responsibility with eagerness.

Parenting is not just difficult: it is also stressful. Stress can have an impact on parenting by significantly contributing to irritability, depression, marital problems and low self-esteem. The effectiveness with which parents are able to cope with this stress has significant implications not only for them, but for their child, also.

Many researchers have worked to identify sources of stress in child-rearing and some have studied sources related to raising a child with mental retardation in particular. I will try to summarize some of their work.

My purpose in discussing stress is to help parents recognize some of the sources within their own families. Sources of stress differ between families; they differ for mother and father and for the single parent. Also, sources of stress change with the composition of the family and with the age and developmental stage of the child with the developmental disability.

Not all issues I discuss will be pertinent to every family, but sometimes by thinking about stress in an orderly way it is possible to develop strategies for both stress resolution and effective coping.

Since this is such an important topic I will present the material in two parts. This first part will discuss how the characteristics of a child with Down syndrome can impact on the level of stress within the family.

The second part of this article will be in the next issue of Down Syndrome Today. In it I will discuss the characteristics of the family in relation to stress and suggest some mechanisms for coping with stress.

CHILD CHARACTERISTICS

Level of Abilities

Although Down syndrome is very frequently diagnosed at or soon after birth, it is impossible to predict at that time the level of achievement the child will eventually reach. With very few exceptions, Down syndrome results in mental retardation but the level of impairment of individuals
ranges from mild to profound.

One study reported that parents of higher functioning children with mental retardation expressed less stress about their child's physical limitations and less concern about life-span care than parents of lower functioning children. Children who are higher functioning will develop faster and achieve independence in toileting, eating and dressing earlier. As each of these developmental milestones is achieved the anxiety over whether the child will achieve that milestone is reduced. In addition, higher functioning children are less likely to be disruptive to a family because they have more individual resources for flexibly adapting to family needs.

In recent years the expectation for children with Down syndrome to achieve higher functioning has increased dramatically. For many parents the effort required to realize the potential for their child with Down syndrome can lead to stress, as they try to meet all the demands for educational, therapeutic and recreational activities. Further, a significant number of children with Down syndrome will make very slow progress even with a supportive environment and intensive intervention. For the parents of these children, the disappointment and frustration of their child's development can also be stressful.

Age of Child

In one study mothers of children with developmental delays reported that middle childhood (6-12 years) was more stressful than either preschool or adolescence. During middle childhood there are increased demands for the child to develop independence while the demands on the primary caretaker to provide constant vigilance and assistance in toileting, dressing, and eating may still be present. Without family and community support, parent exhaustion becomes a definite possibility. With older adolescent children many of the care-taking tasks may have been transferred to resources outside the family.

In even the best informed families, parents often entertain unrealistic expectations for their child. This reaching for higher goals can be helpful in freeing the child from restrictions which may limit opportunity. It can also put stress on the family to meet these goals. This factor can be especially significant during the childhood years when the child's level of abilities is still largely unknown. By the time a child with Down syndrome reaches adolescence or adulthood, families may have readjusted their expectations to better represent the abilities of the individual.

The age of the child with Down syndrome in relation to other family members is also important. Typically, a child with mental retardation, regardless of their chronological age, is relegated to the social status of the "youngest" once their siblings pass his or her developmental level. With a child in the household who is viewed as perpetually young, parents may feel that they will never be able to progress beyond child-rearing to address their own, personal goals. In addition, the prolonged demands for involvement in child-rearing can be particularly wearing on older parents of a child with Down syndrome.

Medical Problems

Early infancy is a particularly anxious time for parents of a child with Down syndrome because it is during infancy that many of the associated life-threatening conditions are identified and treated. Some conditions, such as recurrent ear infections, persist throughout childhood. Stress for parents can occur not just around a time of crisis, but can also accompany the daily demands for coping with persistent medical conditions.

In managing complicated educational and medical issues, parents frequently become the advocates for their children. Parents are often placed in the position of evaluating the benefits of a program for their child. The responsibility for decisions about care may be difficult for parents because they feel they are not adequately trained.

Behavior of the Child

Parents of children with behavior problems that are difficult to ameliorate, such as hyperactivity, self-abusiveness, and self-stimulatory behaviors, report higher levels of stress. Many of these serious behavior problems are linked to the same causes as the mental retardation of the individual and are not the result of poor judgment in child-rearing. Serious behavior problems are not characteristic of people with Down syndrome, but when they occur they can be a major source of stress.

Fortunately, most individuals with Down syndrome are socially responsive. Not only does this provide the parent with personal satisfaction, but social approval can be an effective tool in modifying some unacceptable behaviors.

Part 2

In Part 1 of this article which appeared in the Winter issue of Down Syndrome Today, I introduced the topic of stress for parents by saying that not all families experience stress over the same issues. Families are a dynamic unit which changes over time. The issues which cause stress in family life also change. Age of family members, composition of the family, family resources, and individual satisfaction are a few of the many factors which contribute to family dynamics. Indeed, coping with stress, itself, changes a family's dynamics.

By describing some of the possible sources of stress I hope to provide a framework whereby parents can think about stress within their own situation. I have chosen only a few frequently mentioned sources of stress but there are many more. Similarly, there are many techniques for coping with stress; some are adaptive (that is, they promote healthy family life) and others are destructive to the family or individuals within the family. Part of working to preserve every family unit involves working to resolve stress.

In Part 1 of this article I described some sources of stress which are related to the characteristics of the child with a developmental disability. I will now identify some of the characteristics of the family which contribute to stress.

PARENT CHARACTERISTICS

Parenting Satisfaction

Parents want to feel they are meeting the needs of their children. They find satisfaction in the progress of their child. They also need to feel they have a role in shaping the development of their child.

When a child has special needs there is a tendency to shift many of the important decisions to the ‘experts’. Decisions about when to begin intervention and which therapies to provide are frequently determined by a team of professionals. Decisions about educational placement are given to the educational system.
Although medical and educational institutions are better than they have ever been in providing supportive intervention for children with Down syndrome, the delivery of these services becomes a source of stress when parents either do not agree with or trust the decisions of experts, are unable to meet the demands for service delivery, or feel they have a reduced role in the decision making process. For some parents, this relinquishing of control can result in feelings of inadequacy as a parent and of anger at the delivery system.

**Personal Issues**

Parents of children with a developmental disability frequently have negative feelings of guilt, anger, disappointment, and self-pity. These can coincide with feelings of love, gratitude, and pride. Having feelings which seem to be in apparent conflict can be personally stressful.

For many parents of a child with Down syndrome, the early months are occupied with understanding the implications of the diagnosis, coping with early medical problems, and initiating early infant stimulation programs. There is little time or energy for parents to cope with their own feelings. These feelings can return at later (and sometimes unexpected) times, even in individuals who at other times genuinely celebrate their good fortune in having their special child.

A successful family provides emotional support for all the members of the family. However, no family can address all of the individual needs of every member. Having to look outside the family for support can itself be stressful for people who are very independent and self-reliant. Both children and parents at times need to look outside the family for sources of support. Sometimes a parent or sibling finds it easier to express negative feelings outside the family. This should not be taken as a sign of betrayal. It is seeking validation of a feeling which can allow the individual to return to the family with renewed personal resources.

**Economic Support**

The demands for providing for basic needs are common to all families. The demands on the family, however, change depending on the ages of the children. Although it is becoming increasingly more common for both parents to share financial responsibility for the family, fathers continue to report this responsibility as an important source of stress.

Economics becomes a source of stress when there is not enough money for the needs of the family. When one of the children in the family has Down syndrome there is likely to be increased demands on the financial resources of the family to pay for medical care, additional therapies, babysitters and participation in special programs. These demands can persist throughout adolescence and sometimes into adulthood. At the same time, the involvement of parents in addressing the special needs of a child reduces the amount of time and energy available to them for increasing income to meet these needs.

**Managing Resources**

Each person should share in the attention and concern of all family members. This sometimes entails sacrifice and leaving some personal needs unmet. The child with Down syndrome is entitled to be a full participating member of the family and, therefore, should be required to share the family resources, not monopolize them.

In addition, when a family is in a stressful period (for instance, when there is a death of a close friend or relative), the child with Down syndrome should share in the stress and be supported in learning to cope within his or her ability.

**Coping with Stress**

There are many ways to cope with stress but some are more adaptive than others. As I emphasized in the introduction to both Parts 1 and 2, there are many differences between families in their vulnerability to stress. Similarly, there are many ways to cope with stress. I mention here only three areas to consider.

One consistent finding of research is that it is easier to cope with the stress of parenting if there is marital stability and/or a supportive social network. Some parents of children with developmental disabilities feel isolated. Maintaining and establishing meaningful social relationships requires effort but children benefit indirectly because parents with less stress are more effective in their child-rearing. There are many opportunities for social net-working among parents of children with similar disabilities to share their questions and concerns. It is also important for the personal development of all family members to maintain social contacts which do not focus on the child in the family with Down syndrome.

Another way to cope with stress is through information seeking. This can take the form of learning about Down syndrome, in general, or by sharing common experiences with other parents. Parent support groups help families to focus on important issues. They can also provide role models and can help parents understand the next developmental stage and approach it with more preparedness than dread. One group, the Association for the Care of Children’s Health (7910 Woodmont Ave., Bethesda, MD 20814), assists parents of children with developmental disabilities by providing needed information about the health care system. Two other sources for information on Down syndrome are the National Down Syndrome Society (666 Broadway, NY, 10012) and the National Association for Down Syndrome (PO Box 4542, Oak Brook, IL, 60522).

Finally, expressing emotions in socially appropriate contexts is also a way to reduce stress. The individual needs of parents or siblings should not be neglected in the urgency of providing needed services and support for the individual with Down syndrome. While this is not always possible, at least attempting to balance your needs with those of each member of your family can help in achieving a greater sense of normalization of, and control over, your life.

Parenting any child is stressful, and most parents of children with Down syndrome know all too well about coping with stress. Practically any one of you could write your own story and other parents would find it familiar. In trying to deal with stress it is often difficult to see beyond today and maybe tomorrow. My purpose in writing these articles is to point out that you are not alone in experiencing stress over small and large issues of child-rearing. Sources of immediate stress will pass and probably be resolved satisfactorily. But development is characterized by change and as you and your child develop, new sources of stress will emerge. Knowing how to identify personal sources of stress, and coping with them effectively, has long term beneficial consequences. Your successful experiences in coping will likely increase your confidence and resources and prepare you for future experiences.
Stress and the Immune System

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Edited and reviewed by Professor of Medicine William Nelson IMUNE

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Below:
- Stress and immunity
- Stress and premature aging
- Wound healing
- Infectious disease
- Stress and the “Big C”: cancer
- Other conditions
- Was Grandma right?

The idea that psychological stress can make us -- or at least rats -- more vulnerable to illness was inadvertently proven by an eager yet clumsy physiologist back in the 1930s. Hans Selye, an Austrian-born endocrinologist working in Canada, was trying to prove that he’d discovered a new hormone by injecting lab rats daily with an ovarian extract. As the story goes, Selye was an inexperienced technician, and often dropped the rats and had to chase them around the floor with a broom in order to catch and successfully inject them.

A few months later, when the rats developed peptic ulcers and swollen adrenal glands, Selye was convinced he’d discovered a new hormone. Just to be sure, he ran a control group on more rats, injecting them with plain saline solution. The results? The control rats developed the exact same symptoms. The young scientist was forced to conclude that it was the stress of his sloppy lab-side manner that caused the rats’ maladies. Selye had failed to discover a new hormone, but succeeded in proving a relationship between stress and physical disease. He went on to write more than 1,700 papers and 33 books on the subject of stress. Today, the late Hans Selye is known as “the father of the stress field.”

Thankfully, most of us will never be chased around by giant hands attempting to stick us with sharp needles. But we will go through harrowing break-ups, moving days, and bad weeks at the office. Can stressful events like these actually make humans more likely to contract a disease? Can they hinder our recovery from hard-hitting illnesses like heart disease and cancer? Can they slow the healing of wounds? Increasing evidence suggests that stress may indeed affect the immune system in these and other ways. In fact, there is so much research on stress and immunity that it has its own field, called psychoneuroimmunology, complete with specialized journals and textbooks.

Stress and immunity

How exactly does stress from the mind end up affecting the immune system?

“Some kinds of stress -- very short-term, that last only a matter of minutes -- actually redistribute cells in the bloodstream in a way that could be helpful,” says Suzanne Segerstrom, an associate professor of psychology at the University of Kentucky who has conducted studies on stress and the immune system. “But once stress starts to last a matter of days, there are changes in the immune system that aren’t so helpful. And the longer that stress lasts, the more potentially harmful those changes are.”

The fight-or-flight response (short-term stress) goes something like this: When a villager in Africa sees a lion charging at him, for example, the brain sends a signal to the adrenal gland to create hormones called cortisol and adrenaline, which have many different effects on the body, from increasing heart rate and breathing to dilating blood vessels so that blood can flow quickly to the muscles in the legs. Besides helping him run away, this type of acute stress also boosts the immune response for three to five days (presumably to help him heal after the lion takes a swipe at him).

When humans experience stress, our bodies react the same way that animals’ bodies do. Once the lion is gone, a zebra or gazelle’s stress level will return to normal, but humans have more trouble getting back to our routines after a stressful event, whether it’s a car accident or a divorce. We’ll think about it, dream about it, and worry about it for a long time, and that sets us up for long-term problems, says Robert M. Sapolsky, a Stanford University stress expert and author of Why Don’t Zebras Get Ulcers.

Over time, continually activating the stress response may interfere with the immune system. How this affects your disease risk, Sapolsky suggests, depends partly on your risk factors and your lifestyle, including your degree of social support.

Stress and premature aging

The stress involved with caring for a loved one with dementia is well documented. According to the national Alzheimer’s Association, 80 percent of caregivers report suffering high levels of stress, and nearly half suffer from depression. As a result, caregivers have become popular subjects for studies involving stress and the immune system.

A 2003 analysis of caregivers, for example, found that people caring for spouses with Alzheimer’s disease showed a marked overproduction of an immune factor called IL-6, which is normally involved in the immune response to injury. A rise in IL-6 is associated with many age-related conditions, including cardiovascular disease, osteoporosis, arthritis, Type 2 diabetes, certain cancers, and mental decline.

Wound healing

In another study, dental students volunteered to receive small cuts on the roofs of their mouths on two occasions: once during summer break and again six weeks later, during exams. The students’ wounds took 40 percent longer to heal when they were under the stress of exams. In addition, the students’ levels of a protein called IL-1, which summons other immune cells to battle, were found to be two-thirds lower when the students were in exams than in the summer.

A similar study found that marital discord was also associated with the healing of wounds. In the 2005 study published in the Archives of General Psychiatry, couples whose behavior was rated as “hostile” toward each other had a wound-healing rate that was 60 percent of the rate of couples...
with gentler relations.

Infectious disease
A handful of vaccine studies have also found that the immune system of highly stressed individuals have sluggish responses to challenges. In one study, published in the journal Psychosomatic Medicine in 2000, a pneumonia vaccine was administered to 52 older adults, including 11 people caring for spouses with dementia. After just six months, the levels of antibodies produced against pneumonia in the caregivers had dropped off, while the non-caregivers’ levels remained stable. A similar study in which 32 caregivers were given the flu shot in 1995 also found that caregivers received less protection from the vaccine than did a control group of non-caregivers.
If you’re stressed out, you’re more likely to get sick — at least it seems that way. A 1991 study in the New England Journal of Medicine actually found that higher psychological stress levels resulted in a higher likelihood of catching the common cold. The researchers accounted for many variables — including the season; alcohol use; quality of diet, exercise, and sleep; and levels of antibodies before exposure to the virus — and concluded that higher stress was to blame for lowered immunity and higher infection rates.

Stress and the “Big C”: cancer
The relationship between stress and the big daddy of all diseases — cancer — has also been the subject of much research. “Our studies have shown that stress can adversely affect components of the immune system involved in fighting diseases like cancer,” says David Spiegel, MD, a psychiatrist and researcher at Stanford University. The number of natural killer or NK cells — cells that kill undesirables like bacteria and cancer cells — has been found to be lower among people who are suffering from chronic stress, says Spiegel, who also directs Stanford’s Center for Integrative Medicine.
Spiegel, among others, has conducted a number of studies that indicate that group counseling and stress-management techniques offered to people who have already been diagnosed with cancer may help boost their immune systems. For example, a study of 103 women with metastatic breast cancer (cancer that has spread beyond the breast) examined how much support from family and friends the women had to help them deal with their diagnosis and treatment. The study, published in the journal Psychosomatic Medicine in 2000, found that women who had greater social support displayed lower levels of cortisol in their saliva than the women who had less support. Lower levels of cortisol, says Spiegel, indicate a healthier immune system functioning.
But the evidence linking stress and cancer is murky at best. As Sapolsky points out in his book Why Zebras Don’t Get Ulcers, none of the cancer studies out there is able to directly link lower levels of stress to longer survival rates for cancer victims. And certainly, none of them can prove that stress causes any type of cancer in the first place.
“We must be careful not to blame the victim,” Spiegel says. “We get cancer because we are biological creatures, not because we didn’t handle stress right. Stress is just one variable among many.”

Other conditions
Stress acts on the body through the immune system, and in recent years we have been learning that chronic inflammation — the immune system’s response to injury or irritation — may be involved in everything from heart disease and diabetes to Alzheimer’s disease and other dementia. So, indirectly, a stress-related imbalance in the immune system may have a wider-ranging effect than originally suspected.

Was Grandma right?
As we’ve seen, many studies show that stress can impact different facets of the immune system. Some suggest that stress slows recovery from illness or makes us more likely to catch colds. But can stress actually make us sick, or shorten our lifespans? Our immune systems are so complicated, and a person’s immune response affected by so many factors, it’s understandably a difficult area of study. In addition, it’s hard to find stressed-out volunteers willing to expose themselves to viruses to see if they’ll get sick or not.
In the meantime, there is enough evidence to convince us that we should find healthy ways to keep our stress levels down, which is advice we got from our grandmothers: Eat right, exercise, and get enough sleep.
“Stress is inevitable,” Spiegel says. “The trick is to learn to manage it, to find some aspect of our stress and do something about it. Don’t think in terms of ‘all or nothing’ but in terms of ‘more or less.’”
-- Paige Bierma is a health and medical writer who has contributed to Hippocrates, Safety + Health magazine, and Vibe.

References
Interview with David Spiegel, MD, Stanford University
Interview with Suzanne Segerstrom, PhD, University of Kentucky
Stress as a Medical Concern

Stress is a medical disease and concern. International Classification of Diseases #9 (ICD#9) lists 308.0 as Acute Reaction to Stress and 308.3 Stress, Acute Situational Disturbance, and ICD#10 lists F43 Reaction to severe stress, and adjustment disorders and F43.0 Acute stress reaction, F43.1 as Post-traumatic stress disorder, F43.2 as Adjustment disorders, F43.9 as Other reactions to severe stress and F43.8 as Other reactions to severe stress and unspecified. The opinion of the word “acute” is to be made by the therapist or the patient and is not the responsibility of the manual nor the SCIO2.

Biofeedback is a medical therapy for stress. Current Procedural Terminology (CPT) codes for therapy lists 90901 as Biofeedback training by any modality and 9081X as approximately 45-50 minute sessions.

From the ICD listings we see that stress is recognized as a medical concern. The diagnosis of medical stress is for a qualified doctor or trained therapist. Acute stress is different for all patients. One person’s acute stress is another’s relaxation. A simple spider might set off one person, where a spider can have no effect or even a pleasurable effect on another. Stress is an individual INTERNAL response to an EXTERNAL situation. Subclinical stressors exist every day. These can be accumulative and combine to produce an Acute Stress medical situation. A list of major stressor that can accumulate and produce a medical situation includes Christmas. The stress of Christmas might be the straw that breaks the healthy camel’s back and produces a medical health risk. At any rate stress reduction might be a preventative to stopping the risk of hurting the camel’s back and producing a medical health risk.

There can be no Objective definition of Stress. It is always an individual Subjective internal reaction to External Situations. People react differently to situations. Some are more sensitive to minor subclinical stress than others. Stress can be accumulative. And stress must be assayed individually.

There once was a farmer looking for a good worker, a case of occupational placement under the Bureau of Labor Statistics NET 45-2011.00. A big strong young man seeking employment used the Occupational Outlook Handbook (OOH) and applied to the farmer. The farmer wanting to challenge his occupational level of abilities first assigned him the excessive task of plowing an acre of land with a plow and no horse, being careful to not disobey animal safety regulations code 23-4500. The young man finished in two hours. This was validated by the OSHA Occupational Safety and Health Administration, compliance directive CPL 02-00-135. Next to further assay his occupational range of services code 311100. The farmer assigned the task of loading one hundred bales of hay into the loft of the barn. The big strong young man finished his assignment in two hours with no distress, passing code 45-2000. The farmer was now satisfied that this young man was proper for occupational assignment and he hired him, internal document 80011. To make the young man more comfortable the farmer assigned him the task of sitting under a shady tree, with a glass of lemonade, and to sort a bushel of apples, code 45-2011. Good apples place on the left bad on the right. After thirty minutes the young man was sweating and over stressed and came rushing to the farmer with a protest and a request to quit employment. The young man registered the complaint “There is too much job stress, These decisions are killing me, I Quit.”

This joke points out how regulatory picayune rules and regulations have been imposed to access in our society. Over use of imposed rules and regulations have made us lose some of our honest humanity. Medicine has been over regulated and a sea of paperwork and an ocean of regulations...
have made medicine impersonal and expensive. Stress is an individual concern for the personal touch of the therapist client relationship. It is paramount to medicine to maintain a personal human touch and to realize that stress reduction is a key and very important part of medicine.

The diagnosis of medical stress is for a qualified doctor or trained therapist to perform on an individual basis. The diagnosis of medical stress is NOT the job or responsibility of regulatory officials, review boards, or governmental agencies. Regulatory officers and agents intrusion into the diagnostic process is both irregular and inappropriate. Stress is an individual INTERNAL response to an EXTERNAL situation, and thus must be done on a case by case basis. Since stress reduction benefits all any stress reduction therapy such as biofeedback can have universal benefits for all patients.

The following article from Dr. Janos Selye will define this further:

The best way for us to review the SCIO policy on stress reduction is to introduce the philosophical father of the device Canadian doctor Hans Selye. A current updated literature review follows as well as our own sponsored independent research.

Hans Hugo Bruno Selye, CC (Hungarian: Selye János) (January 26, 1907 — October 16, 1982) was a Canadian endocrinologist of Austro-Hungarian origin and Hungarian ethnicity. Selye did much important factual work on the hypothetical non-specific response of the organism to stressors. While he did not recognize all of the many aspects of glucocorticoids, Selye was aware of this response on their role. Some commentators considered him the first to demonstrate the existence of biological stress.

Hans Selye, or in the Hungarian Selye Janos

Hans Selye was born in Vienna in 1907, of Hungarian descent, but did most of his work in Canada. As early as his second year of medical school (1926), he began developing his now-famous theory of the influence of stress on people's ability to cope with and adapt to the pressures of injury and disease. He discovered that patients with a variety of ailments manifested many similar symptoms, which he ultimately attributed to their bodies' efforts to respond to the stresses of being ill. He called this collection of symptoms--this separate stress disease--stress syndrome, or the general adaptation syndrome (GAS).

He spent a lifetime in continuing research on GAS and wrote some 30 books and more than 1,500 articles on stress and related problems, including Stress without Distress (1974) and The Stress of Life (1956). So impressive have his findings and theories been that some authorities refer to him as "the Einstein of medicine." His medical genius has gone unrewarded for his work did not depend on any synthetic drug solution in an overly reductionistic style of modern medicine. He has shown important factual work on the hypothetical non-specific response of the organism to stressors.

While he did not recognize all of the many aspects of glucocorticoids, Selye was aware of this response on their role. Some commentators considered him the first to demonstrate the existence of biological stress.

The Nature of Stress

by Hans Selye

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The Nature of Stress was submitted to Dr. Nelson and his other colleagues shortly before Selye's death. Dr. Nelson knew him well having been worked with Selye and having shared his lecture platform on several occasions. This treatise is presented as prepared by Hans Selye as if he is still living, which indeed he is through his monumental works, for Dr. Stress, or the Einstein of modern medicine as he was occasionally entitled, will live forever since so many believe that Hans Selye is the foremost medical researcher of the 20th century.

About the Author: Dr. Hans Selye is without question one of the great pioneers of medicine. His famous and revolutionary concept of stress opened countless avenues of treatment through the discovery that hormones participate in the development of many degenerative diseases, including coronary thrombosis, brain hemorrhage, hardening of the arteries, high blood pressure and kidney failure, arthritis, peptic ulcers and even cancer. At present, most of his research is concerned with formulating a code of behavior based on the laws governing the body's stress resistance in dealing with personal, interpersonal, toxic, nutritional, traumatic and group problems.

Dr. Selye has served since 1945 as professor and Director of the Institute of Experimental Medicine and Surgery at the University of Montreal. Now he is President of the International Institute of Stress, founded by him in 1976 at the University of Montreal.

Born in Vienna in 1907, he studied in Prague, Paris, and Rome. He received his medical degree and his Ph.D. (chemistry) from the German University in Prague, and his D.Sc. at McGill University in Montreal. He is the author of 38 volumes and more than 1600 technical articles. In addition to his doctorates he holds 20 honorary degrees from universities around the world. He is a Fellow of the Royal Society of Canada and an Honorary Fellow of 68 other scientific societies. A recipient of numerous honorary citizenships, he counts among his medals the Starr Medal (highest distinction of the Canadian Medical Association); the Prix de l'Oeuvre Scientifique (highest award of the Canadian Association of Frenchspeaking Physicians); the Killam Scholarship (highest award of the Canada Council); the International Kittay Award (top prize in psychiatry); the American Academy of Achievement's Golden Plate Award, and the 1977 Canadian Authors Association Literary Award for nonfiction. He has, in addition, been made a Companion of the Order of Canada (the highest
What stress is not

The word stress has been used so loosely, and so many confusing definitions of it have been formulated, that I think it will be best to start by clearly stating what it is not. Contrary to current popular or medical opinion:

1. Stress is not nervous tension. Stress reactions do occur in lower animals and even in plants, which have no nervous system. The general manifestations of an alarm reaction can be induced by mechanically damaging a denervated limb. Indeed, stress can be produced under deep anesthesia in patients who are unconscious, and even in cell cultures grown outside the body.

2. Stress is not an emergency discharge of hormones from the adrenal medulla. An adrenaline discharge is frequently seen in acute stress affecting the whole body, but it plays no conspicuous role in generalized inflammatory diseases (arthritis, tuberculosis) although they can also produce considerable stress. Nor does an adrenaline discharge play any role in "local stress" reactions, limited to directly injured regions of the body.

3. Stress is not that which causes a secretion by the adrenal cortex of its hormones (the corticoids). ACTH, the adrenal-stimulating pituitary hormone, can discharge these hormones without producing any evidence of stress.

4. Stress is not the nonspecific result of damage only. Normal and even pleasant activities - a game of tennis or a passionate kiss - can produce considerable stress without causing conspicuous damage.

5. Stress is not the deviation from homeostasis, the steady state of the body. Any specific biologic function, e.g., the perception of sound or light, the contraction of a muscle, eventually causes marked deviations from the normal resting state in the active organs. This is undoubtedly associated with some local demand for increased vital activity, but it can cause only "local stress" and even this does not necessarily parallel the intensity of the specific activity.

6. Stress is not that which causes an alarm reaction. The stressor does that, not stress itself.

7. Stress is not identical with the alarm reaction or with the G.A.S. as a whole. These are characterized by certain measurable organ changes which are caused by stress.

8. Stress itself is not a nonspecific reaction. The pattern of the stress reaction is very specific: it affects certain organs (e.g., the adrenal, the thymus, the gastrointestinal tract) in a highly selective manner.

9. Stress is not a reaction to a specific thing. The stress response can be produced by virtually any agent.

10. Stress is not necessarily undesirable. It all depends on how you take it. The stress of failure, humiliation, or infection is detrimental; but that of exhilarating, creative, successful work is beneficial. The stress reaction, like energy consumption, may have good or bad effects.

11. Stress cannot and should not be avoided. Everybody is always under some degree of stress. Even while quietly asleep our heart must continue to beat, our lungs to breathe, and even our brain works in the form of dreams. Stress can be avoided only by dying. The statement "He is under stress" is just as meaningless as "He is running a temperature." What we actually refer to by means of such phrases is an excess of stress or of body temperature.

If we consider these points, we may easily be led to conclude that stress cannot be defined, and that perhaps the concept itself is just not sufficiently clear to serve as the object of scientific study. Nevertheless, stress has a very clear, tangible form. Countless people have actually suffered or benefited from it. Stress is very real and concrete indeed, and is manifested in precisely measurable changes within the body. So before we proceed to a formal definition of the nature of stress, we will describe these manifestations.

What stress is

Mechanism. The workings of stress are extremely complex (see Figure). Apart from specific stimuli, which need not be discussed here, the first effect of any, agent or demand made upon the body - be it running up a flight of stairs, dealing with a viral infection, or performing a dance - is to produce a nonspecific stimulus (the agent's "stressor effect"). This may be a nervous impulse, a chemical substance or lack of an indispensable metabolic factor; it is referred to simply as the "first mediator," because we know nothing about its nature. We are not even certain that it has to be an excess or deficiency of any particular substance; it is possible that various derangements of homeostasis can activate the stress mechanism. Although we have still to identify the first mediator(s), we do know that eventually stress acts...
upon the hypothalamus and particularly upon the median eminence (ME). This action appears largely to be mediated through or modified by nervous stimuli coming from the cerebral cortex, the reticular formation and the limbic system (especially the hippocampus and amygdala). The incoming nervous stimuli reach certain neuroendocrine cells, most of which are located in the ME. These act as "transducers," transforming nervous signals into a humoral messenger, the corticotrophic hormone releasing factor (CRF), which can be demonstrated histochemically in the ME region and can also be extracted from it. Oddly enough, the posterior pituitary contains the highest concentration of CRF, and it has been isolated from this source in pure form, thus permitting the determination of its chemical formula as a polypeptide which subsequently was synthesized. Yet we have no conclusive proof that the CRF-active material extracted from the hypothalamus is identical with that obtained from the posterior lobe since only the structure of the latter has been definitely ascertained. Although vasopressin (antidiuritic hormone) possesses considerable CRF activity it is not identical with CRF; this has been shown by the well-documented differences in their chemical structure and physiologic activity.

CRF reaches the anterior lobe through the hypothalamo-hypophysal portal system that originates in the ME region within a network of capillaries into which CRF is discharged by the local neuroendocrine cells. It is then carried down through the larger veins of the pituitary stalk to a second capillary plexus in the pituitary.

The hypothalamus does not stimulate the adrenocorticotrophic hormone (ACTH) secretion of the anterior lobe through nervous pathways descending in the pituitary stalk but rather through blood-borne substances carried by way of the portal veins. That is why transection of the stalk inhibits the ACTH secretion only before vascular connections between the hypothalamus and the gland are reestablished; if regeneration of these vessels is prevented by interposing a plate between the cut ends of the stalk, this pathway is permanently blocked.

Both in vivo and in vitro experiments have proven that CRF elicits a discharge of ACTH from the adenohypophysis into the general circulation. Upon reaching the adrenal cortex, it causes secretion of corticoids, mainly glucocorticoids such as cortisol or corticosterone. These induce enzymatically regulated adaptive metabolic responses and suppress immune reactions as well as inflammation, assisting the body to coexist with potential pathogens (syntoxic reactions). In addition, they facilitate various other necessary to meet the demands faced by the body. In ancient stress, these glucocorticoids prepare the body for fight or flight.

The foregoing processes are the principal ones involved in the stress reaction, but by no means level similarly inhibits ACTH secretion. It is still not quite clear to what extent these feedbacks act upon the neuroendocrine cells of the hypothalamus, the adrenohypophysis or both. (Hence, in the Figure the corresponding arrowheads merely point towards the hypothalamo-hypophysal region in general, without specifying exactly where their target areas are situated.)

Another major pathway involved in the stress mechanism is carried through the catecholamines liberated under the influence of an acetylcholine discharge, at autonomic nerve endings and in the adrenal medulla. The chromaffin cells of the latter secrete mainly epinephrine, which is of considerable value in that it stimulates mechanisms of general utility to meet various demands for adaptation. Thus it provides readily available sources of energy by forming glucose from glycogen deposits and free fatty acids from the triglyceride stores of adipose tissue; it also quickens the pulse, raises the blood pressure to improve circulation into the musculature, and stimulates the CNS. In addition, epinephrine accelerates blood coagulation and thereby protects against excessive hemorrhage should wounds be sustained in conflicts. All of this is helpful in meeting the demands, whether they call for fight or flight.

At this point it will be helpful to discuss two apparent objections to accepting the concept of a single stereotyped response to stress:

1. Qualitatively different agents of equal toxicity or stressor potency do not necessarily elicit exactly the same reactions in different people.
2. Even the same degree of stress, induced by the same agent, may produce different effects and even lesions in different individuals.
3. The effects specific to any given agent usually modify the effects and manifestations of the general stress syndrome. (Thus, it took many years to recognize and prove the existence of the latter.)
4. The fact that the state of stress, even if due to the same agent, can cause different effects in different individuals, has been traced to "conditioning factors" that can selectively enhance or inhibit one or the other effect stress. This conditioning may be endogenous (genetic predisposition, age or sex) or exogenous (treatment with certain hormones, drugs, or dietary factors.) (See Figure.) Under the influence of such conditioning factors, a normally well-tolerated degree of stress can even become pathogenic, selectively affecting those parts of the body that are particularly sensitized both by those conditioning factors and by the specific effects of the eliciting agent, just as physical tensions of equal strength in different chains will break the particular link that is the weakest as a result of internal or external factors.

The foregoing processes are the principal ones involved in the stress reaction, but by no means the only ones. As well, the level of STH, the growth hormone, may rise, and changes in the output of thyroid hormones of the ovary or testis may take place.

Stressors. The agents or demands that evoke this coordinated response which I have designated 11 stress" are referred to, quite naturally, as stressors; and of course something is a stressor to the same degree that it calls forth the syndrome.

When the stressor in question is some organism or substance foreign to the body, the curative process resulting from the stress reaction can take either of two forms, according to whether the pathogen causes trouble directly or indirectly. Direct pathogens cause disease irrespective of our
body’s reaction, whereas indirect pathogens produce damage only through the exaggerated and purposeless defensive responses they provoke. If a patient accidentally exposes his hand to a strong acid, alkali, or boiling water, damage will occur irrespective of his reactions. Because all these are direct pathogens; they would cause damage even to the body of a dead man who obviously could not put up any vital defense reactions. On the other hand, most common inflammatory irritants, including allergens, are essentially indirect pathogens, which do not themselves cause disease, but are damaging only by stimulating an inopportune and harmful fight against what is innocuous.

During evolution, immunologic reactions which lead to destruction of microbes, grafts, and other foreign tissues undoubtedly developed as useful defensive mechanisms against potentially dangerous foreign materials. However, when - as in the case of many allergens, heart transplants, etc. - the attack against the "foreign" agent is unnecessary or even harmful, man can improve upon the wisdom of Nature by suppressing this hostility. Nevertheless, when the aggressor is dangerous, the defensive reaction should not be suppressed but, if possible, increased above the normal level, which can be done, for example, by cataleptic substances that carry the chemical message to the tissues to destroy the invaders even more actively than would normally be the case.

However, stressors are not exclusively physical in nature. Emotions, e.g., love, hate, joy, anger, challenge and fear, also call forth the changes characteristic of the stress syndrome.

Stress and disease. Stress is an individual INTERNAL response to an EXTERNAL situation. In general, the hormonal responses outlined above aid adaptation to environmental change or stimuli; but they are sometimes the cause of disease, especially if the state of stress is prolonged or intense. In this latter case, the body goes through the three stages of what I call the "general adaptation syndrome" (G.A.S.). The first is the alarm reaction, characterized by the changes above described. Of course, if the stressor (stress-producing agent) is so severe that continued exposure is incompatible with life, the organism will die within a few hours during this stage; otherwise, a stage of adaptation of resistance will ensue, since no organism can be maintained continuously in a state of alarm. The adaptive stage is characterized by the vanishing or diminishing of the initial symptoms, since the body has achieved optimal adaptation. After still more prolonged exposure to the stressor, however, this acquired adaptation is lost and a third stage of exhaustion is entered into, which, unless the organism receives emergency aid from some outside source, leads to death. Apparently, the adaptability of an organism is finite.

Also of interest is the routine picture of endocrine gland disturbance that Selye (The Stress of Life, New York, McGraw-Hill, Inc., 1956) so ably depicted in the General Adaptation Syndrome brought on by any Stress to the body.”

Definition. Let us see now whether the following definition will fit all our facts:

Stress is the state manifested by a specific syndrome which consists of all the nonspecifically-induced changes within a biologic system. Thus, stress has its own characteristic form and composition, but no particular cause. The elements of its form are the visible changes due to stress, which are addictive indicators expressing the sum of all the different adjustments that are going on in the body at any time.

The above is essentially an "operational definition"; it tells what must be done to produce and recognize stress. A state can be recognized only by its manifestations; you have to observe a great many living beings exposed to a variety of agents before you can see the shape of stress as such. Those changes which are induced by only one or the other agent must first be rejected; if you then take what is left - that which is induced by many agents - you have uncovered stress itself. For simplicity’s sake we have attempted to state the essence of this concept in the following, less formal terms: Stress is the nonspecific response of the body to any demand, whether it is caused by, or results in, pleasant or unpleasant conditions. Stress as such, like temperature as such, is all-inclusive, embodying both the positive and the negative aspects of these concepts.

Within the general concept of stress, however, we must differentiate between distress (from the Latin dis = bad, as in dissonance, disagreement), and eustress (from the Greek eu = good, as in euphoria, euphoria). During both eustress and distress the body undergoes virtually the same nonspecific responses to the various positive or negative stimuli acting upon it. However, the fact that eustress causes much less damage than distress graphically demonstrates that it is “how you take it” that determines, ultimately, whether you can adapt successfully to change.

The general adaptation syndrome

Definition. While stress is reflected by the sum of the nonspecific changes as they develop throughout time during continued exposure to a stressor, the G.A.S. encompasses all nonspecific changes as they occur during continued exposure to a stressor. One is a snapshot, the other a motion picture of the response to demands.

Thus, the G.A.S. may be defined as the manifestation of stress in the whole body, as they develop in time. As we have seen, a fully-developed G.A.S. consists of three stages: the alarm reaction, the stage of resistance, and the stage of exhaustion. Yet it is not necessary for all three stages to develop before we can speak of G.A.S. Only the most severe stress leads rapidly to the stage of exhaustion and death. Most of the physical or mental exertions, infections, and other stressors, which act upon us during a limited period, produce changes corresponding only to the first and second stages: at first they may upset and alarm us, but then we adapt to them.

Normally, in the course of our lives, we go through these first two stages many, many times. Otherwise we could never become adapted to all the activities and demands which are man’s lot. Even the stage of exhaustion does not always need to be irreversible and complete, as long as it affects only parts of the body. For instance, running produces a stress situation, mainly in our muscles and cardiovascular system. To cope with this, we first have to limber up and get these organs ready for the task at hand; then for a while we will be at the height of efficiency in running, but eventually exhaustion will set in. This could be compared with an alarm reaction, a stage of resistance, and a stage of exhaustion, all limited primarily to the muscular and cardiovascular system. But such exhaustion is reversible; after a good rest we will be back to normal.

Most human activities go through three stages analogous to those of the G.A.S.: we first have to get into the swing of things, then we get pretty good at them, but finally we tire and lose our acquired efficiency. This triphasic evolution of adaptation is quite characteristic also of all bodily activities, including those that only the physician can fully appraise; for instance, of inflammation. If some virulent microbes get under the skin, they first cause what we call acute inflammation (reddening, swelling, pain); then follows chronic inflammation (ripening of a boil or abscess); and finally an exhaustion of tissue resistance takes place, which permits the inflamed, purulent fluid to be evacuated (breaking through of an abscess). The diseases of adaptation. Many maladies are due not so much to what happens to us as to our inability to adapt, and they have therefore
been called “diseases of adaptation.” The most common of such diseases are peptic ulcers in the stomach and upper intestine, high blood pressure, heart accidents, and nervous disturbances. Of course, any event makes demands upon us and, hence, causes some stress, but it is only people who cannot cope, either because of innate defects or lack of knowledge, who develop stress diseases.

Yet this is a relative concept. No malady is just a disease of adaptation. Nor are there any disease producers which can be so perfectly handled by the organism that maladaptation plays no part in their effects upon the body. Such agents would not produce disease. This hazziness in its delimitation does not interfere with the practical utility of our concept. We must put up with the same lack of precision whenever we have to classify any other kind of disease. There is no pure heart disease, in which all other organs remain perfectly undisturbed, nor can we ever speak of a pure kidney disease or a pure nervous disease in this sense.

The concept of adaptation energy. The selective exhaustion of muscles, eyes, or inflamed tissue all represent final stages in local adaptation syndromes (L.A.S.) only. Several of these may develop simultaneously in various parts of the body; in proportion to their intensity and extent, they can activate the G.A.S. mechanism. It is when the whole organism is exhausted - through senility at the end of a normal life-span, or through the accelerated aging caused by stress - that we enter into the (fatal) stage of exhaustion of the G.A.S.

Apparently, we have hidden reserves of adaptability, or adaptation energy, in ourselves throughout the body. As soon as local stress consumes the most readily accessible local reserves, local exhaustion sets in and activity in the strained part must stop. This is an important protective mechanism because, during the period of rest thus enforced, more adaptation energy can be made available, either from less readily accessible local stores or from reserves in other parts of the body. Only when all of our adaptability is used up will irreversible, general exhaustion and death follow.

Adaptation energy and a natural code of behavior

There seem to be close interrelations between the G.A.S. and aging. We have already mentioned that several local adaptation syndromes may develop consecutively or even simultaneously in the same individual. People can get used to a number of things (cold, heavy muscular work, worries), that several local adaptation syndromes may develop consecutively or even simultaneously in the same individual. People can get used to a number of things (cold, heavy muscular work, worries), which at first had a very alarming effect; yet, upon prolonged exposure, sooner or later all resistance breaks down and exhaustion sets in. The term “adaptation energy” has been coined for the fact that man has an inescapable natural urge to work egoistically for things that can be stored to strengthen his homeostasis in the unpredictable situations with which life may confront him.

We should not combat or be ashamed of these instincts. We can do nothing about having been built to work, and it is primarily for our own good. Organs that are not used (muscles, bones, even the brain) undergo inactivity atrophy, and every living being looks out first of all for itself. Neither should we feel guilty because we work for treasures that can be stored to ensure our homeostatic equilibrium with both the social and the inanimate world. To achieve this state, our activities must earn lasting results; the fruits of work must be cumulative and must provide a capital gain to meet future needs. To succeed, we have to accept the scientifically established fact that man has an inescapable natural urge to work egoistically for things that can be stored to strengthen his homeostasis in the unpredictable situations with which life may confront him.

On the other hand, there is no example in Nature of a creature guided exclusively by altruism and the desire to protect others. In fact, a code of universal altruism would be highly immoral, since it would expect others to look out for us more than themselves. Of course, “Love thy neighbor as yourself” is a command full of wisdom; but, as originally expressed, it is incompatible with biologic laws; no one needs to develop an inferiority complex if he cannot love all his fellow men on command.

What are the ingredients of a code of ethics that accepts egoism and working to hoard personal capital as morally correct? After four decades of clinical and laboratory research, I have tried to arrive at a code of ethics based not on the strictures and traditions of society, inspiration, or blind faith in the infallibility of a particular prophet, religious leader or political doctrine, but on the scientifically verifiable laws that govern the body’s reactions in maintaining homeostasis and living in satisfying equilibrium with its environment. By means of such a code, we can adjust our personal reactions to enjoy fully the eustress of success and accomplishment without suffering the distress commonly generated by frustrating friction and purposeless, aggressive behavior against our surroundings.

It is a biologic fact that man - like the lower animals - must fight and work for some goal that he considers worthwhile. We must use our innate capacities to enjoy the eustress of fulfillment. Only through effort, often aggressive, egoistic effort, can we maintain our fitness and assure our homeostatic equilibrium with both the social and the inanimate world. To achieve this state, our activities must earn lasting results; the fruits of work must be cumulative and must provide a capital gain to meet future needs. To succeed, we have to accept the scientifically established fact that man has an inescapable natural urge to work egoistically for things that can be stored to strengthen his homeostasis in the unpredictable situations with which life may confront him.

1. Find you own stress level - the speed at which you can run toward your own goal. Make sure that both the stress level and the goal are really your own, and not imposed upon you by society, for only you yourself can know what you want and how fast you can accomplish it. There is no point in forcing a turtle to run like a racehorse or in preventing a racehorse from running faster than a turtle because of some “moral obligation.” The same is true of people.

2. Be an altruistic egoist. Do not try to suppress the natural instinct of all living beings to look after themselves first. Yet the wish to be of some use, to do some good to others, is also natural.
We are social beings, and everybody wants somehow to earn respect and gratitude. You must be useful to others. This gives you the greatest degree of safety, because no one wishes to destroy a person who is useful.

3. Earn thy neighbor’s love. This is a contemporary modification of the maxim “Love thy neighbor as thyself.” It recognizes that not all neighbors are lovable and that it is impossible to love on command.

Perhaps two short lines can encapsulate what I have discovered from all my thought and research:

*Fight for your highest attainable aim,*

*But do not put up resistance in vain.*

So far as possible, I myself have followed this philosophy, and it has made my life a happy one. Frankly, in looking back, I realize that I have not always succeeded to perfection, but this has been due to my own shortcomings, not those of the philosophy. As I have often said. The builder of the best racing car is not necessarily its best driver. As to a driver, I turn my life’s work over to my successors like Dr. Nelson who I believe can drive this car and revolutionize medicine.

**Notes**

Undoubtedly, in man, with his highly developed central nervous system (CNS), emotional arousal is one of the most frequent activators. Yet it cannot be regarded as the only factor, since typical stress reactions can occur in patients exposed to muscle fatigue, trauma, hemorrhage, etc. while under deep anesthesia. Indeed anesthetics themselves are commonly used in experimental medicine to produce stress, and 11 stress of anesthesia” is a serious problem in clinical surgery.

**Bibliography**


The work of the Canadian genius medical doctor Hans Selye, has shown the world the pervasive and comprehensive effects of stress on the body. Stress and stressors weaken the body’s immune system and generally weaken the whole defense system, thus the genetic or systemic weak link of the body will give out first from continued stress. Reducing stressors helps all diseases. Our system uses a health questionnaire to assay behavior or lifestyle stressors and to educate the client to reduce the stress burden.

Towards a new Safe and Effective truly Modern Medicine

This is a new common sense method of modern medicine, that is Health motivated not just symptom control. We respect the complexity and the whole body, and respect the Natural process of health

Health is Ease of Flow, Stressors block Flow, Stress is more than Just personal stress.

Stress Reduction is the key to Medicine.

Major Stressors or Causes of Disease include:

- **LACK OF AWARENESS OR LACK OF EDUCATION**
- **STRESS**
- **HEREDITY**
- **MENTAL FACTORS** (Greed, anger, delusion arrogance ETC)
- **ALLERGY**
- **BAD POSTURE**
- **TOXICITY**
- **TRAUMA INJURY**
- **PATHOGENS** (MICRO-ORGANISMS, Bacteria, fungus, virus, prions, worms ETC)
- **PERVERSE ENERGY** (Heat, cold, wind, dryness, radiation, magnetic ETC)
- **DEFICIENCY OR EXCESS OF NUTRIENTS**

When the stressor or stressors weaken the defenses of the body, the weakest link of the body (from nature or nurture) is most prone to distress and thus disease.

HEALTH THEN ENTER STRESSOR (TOXIN ETC)-enters

1. **ALARM Stage**: symptoms are the alarm, not the enemy, symptoms at first are related to the Stressor, later the dysfunction

   if stressor continues then

2. **ADAPTATION Stage**: symptoms go away as we adapt, the distress + disease penetrates deeper.

   You can have no symptoms and be very very sick.

   Being symptom free is not an indicator of Health
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SUPPRESSION AND OBSTRUCTION TO CURE

SOC Index:
The SCIO interview opens with a behavioral medicine interview. This is called the SOC Index. Named after the work of Samuel Hahneman the father of homeopathy, he said that the body heals itself with its innate knowledge. But the patient can suppress or obstruct the healing process with some behavior. Hahneman said that the worst way to interfere with the healing natural process was allopathy or synthetic drugs. Theses upset the natural healing process by unnatural intervention and regulation disturbance. Other ways to Suppress or Obstruct the Cure are smoking, mercury amalgams, stress, lack of water, exercise and many others. This behavioral survey then gives an index of SOC.

The scores relate to the risk of Suppression and Obstruction to the natural Cure. The higher the scores the more the Suppression and or Obstruction. The scores of 100 or lower are ideal. The SOC index questions are: mostly based on a scanine (1-10) answer. Some answers can be more.

These questions include:
1. Number of organs removed:
2. Number of Synthetic drugs taken currently:
3. Number of cigarettes you smoke a day
4. Number of metal or amalgam fillings in the teeth during the last year:
5. Number of street drugs used per month:
6. Number of known allergies:
7. Number of unresolved mental factors:
8. Are you responsible for you body and the diseases you have:
9. Amount of fat in diet as a percent:
10. Personal stress 0-10 10 being max. numbers can be larger than 10.
11. Number of sugar servings per day:
12. Number of exercise sessions 20 min or more per week:
13. Number of alcoholic drinks per day average:
14. Number of cups of coffee or any caffeine product:
15. Number of extreme toxic exposures last year:
16. Number of major injuries in past:
17. Number of major infections in past:
18. Number of glasses of water or natural fruit juice per day:
19. Number of pounds overweight:
20. Interpersonal stress 0-10 10 being max. Numbers can be larger than 10.
21. Job-school stress 0-10 10 being max. Numbers can be larger than 10.

Since the body’s weakest link is prone to disease from the stressors, any disease will improve with reduction of the stressors. If there is good nutrition and no excess or deficiency of nutrients, the body’s repair system improves. With stress reduction the Para-Sympathetic system becomes free to boast digestion and immunity as well as cellular repair. Some stressors can have more specific target diseases, such as cigarettes target the lungs primarily. But with the lack of systemic oxygen, any other weak link in the body from genetics or from life will be involved. Thus stress reduction is a universal therapy for all diseases. Reductionism of diseases via inaccurate and expensive current medical diagnostic means, are archaic, inaccurate, overly complex, non-productive, expensive, unsafe, risky and most often ineffective. Add to this the risk of side effects from SYNthetic drugs and we see the poor history of medicine. Nelson and Selye have plotted out a safe, inexpensive and effective new more modern medicine.
22. Money stress 0-10 10 being max. Numbers can be larger than 10.
23. Sickness stress 0-10 10 being max. Numbers can be larger than 10.
24. Family stress 0-10 10 being max. Numbers can be larger than 10.
25. Desire stress 0-10 10 being max. Numbers can be larger than 10.
26. Bowel detox stress 0-10 10 being max. Numbers can be larger than 10.
27. Sweat detox stress 0-10 10 being max. Numbers can be larger than 10.
28. Urine detox stress 0-10 10 being max. Numbers can be larger than 10.
29. Mucous detox stress 0-10 10 being max. Numbers can be larger than 10.
30. Skin detox stress 0-10 10 being max. Numbers can be larger than 10.
31. Sleep stress 0-10 10 being max. Numbers can be larger than 10.
32. Number of Root canals:

Each of these questions relates a behavioral burden on the body that can create a suppression or obstruction to the curative process. Scores below 50 are very good and show little risk of suppression or obstruction. Scores above 50 and below 100 are good and show some chance of suppression or obstruction to cure. Numbers above 100 are of risk.

Social Stress Inventory Form
DETERMINING THE SOURCES AND EXTENT OF STRESS IN YOUR LIFE THE SOURCES OF STRESS IN YOUR LIFE

Stress that is not handled properly can affect you in many ways. It can impair your ability to function mentally at home and at work. You can experience a variety of physical symptoms that can range from headaches to gastrointestinal upsets. Everyone experiences the negative effects of stress at various points in their lives. The danger lies in chronic stress overload. When your body is constantly in the fight or flight mode, you are bound to blow a fuse at your body’s weakest point. For some people the end result is a serious mental or physical illness.

This survey is designed to help you determine:
1) Your general level of stress.
2) Your level of stress at work.
3) Your physical symptoms of stress.
4) Your level of stress in interpersonal situations.

Take a look at the checklists that follow to see how stressed you are.

How Stressed Are You?
Directions: Indicate how often your feelings agree with the statements below. Scoring for each item is based on the following scale:
1 = Never feel that way
2 = Seldom feel that way
3 = Sometimes feel that way
4 = Frequently feel that way
5 = Always feel that way

How Stressed Are You? (General Feelings)

1. I worry a lot.
2. I feel unhappy.
3. All kinds of worrisome thoughts run through my mind.
4. There are times when I feel like crying for no reason.
5. I don’t know what’s the matter with me. I’m so irritable.
6. I have lost my ability just to sit around and do nothing.
7. I feel like I’m living inside a pressure cooker and about to explode.
8. Lately I’m bored with my life, job, friends and even my loved ones.
9. Deep inside, I’m dissatisfied and I don’t know why.
10. I forget things.

Total Score =

How Stressed Are You? (Work Performance)

1. I have trouble concentrating on my work.
2. It takes me forever to make decisions.
3. I can’t seem to stick to a job.
4. From the time I get there until I leave, I’m plain fidgety.
5. I overreact to things at work.
6. I let minor things get to me.
7. I procrastinate.
8. I can't seem to get organized.
9. I'm unclear about my role at work.
10. I do a lot of paper shuffling.

Total Score =

---

How Stressed Are you? (Physical Symptoms)

1. My heart races or pounds.
2. I have trouble catching my breath.
3. I get diarrhea.
4. I have headaches.
5. I have to urinate frequently.
6. I get dizzy for no reason.
7. I spend my nights awake, or it takes forever to fall asleep.
8. I'm tired.
9. My throat and/or mouth is often dry.
10. My stomach is tense.
11. I have no energy.
12. I'm chilly.
13. My neck (or shoulders, eye, chest, lower back, throat, hands) is sore, stiff or painful.
14. Lately I seem to have one bug or cold after another.
15. In the afternoon I run out of steam.
16. My posture is terrible.

Total Score =

---

How Stressed Are You? (Interpersonal Relations)

1. I startle easily when people come up on me.
2. Around people, I can't speak correctly.
3. I can't stand to be around a particular person (or group).
4. I can't stand to be around people when they are emotional.
5. I can't tell anyone how I feel.
6. I don't feel anything.
7. I can't laugh at myself.
8. Down deep, I'm not happy with my sex life.
9. I don't trust anybody.
10. I need help (food or drink) to be social.

Total Score =

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SCORING

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To compute overall average score, add up your total scores for each scale and divide by 46.

5 is the highest score, 1 the lowest.
Stress can make you fat

Researchers have found that stress from everyday life can contribute to obesity. The finding came from the Whitehall II study, which has followed thousands of civil servants since 1985, seeking to establish the effects on health of stress at work, job security, change in the workplace and lifestyle factors. The results of the study and its predecessor, Whitehall I, are now influencing policy discussions.

“This is the first study to show that daily stress influences the development of obesity,” said Professor Sir Michael Marmot, who has led the research for more than 20 years.

In the past year, Whitehall II has yielded many results. Another finding is that employees who report that they are treated unfairly at work by their supervisors suffer increased levels of mental illness. The researchers are now looking into the effects of unfair treatment at work on rates of sick leave, inflammation in the body and sleeping difficulties.

In closely related research, results showed that reports of stress at work were directly related to a combination of health problems known as the metabolic syndrome that makes people more likely to suffer diabetes and heart disease. “Obesity rates are higher among lower socioeconomic groups. We found there were greater reports of work stress among lower occupational grades, which may explain some of the reason for this,” said Professor Marmot.

Stress Clinical evaluation 2009

The work of the Canadian genius medical doctor Hans Selye, has shown the world the pervasive and comprehensive effects of stress on the body. Stress and stressors weaken the bodies immune system and generally weaken the whole defense system, thus the genetic or systemic weak link of the body will give out first from continued stress. Reducing stressors helps all diseases. Our system uses a health questionnaire to assay behavior or lifestyle stressors and to educate the client to reduce the stress burden.

The best way for us to review the EPFX/SCIO policy on stress reduction is to introduce the philosophical father of the device, the famous Canadian Doctor Hans Selye. A current updated literature review follows as well as our own sponsored independent research.

Wikipedia

Hans Hugo Bruno Selye, CC (Hungarian: Selye János) (January 26, 1907 — October 16, 1982) was a Canadian endocrinologist of Austro-Hungarian origin and Hungarian ethnicity. Selye did much important factual work on the hypothetical non-specific response of the organism to stressors. While he did not recognize all of the many aspects of glucocorticoids, Selye was aware of this response on their role. Some commentators considered him the first to demonstrate the existence of biological stress.

Hans Selye, or in the Hungarian Selye János

Hans Selye was born in Vienna in 1907, of Hungarian descent, but did most of his work in Canada. As early as his second year of medical school (1926), he began developing his now-famous theory of the influence of stress on people’s ability to cope with and adapt to the pressures of injury and disease. He discovered that patients with a variety of ailments manifested many similar symptoms, which he ultimately attributed to their bodies’ efforts to respond to the stresses of being ill. He called this collection of symptoms--this separate stress disease--stress syndrome, or the general adaptation syndrome (GAS).

He spent a lifetime in continuing research on GAS and wrote some 30 books and more than 1,500 articles on stress and related problems, including Stress without Distress (1974) and The Stress of Life (1956). So impressive have his findings and theories been that some authorities refer to him as “the Einstein of medicine.” His medical genius has gone unrewarded for his work did not depend on any synthetic drug solution in an overly reductionistic style of modern medicine. He has shown that at first the symptoms of disease are alarm reactions to stressors. If the stressor continues the person’s body adapts to the alarm reaction and the symptom goes away. The stressor continues to develop disease but the alarm reaction (symptom) goes away. Thus as Selye has said “being symptom free is not an indicator of health, and a medicine based on symptoms is irregular .”

A physician and endocrinologist with many honorary degrees for his pioneering contributions to science, Selye also served as a professor and director of the Institute of Experimental Medicine and Surgery at the University of Montreal. More than anyone else, Selye has demonstrated the role of emotional and biological stressor responses in causing or combating much of the wear and tear experienced by human beings throughout their lives. He died in 1982 in Montreal, where he had spent 50 years studying the causes and consequences of non-specific stress as a universal
The Nature of Stress
by Hans Selye
International Institute of Stress
University of Montreal
Montreal, Quebec, Canada

The Nature of Stress was submitted to Dr. Nelson and his other colleagues shortly before Selye’s death. Dr. Nelson knew him well having been worked with Selye and having shared his lecture platform on several occasions.

This treatise is presented as prepared by Hans Selye as if he is still living, which indeed he is through his monumental works, for Dr. Stress, as he was occasionally entitled, will live forever since so many believe that Hans Selye is the foremost medical researcher of the 20th century.

About the Author: Dr. Hans Selye is without question one of the great pioneers of medicine. His famous and revolutionary concept of stress opened countless avenues of treatment through the discovery that hormones participate in the development of many degenerative diseases, including cancer, arteriosclerosis, heart disease, diabetes, and convulsions. The Pasteur Institute in Paris named him the discoverer of a “general adaptation syndrome” and the world-renowned physiologist Dr. W. H. Ballinger declared that “Dr. Selye has solved the problem of stress.”

Stress is not nervous tension. Stress reactions do occur in lower animals and even in plants, which have no nervous system. The general manifestations of an alarm reaction can be induced by mechanically damaging a denervated limb. Indeed, stress can be produced under deep anesthesia in patients who are unconscious, and even in cell cultures grown outside the body.

Stress is an emergency discharge of hormones from the adrenal medulla. An adrenaline discharge is frequently seen in acute stress affecting the whole body, but it plays no conspicuous role in generalized inflammatory diseases (arthritis, tuberculosis) although they can also produce considerable stress. Nor does an adrenaline discharge play any role in “local stress” reactions, limited to directly injured regions of the body.

Stress is not nervous tension. Stress is not the nonspecific result of damage only. Normal and even pleasant activities - a game of tennis or a passionate kiss - can produce considerable stress without causing conspicuous damage.
5. Stress is not the deviation from homeostasis, the steady state of the body. Any specific biologic function, e.g., the perception of sound or light, the contraction of a muscle, eventually causes marked deviations from the normal resting state in the active organs. This is undoubtedly associated with some local demand for increased vital activity, but it can cause only "local stress" and even this does not necessarily parallel the intensity of the specific activity.

6. Stress is not that which causes an alarm reaction. The stressor does that, not stress itself.

7. Stress is not identical with the alarm reaction or with the G.A.S. as a whole. These are characterized by certain measurable organ changes which are caused by stress.

8. Stress itself is not a nonspecific reaction. The pattern of the stress reaction is very specific: it affects certain organs (e.g., the adrenal, the thymus, the gastrointestinal tract) in a highly selective manner.

9. Stress is not a reaction to a specific thing. The stress response can be produced by virtually any agent.

10. Stress is not necessarily undesirable. It all depends on how you take it. The stress of failure, humiliation, or infection is detrimental; but that of exhilarating, creative, successful work is beneficial. The stress reaction, like energy consumption, may have good or bad effects.

11. Stress cannot and should not be avoided. Everybody is always under some degree of stress. Even while quietly asleep our heart must continue to beat, our lungs to breathe, and even our brain works in the form of dreams. Stress can be avoided only by dying. The statement "He is under stress" is just as meaningless as "He is running a temperature." What we actually refer to by means of such phrases is an excess of stress or of body temperature.

If we consider these points, we may easily be led to conclude that stress cannot be defined, and that perhaps the concept itself is just not sufficiently clear to serve as the object of scientific study. Nevertheless, stress has a very clear, tangible form. Countless people have actually suffered or benefited from it. Stress is very real and concrete indeed, and is manifested in precisely measurable changes within the body. So before we proceed to a formal definition of the nature of stress, we will describe these manifestations.

What stress is

Mechanism. The workings of stress are extremely complex (see Figure). Apart from specific stimuli, which need not be discussed here, the first effect of any agent or demand made upon the body - be it running up a flight of stairs, dealing with a viral infection, or performing a dance - is to produce a nonspecific stimulus (the agent's "stressor effect"). This may be a nervous impulse, a chemical substance or lack of an indispensable metabolic factor; it is referred to simply as the "first mediator," because we know nothing about its nature. We are not even certain that it has to be an excess or deficiency of any particular substance; it is possible that various derangements of homeostasis can activate the stress mechanism.

Although we have still to identify the first mediator(s), we do know that eventually stress acts upon the hypothalamus and particularly upon the median eminence (ME). This action appears largely to be mediated through or modified by nervous stimuli coming from the cerebral cortex, the reticular formation and the limbic system (especially the hippocampus and amygdala). The incoming nervous stimuli reach certain neuroendocrine cells, most of which are located in the ME. These act as "transducers," transforming nervous signals into a humoral messenger, the corticotrophic hormone releasing factor (CRF), which can be demonstrated histochemically in the ME region and can also be extracted from it. Oddly enough, the posterior pituitary contains the highest concentration of CRF, and it has been isolated from this source in pure form, thus permitting the determination of its chemical formula as a polypeptide which subsequently was synthesized. Yet we have no conclusive proof that the CRF-active material extracted from the hypothismals is identical with that obtained from the posterior lobe since only the structure of the latter has been definitely ascertained. Although vasopressin (antidiuretic hormone) possesses considerable CRF activity it is not identical with CRF; this has been shown by the well-documented differences in their chemical structure and physiologic activity.

CRF reaches the anterior lobe through the hypotalamo-hypophyseal portal system that originates in the ME region within a network of capillaries into which CRF is discharged by the local neuroendocrine cells. It is then carried down through the larger veins of the pituitary stalk to a second capillary plexus in the pituitary.

The hypothalamus does not stimulate the adrenocorticotropic hormone (ACTH) secretion of the anterior lobe through nervous pathways descending in the pituitary stalk but rather through blood-borne substances carried by way of the portal veins. That is why transection of the stalk inhibits the ACTH secretion only before vascular connections between the hypothalamus and the gland are reestablished, i.e., if regeneration of the vessels is prevented by interposing a plate between the cut ends of the stalk, this pathway is permanently blocked.

Both in vivo and in vitro experiments have proven that CRF elicits a discharge of ACTH from the adenohypophysis into the general circulation. Upon reaching the adrenal cortex, it causes secretion of corticoids, mainly glucocorticoids such as cortisol or corticosterone. These induce glycogenolysis, thereby supplying a readily-available source of energy for the adaptive reactions necessary to meet the demands faced by the body. In addition, they facilitate various other enzymatically regulated adaptive metabolic responses and suppress immune reactions as well as inflammation, assisting the body to resist with potential pathogens (syntoxic reactions). Furthermore, the glucocorticoids are responsible for the thymic lymphatic involution, eosinopenia and lymphopenia characteristic of acute stress. Curiously, glucocorticoids are needed for the acquisition of adaptation primarily during the alarm reaction, but not so much to maintain the adjustment during the stage of resistance. ACTH plays a comparatively minor role in the secretion of mineralocorticoids, such as aldosterone, which is regulated mainly by the renin-hypertension system and the blood electrolytes, whose homeostasis is in turn influenced by them.

This chain of events is cybernetically controlled by several biofeedback mechanisms. Whether an excess of CRF can inhibit its own endogenous secretion is still doubtful because its lifespan in the circulating blood is very short. On the other hand, there is definite proof of an ACTH feedback (short-loop feedback) by a surplus of the hormone, which returns to the hypothalamo-pituitary system and inhibits further ACTH production. We have even more evidence to substantiate the existence of a corticoid feedback mechanism (long-loop feedback) in that a high blood corticoid level similarly inhibits ACTH secretion. It is still not quite clear to what extent these feedbacks act upon the neuroendocrine cells of the hypothalamus, the adenohypophysis or both. (Hence, in the Figure the corresponding arrowheads merely point towards the hypothalamo-hypophyseal region...
Another major pathway involved in the stress mechanism is carried through the catecholamines liberated under the influence of an acetylcholine discharge, at autonomic nerve endings and in the adrenal medulla. The chromaffin cells of the latter secrete epinephrine, which is of considerable value in that it stimulates mechanisms of general utility to meet various demands for adaptation. Thus it provides readily available sources of energy by forming glucose from glycogen depots and free fatty acids from the triglyceride stores of adipose tissue; it also quickens the pulse, raises the blood pressure to improve circulation into the musculature, and stimulates the CNS. In addition, epinephrine accelerates blood coagulation and thereby protects against excessive hemorrhage should wounds be sustained in conflicts. All of this is helpful in meeting the demands, whether they call for fight or flight.

At this point it will be helpful to discuss two apparent objections to accepting the concept of a single stereotyped response to stress:

1. Qualitatively different agents of equal toxicity or stressor potency do not necessarily elicit exactly the same reactions in different people.

2. Even the same degree of stress, induced by the same agent, may produce different effects and even lesions in different individuals.

3. The effects specific to any given agent usually modify the effects and manifestations of the general stress syndrome. (Thus, it took many years to recognize and prove the existence of the latter.)

4. The fact that the state of stress, even if due to the same agent, can cause different effects in different individuals, has been traced to “conditioning factors” that can selectively enhance or inhibit one or the other stress effect. This conditioning may be endogenous (genetic predisposition, age or sex) or exogenous (treatment with certain hormones, drugs, or dietary factors.) (See Figure.) Under the influence of such conditioning factors, a normally well-tolerated degree of stress can even become pathogenic, selectively affecting those parts of the body that are particularly sensitized both by those conditioning factors and by the specific effects of the eliciting agent, just as physical tensions of equal strength in different chains will break the particular link that is the weakest as a result of internal or external factors.

The foregoing processes are the principal ones involved in the stress reaction, but by no means the only ones. As well, the level of STH, the growth hormone, may rise, and changes in the output of thyroid hormones of the ovary or testis may take place.

Stressors. The agents or demands that evoke this coordinated response which I have designated as the “stressed response” are referred to, quite naturally, as stressors; and of course something is a stressor to the same degree that it calls forth the syndrome.

When the stressor in question is some organism or substance foreign to the body, the curative process resulting from the stress reaction can take either of two forms, according to whether the pathogen causes trouble directly or indirectly. Direct pathogens cause disease irrespective of our body’s reaction, whereas indirect pathogens produce damage only through the exaggerated and purposeless defensive responses they provoke. If a patient accidentally exposes his hand to a strong acid, alkali, or boiling water, damage will occur irrespective of his reactions. Because all these are direct pathogens; they would cause damage even to the body of a dead man who obviously could not put up any vital defense reactions. On the other hand, most common inflammatory irritants, including allergens, are essentially indirect pathogens, which do not themselves cause disease, but are damaging only by stimulating an inopportune and harmful fight against what is innocuous.

During evolution, immunologic reactions which lead to destruction of microbes, grafts, and other foreign tissues undoubtedly developed as useful defensive mechanisms against potentially dangerous foreign materials. However, when - as in the case of many allergens, heart transplants, etc. - the attack against the “foreign” agent is unnecessary or even harmful, man can improve upon the wisdom of Nature by suppressing this hostility. Nevertheless, when the aggressor is dangerous, the defensive reaction should not be suppressed but, if possible, increased above the normal level, which can be done, for ex ample, by cataleptic substances that carry the chemical message to the tissues to destroy the invaders even more actively than would normally be the case.

However, stressors are not exclusively physical in nature. Emotions, e.g., love, hate, joy, anger, challenge and fear, also call forth the changes characteristic of the stress syndrome.

Stress and disease. In general, the hormonal responses outlined above aid adaptation to environmental change or stimuli; but they are sometimes the cause of disease, especially if the state of stress is prolonged or intense. In this latter case, the body goes through the three stages of what I call the “general adaptation syndrome” (G.A.S.). The first is the alarm reaction, characterized by the changes above described. Of course, if the stressor (stress-producing agent) is so severe that continued exposure is incompatible with life, the organism will die within a few hours during this stage; otherwise, a stage of adaptation of resistance will ensue, since no organism can be maintained continuously in a state of alarm. The adaptive stage is characterized by the vanishing or diminishing of the initial symptoms, since the body has achieved optimal adaptation. After still more prolonged exposure to the stressor, however, this acquired adaptation is lost and a third stage of exhaustion is entered into, which, unless the organism receives emergency aid from some outside source, leads to death. Apparently, the adaptability of an organism is finite.

Also of interest is the routine picture of endocrine gland disturbance that Selway (The Stress of Life, New York, McGraw-Hill, Inc., 1956) so ably depicted in the General Adaptation Syndrome brought on by any Stress to the body.”

Definition. Let us see now whether the following definition will fit all our facts:

Stress is the state manifested by a specific syndrome which consists of all the nonspecifically-induced changes within a biologic system. Thus, stress has its own characteristic form and composition, but no particular cause. The elements of its form are the visible changes due to stress, which are addictive indicators expressing the sum of all the different adjustments that are going on in the body at any time.

The above is essentially an “operational definition”; it tells what must be done to produce and recognize stress. A state can be recognized only by its manifestations; you have to observe a great many living beings exposed to a variety of agents before you can see the shape of stress as such. Those changes which are induced by only one or the other agent must first be rejected; if you then take what is left - that which is induced by many agents - you have uncovered stress itself.

For simplicity’s sake we have attempted to state the essence of this concept in the following, less
Stress is the nonspecific response of the body to any demand, whether is is caused by, or results in, pleasant or unpleasant conditions. Stress as such, like temperature as such, is all-inclusive, embodying both the positive and the negative aspects of these concepts.

Within the general concept of stress, however, we must differentiate between distress (from the Latin dis = bad, as in dissonance, disagreement), and eustress (from the Greek eu = good, as in euphoria, euphoria). During both eustress and distress the body undergoes virtually the same nonspecific responses to the various positive or negative stimuli acting upon it. However, the fact that eustress causes much less damage than distress graphically demonstrates that it is “how you take it” that determines, ultimately, whether you can adapt successfully to change.

The general adaptation syndrome

Definition. While stress is reflected by the sum of the nonspecific changes as they develop throughout time during continued exposure to a stressor, the G.A.S. encompasses all nonspecific changes as they occur during continued exposure to a stressor. One is a snapshot, the other a motion picture of the response to demands.

Thus, the G.A.S. may be defined as the manifestation of stress in the whole body, as they develop in time. As we have seen, a fully-developed G.A.S. consists of three stages: the alarm reaction, the stage of resistance, and the stage of exhaustion. Yet it is not necessary for all three stages to develop before we can speak of G.A.S. Only the most severe stress leads rapidly to the stage of exhaustion and death. Most of the physical or mental exertions, infections, and other stressors, which act upon us during a limited period, produce changes corresponding only to the first and second stages: at first they may upset and alarm us, but then we adapt to them.

Normally, in the course of our lives, we go through these first two stages many, many times. Otherwise we could never become adapted to all the activities and demands which are man’s lot.

Even the stage of exhaustion does not always need to be irreversible and complete, as long as it affects only parts of the body. For instance, running produces a stress situation, mainly in our muscles and cardiovascular system. To cope with this, we first have to limber up and get these organs ready for the task at hand; then for a while we will be at the height of efficiency in running, but eventually exhaustion will set in. This could be compared with an alarm reaction, a stage of resistance, and a stage of exhaustion, all limited primarily to the muscular and cardiovascular system. But such exhaustion is reversible; after a good rest we will be back to normal.

Most human activities go through three stages analogous to those of the G.A.S.: we first have to get into the swing of things, then we get pretty good at them, but finally we tire and lose our acquired efficiency. This triphasic evolution of adaptation is quite characteristic also of all bodily activities, including those that only the physician can fully appraise; for instance, of inflammation. If some virulent microbes get under the skin, they first cause what we call acute inflammation (reddening, swelling, pain); then follows chronic inflammation (ripening of a boil or abscess); and finally an exhaustion of tissue resistance takes place, which permits the inflamed, purulent fluid to be evacuated (breaking through of an abscess).

The diseases of adaptation. Many maladies are due not so much to what happens to us as to our inability to adapt, and they have therefore been called “diseases of adaptation.” The most common of such diseases are peptic ulcers in the stomach and upper intestine, high blood pressure, heart accidents, and nervous disturbances. Of course, any event makes demands upon us and, hence, causes some stress, but it is only people who cannot cope, either because of innate defects or lack of knowledge, who develop stress diseases.

Yet this is a relative concept. No malady is just a disease of adaptation. Nor are there any disease producers which can be so perfectly handled by the organism that maladaptation plays no part in their effects upon the body. Such agents would not produce disease. This haziness in its delimitation does not interfere with the practical utility of our concept. We must put up with the same lack of precision whenever we have to classify any other kind of disease. There is no pure heart disease, in which all other organs remain perfectly undisturbed, nor can we ever speak of a pure kidney disease or a pure nervous disease in this sense.

The concept of adaptation energy. The selective exhaustion of muscles, eyes, or inflamed tissue all represent final stages in local adaptation syndromes (L.A.S.) only. Several of these may develop simultaneously in various parts of the body; in proportion to their intensity and extent, they can activate the G.A.S. mechanism. It is when the whole organism is exhausted - through senility at the end of a normal life-span, or through the accelerated aging caused by stress - that we enter into the (fatal) stage of exhaustion of the G.A.S.

Apparently, we have hidden reserves of adaptability, or adaptation energy, in ourselves throughout the body. As soon as local stress consumes the most readily accessible local reserves, local exhaustion sets in and activity in the strained part must stop. This is an important protective mechanism because, during the period of rest thus enforced, more adaptation energy can be made available, either from less readily accessible local stores or from reserves in other parts of the body. Only when all of our adaptability is used up will irreversible, general exhaustion and death follow.

Adaptation energy and a natural code of behavior

There seem to be close interrelations between the G.A.S. and aging. We have already mentioned that several local adaptation syndromes may develop consecutively or even simultaneously in the same individual. People can get used to a number of things (cold, heavy muscular work, worries), which at first had a very alarming effect; yet, upon prolonged exposure, sooner or later all resistance breaks down and exhaustion sets in. The term “adaptation energy” has been coined for that which is consumed during continued adaptive work, to indicate that it is something different from the caloric energy we receive from food; but this is only a name, and even now we still have no precise concept of what this energy might be. Further research along these lines would seem to hold great promise, since we appear to touch upon the fundamentals of fatigue and aging.

Seemingly, each individual inherits a certain amount of adaptation energy, the magnitude of which is determined by his genetic background, his parents. He can draw upon this capital thrifty for a long but monotonously uneventful existence, or he can spend it lavishly in the course of a stressful, intense, but perhaps more colorful and exciting life. In any case, there is just so much of it, and he must budget accordingly.

How can we, as individuals, best manage our limited store of this energy? Surely scientists have found enough evidence to justify trying to develop the fundamentals of a code of behavior based
only on the laws of Nature, though we may need much more scientific work to learn how to apply them in our daily life and to make them easily understandable.

In the light of what my own laboratory and clinical study of somatic diseases has taught me concerning stress, I have tried to arrive at a code of ethics based not on the strictures and traditions of society, inspiration, or blind faith in the infallibility of a particular prophet, religious leader or political doctrine, but on the scientifically verifiable laws that govern the body’s reactions in maintaining homeostasis and living in satisfying equilibrium with its environment. By means of such a code, we can adjust our personal reactions to enjoy fully the eustress of success and accomplishment without suffering the distress commonly generated by frustrating friction and purposeless, aggressive behavior against our surroundings.

It is a biologic fact that man - like the lower animals - must fight and work for some goal that he considers worthwhile. We must use our innate capacities to enjoy the eustress of fulfillment. Only through effort, often aggressive, egoistic effort, can we maintain our fitness and assure our homeostatic equilibrium with both the social and the inanimate world. To achieve this state, our activities must earn lasting results; the fruits of work must be cumulative and must provide a capital gain to meet future needs. To succeed, we have to accept the scientifically established fact that man has an inescapable natural urge to work egoistically for things that can be stored to strengthen his homeostasis in the unpredictable situations with which life may confront him.

We should not combat or be ashamed of these instincts. We can do nothing about having been built to work, and it is primarily for our own good. Organs that are not used (muscles, bones, even the brain) undergo inactivity atrophy, and every living being looks out first of all for itself. Neither should we feel guilty because we work for treasures that can be stored to ensure our future homeostasis. Hoarding is a vitally important biologic instinct that we share with animals such as ants, bees, squirrels and beavers. In man, the urge first manifests itself when children start to gather match boxes, shells or stickers; it continues when adults collect stamps or coins. Such a universal drive cannot be an artificial, indoctrinated tradition.

On the other hand, there is no example in Nature of a creature guided exclusively by altruism and the desire to protect others. In fact, a code of universal altruism would be highly immoral, since it would expect others to look out for us more than themselves. Of course, “Love thy neighbor as thyself” is a command full of wisdom; but, as originally expressed, it is incompatible with biologic laws; no one needs to develop an inferiority complex if he cannot love all his fellow men on command.

What are the ingredients of a code of ethics that accepts egoism and working to hoard personal capital as morally correct? After four decades of clinical and laboratory research, I would summarize the most important principles briefly as follows:

1. Find your own stress level - the speed at which you can run toward your own goal. Make sure that both the stress level and the goal are really your own, an not imposed upon you by society, for only you yourself can know what you want and how fast you can accomplish it. There is no point in forcing a turtle to run like a racehorse or in preventing a racehorse from running faster than a turtle because of some “moral obligation.” The same is true of people.

2. Be an altruistic egoist. Do not try to suppress the natural instinct of all living beings to look after themselves first. Yet the wish to be of some use, to do some good to others, is also natural.

We are social beings, and everybody wants somehow to earn respect and gratitude. You must be useful to others. This gives you the greatest degree of safety, because no one wishes to destroy a person who is useful.

3. Earn thy neighbor’s love. This is a contemporary modification of the maxim “Love thy neighbor as thyself.” It recognizes that not all neighbors are lovable and that it is impossible to love on command.

Perhaps two short lines can encapsulate what I have discovered from all my thought and research:

**Fight for your highest attainable aim.**
**But do not put up resistance in vain.**

So far as possible, I myself have followed this philosophy, and it has made my life a happy one. Frankly, in looking back, I realize that I have not always succeeded to perfection, but this has been due to my own shortcomings, not those of the philosophy. As I have often said. The builder of the best racing car is not necessarily its best driver.

**Notes**

Undoubtedly, in man, with his highly developed central nervous system (CNS), emotional arousal is one of the most frequent activators. Yet it cannot be regarded as the only factor, since typical stress reactions can occur in patients exposed to muscle fatigue, trauma, hemorrhage, etc. while under deep anesthesia. Indeed anesthetics themselves are commonly used in experimental medicine to produce stress, and 11 stress of anesthesia” is a serious problem in clinical surgery.

**Bibliography**

This is THE Medical Concern

Towards a new Safe and Effective truly Modern Medicine

This is a new common sense method of modern medicine, that is Health motivated not just symptom control. We respect the complexity and the whole body, and respect the Natural process of health.

Health is Ease of Flow, Stressors block Flow, Stress is more than Just personal stress. Stress Reduction is the key to Medicine.

Major Stressors or Causes of Disease include:
- LACK OF AWARENESS OR LACK OF EDUCATION
- STRESS
- HEREDITY
- MENTAL FACTORS (Greed, anger, delusion arrognace ETC)
- ALLERGY
- BAD POSTURE
- TOXICITY
- TRAUMA INJURY
- PATHOGENS (MICRO-ORGANISMS, Bacteria, fungus, virus, prions, worms ETC)
- PERVERSE ENERGY (Heat, cold, wind, dryness, radiation, magnetic ETC)
- DEFICIENCY OR EXCESS OF NUTRIENTS

When the stressor or stressors weaken the defenses of the body, the weakest link of the body (from nature or nurture) is most prone to distress and thus disease.

HEALTH THEN ENTER STRESSOR (TOXIN ETC)-enters

1. ALARM Stage- symptoms are the alarm, not the enemy, symptoms at first are related to the Stressor, later the dysfunction

if stressor continues then

2. ADAPTATION Stage: symptoms go away as we adapt, the distress + disease penetrates deeper.

You can have no symptoms and be very very sick.

Being symptom free is not an indicator of Health

if stressor continues then

3. EXHAUSTION Stage: the stressors burden the weakest organs

if stressor continues then

a. FUNCTIONAL first the stressors effect the weakest organ function

if stressor continues then

b. ORGANIC then the weak organs start to swell or shrink

if stressor continues then

4. DEATH cellular, organ, organ system, organism death

1. Reduce the Causes of Disease, Change Behavior, get patients to Care, get the nail out of the tire

2. Repair the organs weakened by the Causes. Restore Health. Fix the Tire

3. Unblock the Blockages to energy, nutrition, Oxygen, waste, Parana, acupuncture, nerval FLOW

4. Treat the symptoms with natural means before resorting to Synthetic. Use foods, exercise, herbals, homeopathics any and all natural means before resulting to Synthetics

5. Balance the metabolic typing or Constitutional Imbalances. Treat the patient as an Individual Whole
Since the body’s weakest link is prone to disease from the stressors, any disease will improve with reduction of the stressors. If there is good nutrition and no excess or deficiency of nutrients, the body’s repair system improves. With stress reduction the Para-Sympathetic system becomes free to boast digestion and immunity as well as cellular repair. Some stressors can have more specific target diseases, such as cigarettes target the lungs primarily. But with the lack of systemic oxygen, any other weak link in the body from genetics or from life will be involved. Thus stress reduction is a universal therapy for all diseases. Reductionism of diseases via inaccurate and expensive current medical diagnostic means, are archaic, inaccurate, overly complex, non-productive, expensive, unsafe, risky and most often ineffective. Add to this the risk of side effects from synthetic drugs and we see the poor history of medicine. Nelson and Selye have plotted out a safe, inexpensive and effective new more modern medicine.

SUPPRESSION AND OBSTRUCTION TO CURE
SOC Index:
The SCIO interview opens with a behavioral medicine interview. This is called the SOC Index. Named after the work of Samuel Hahneman the father of homeopathy, he said that the body heals itself with its innate knowledge. But the patient can suppress or obstruct the healing process with some behavior. Hahneman said that the worst way to interfere with the healing natural process was allopathy or synthetic drugs. These upset the natural healing process by unnatural intervention and regulation disturbance. Other ways to suppress or obstruct the cure are smoking, mercury amalgams, stress, lack of water, exercise and many others. This behavioral survey then gives an index of SOC.

The scores relate to the risk of Suppression and Obstruction to the natural Cure. The higher the scores the more the Suppression and or Obstruction. The scores of 100 or lower are ideal. The SOC index questions are: mostly based on a scanine (1-10) answer. Some answers can be more. These questions include:

1. Number of organs removed:
2. Number of Synthetic drugs taken currently:
3. Number of cigarettes you smoke a day
4. Number of metal or amalgam fillings in the teeth during the last year:
5. Number of street drugs used per month:
6. Number of known allergies:
7. Number of unresolved mental factors:
8. Are you responsible for you body and the diseases you have:
9. Amount of fat in diet as a percent:
10. Personal stress 0-10 10 being max. numbers can be larger than 10.
11. Number of sugar servings per day:
12. Number of exercise sessions 20 min or more per week:
13. Number of alcoholic drinks per day average:
14. Number of cups of coffee or any caffeine product:
15. Number of extreme toxic exposures last year:
16. Number of major injuries in past:
17. Number of major infections in past:
18. Number of glasses of water or natural fruit juice per day:
19. Number of pounds over weight:
20. Interpersonal stress 0-10 10 being max. numbers can be larger than 10.
21. Job-school stress 0-10 10 being max. numbers can be larger than 10.
22. Money stress 0-10 10 being max. numbers can be larger than 10.
23. Sickness stress 0-10 10 being max. numbers can be larger than 10.
24. Family stress 0-10 10 being max. numbers can be larger than 10.
25. Desire stress 0-10 10 being max. numbers can be larger than 10.
26. Bowel detox stress 0-10 10 being max. numbers can be larger than 10.
27. Sweat detox stress 0-10 10 being max. numbers can be larger than 10.
28. Urine detox stress 0-10 10 being max. numbers can be larger than 10.
29. Mucous detox stress 0-10 10 being max. numbers can be larger than 10.
30. Skin detox stress 0-10 10 being max. numbers can be larger than 10.
31. Sleep stress 0-10 10 being max. numbers can be larger than 10.
32. Number of Root canals:

Each of these questions relates a behavioral burden on the body that can create a suppression or obstruction to the curative process. Scores below 50 are very good and show little risk of suppression or obstruction. Scores above 50 and below 100 are good and show some chance of suppression or obstruction to cure. Numbers above 100 are of risk.

Social Stress Inventory Form
DETERMINING THE SOURCES AND EXTENT OF STRESS IN YOUR LIFE

Stress that is not handled properly can affect you in many ways. It can impair your ability to function mentally at home and at work. You can experience a variety of physical symptoms that can range from headaches to gastrointestinal upsets. Everyone experiences the negative effects of stress at various points in their lives. The danger lies in chronic stress overload. When your body is constantly in the fight or flight mode, you are bound to blow a fuse at your body’s weakest link.
point. For some people the end result is a serious mental or physical illness.

This survey is designed to help you determine:

1) Your general level of stress.
2) Your level of stress at work.
3) Your physical symptoms of stress.
4) Your level of stress in interpersonal situations.

Take a look at the checklists that follow to see how stressed you are.

How Stressed Are You?
Directions: Indicate how often your feelings agree with the statements below. Scoring for each item is based on the following scale:
1 = Never feel that way
2 = Seldom feel that way
3 = Sometimes feel that way
4 = Frequently feel that way
5 = Always feel that way

How Stressed Are You? (General Feelings)

1. I worry a lot.
2. I feel unhappy.
3. All kinds of worrisome thoughts run through my mind.
4. There are times when I feel like crying for no reason.
5. I don't know what's the matter with me. I'm so irritable.
6. I have lost my ability just to sit around and do nothing.
7. I feel like I'm living inside a pressure cooker and about to explode.
8. Lately I'm bored with my life, job, friends and even my loved ones.
9. Deep inside, I'm dissatisfied and I don't know why.
10. I forget things.

Total Score =

How Stressed Are You? (Work Performance)

1. I have trouble concentrating on my work.
2. It takes me forever to make decisions.
3. I can't seem to stick to a job.
4. From the time I get there until I leave, I'm plain fidgety.
5. I overreact to things at work.
6. I let minor things get to me.
7. I procrastinate.
8. I can't seem to get organized.
9. I'm unclear about my role at work.
10. I do a lot of paper shuffling.

Total Score =

How Stressed Are You? (Physical Symptoms)

1. My heart races or pounds.
2. I have trouble catching my breath.
3. I get diarrhea.
4. I have headaches.
5. I have to urinate frequently.
6. I get dizzy for no reason.
7. I spend my nights awake, or it takes forever to fall asleep.
8. I'm tired.
9. My throat and/or mouth is often dry.
10. My stomach is tense.
11. I have no energy.
12. I'm chilly.
13. My neck (or shoulders, eye, chest, lower back, throat, hands) is sore, stiff or painful.

Total Score =
14. Lately I seem to have one bug or cold after another.
15. In the afternoon I run out of steam.
16. My posture is terrible.

Total Score =

How Stressed Are You? (Interpersonal Relations)

1. I startle easily when people come up on me.
2. Around people, I can't speak correctly.
3. I can't stand to be around a particular person (or group).
4. I can't stand to be around people when they are emotional.
5. I can't tell anyone how I feel.
6. I don't feel anything.
7. I can't laugh at myself.
8. Down deep, I'm not happy with my sex life.
9. I don't trust anybody.
10. I need help (food or drink) to be social.

Total Score =

SCORING

Category | No. | Total Score | Average Score
--- | --- | --- | ---
General | 10 | | |
Work | 10 | | |
Physical | 16 | | |
Interpersonal | 10 | | |

ALL SCALES | 46 |

To compute overall average score, add up your total scores for each scale and divide by 46.

5 is the highest score, 1 the lowest.

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Stress Detection and Stress Reduction as New Adjunct to Modern Medicine

By Prof William Nelson

International Journal of the Medical Science of Homeopathy

INTRODUCTION

The Bible says "that as a Man thinketh, So is He" Jesus when asked about what food to eat, said it is not what goes into the mouth that defiles some one but what comes out. In fact the Bible, Koran, and all of the religious books abound with references of how the mind effects the body. Prayer and it’s ability to help people is a basic believe. This was all general knowledge many millennia ago. Our science has no proven these believes even further. But today the antiquated science of medicine and small minded doctors have a hard time accepting this fact. Physician Heal Thyself. Mendeleev made a chart of the elements based on his observations. Then later it would be learned that this organization of the chemical elements was because of the quantum states of the outer electrons. Quantum theory alone gave us an understanding of chemistry. But quantum theory has the observer effect where the mind of the observer can effect the outcome. Medicine seems to have an unstable phobia and an over compensative distaste for the powers of the mind.

Science has developed a basic understanding of electronics several centuries ago. Electronics made a major boom in technology, it allowed us to understand so much of the world. But modern medicine has resisted an electrical analysis of the body. Yes technology allows for tech measures of the body, but there is little analysis of the body electric. Energetic medicine of Dr. Nelson defines a process to explain the body electric. But the modern medicine fixation on the financial hold of the synthetic chemical industry, has prevented a progression of medicine into the modern age.

Nearly a century ago, quantum research overturned the 17th century mechanistic paradigm of "world as a machine," within which phenomena are to be understood by reducing them to their parts. Reductionism worked for making cars, buildings and was so valuable to our society. But reductionism fails in a complex situation.

Chaos theory gave us an enlightenment that reductionism does not work in complex systems like the human body. Fractal dynamics teach us that the reductionistic model fails in biology.

In an overly complex closed system Fractal dynamics are unpredictable. Reductionism is completely invalid.

The Rules of a Fractal System are 1. nothing ever repeats exactly as before, 2. small changes can prompt very large and dramatic effects, 3. observer effects and the mind can have effect on a complex fractal system (prayer works). Reductionism is the process of taking a complex situation and reducing it to simple terms. We reduce the weight of a building to a simple vector to calculate the strength of a support wall. Reductionism has been responsible for allowing us to build cars, boats, machines, etc. But reductionism fails in very complex situations. The human body has over 200,000,000,000 cells. Each cell is more complex that we can presently imagine in our verbal
minds. This complexity makes our bodies a fractal. Reductionism can not work for medical analysis.

When the drug companies wanted to test a blood pressure medication they reduce the patient from the complexity of life to a simple variable, blood pressure. They test the blood pressure before, the pre test. Give an intervention, the drug. and then test the blood pressure again, the post test. They do not test the side effects. they observe them. This is important because they can only observe gross side effects and still they get by. If they would have tested the blood sugar, they would have found out that all patients taking certain blood pressure medications get some degree of diabetes every one of them. If they were to test all variables for side effects, it would cost too much to do testing. And there are not enough people to do the test for statistical satisfaction. There are not enough rats. There are not enough fruit flies. the statistics of total protection against side effects are tremendous. These side effects are killing not hundreds of people, not thousands, not tens of thousands, but millions of people every year.

Our society has rejected synthetic foods. We tried the synthetic experiment and it failed. The synthetic foods made cancers and diseases. We will not choose them from a menu, we will not buy them from the shelf. We know from the gourmet that the finest quality is always from the natural. Thus is undoubtable. It is just a simple step of intellect to see that it is also true about our medicines as well.

In the UMSH of 2009 there is an entire issue of the failure of the FDA to protect people from these side effects of synthetic drugs. I spell it SINthetic. It is a sin to kill so many in the name of profit and ignorance. Ignoring the benefits of natural medicine is ignorance at it’s ultimate ignorant best. All justified by reductionism. A science not used today by anybody but medicine. The reductionistic methods of drug testing are killing millions and wounding many many more. But big money is hard to beat, especially when there is 30 billion spent by the drug companies on political lobbying alone in America. Fractal non-linear science has stepped forward to help us understand medicine.

When it was developed in the 1920’s, quantum mechanics was viewed primarily as a way of making sense of the host of anomalous observations at the level of molecules, atoms, and subatomic particles that could not be explained in terms of older mechanical models. Now, in the 21st century, most physicists are confident that quantum mechanics is a fundamental and general description of the physical world. Indeed, quantum ideas are now being applied to understand the workings of consciousness, environment, electromagnetic field interactions, low-dose healing effects, non-local phenomena, and many other observable phenomena that are unexplainable with an outdated mechanistic world view.

During the last century, traditional medical and philosophical practices, such as Traditional Chinese Medicine, acupuncture, Qi Gong, Tai Chi, meditation, homeopathy, naturopathy, and mind-body techniques considered “esoteric” by the scientific establishment, have been largely ignored while the world’s attention was focused solely on drugs, surgery, radiation, genetics, and other invasive and reductionist approaches. Approaches that make money for the synthetic chemical cartel. But these synthetic therapies are failing. One by one the synthetic pharmaceuticals are being discredited.

With massive public pressure to support research of safer Complementary and Alternative Medicines (CAM), and with athletic communities seeking effective drugless performance advantages, significant funds are moving in those directions. Quantum physics and non-linear mathematics are providing scientists with better models for understanding complex systems and subtle interactions, like mental, emotional, environmental, and electro-physiological interactions in the human body. With new ways of measuring and verifying energetic and quantum events and their effects on health, disease, and performance, scientists are re-igniting interest in traditional healing techniques, and the field of subtle-energy medicine is emerging.

One of the most exciting and promising fields of CAM involves bioelectromagnetics (BEM)—the study of electromagnetic fields (EMF’s) and their biological effects. Based largely on biofeedback principles, BEM diagnostic and healing devices are well entrenched in mainstream medicine already, but scientists are really only beginning to realize the practically limitless potentials that this field offers.

The purpose of this article is to introduce modern advanced biofeedback, one of the fastest growing areas within the field of BEM, and provide supportive evidence for its use with Olympic-level athletes. Focus is given to the most advanced biofeedback technology, the SCIO (Scientific Consciousness Information Operating System), which combines mind-body training with a methodology of applying micro-currents at various frequencies to the body, measuring feedback, and utilizing the resultant information for stress reduction, education, behavioral modification, and self-adjusting cybernetic correction (an historic innovation exclusive to the SCIO).

“Conventional” biofeedback, the use of devices to monitor physiological processes and enhance mind-body interactions, has been one of the most researched branches of CAM for over 60 years, and it provides the basis for this study and for claims made in athletic sport performance. “Quantum” biofeedback is the term adopted to describe advanced Quantum Electro-Dynamic Biofeedback capabilities performed with the SCIO system, which combines the benefits of both conventional and advanced methods.

PSYCHO-SOMATIC and SOMA-PsyCHO DISEASE

Medicine was shocked to see that there was indeed a set of diseases that were psycho-somatic. The mind can effect the body. The largest type is the stomach ulcer or other gastric disturbance. Here stress upsets the sympathetic nerval balance versus the parasympathetic.

There are also soma-psycho diseases such as when hormonal disturbances produce mental abnormalities. Medicine was shocked at the proof of this. But this threatened pharmaceutical sales.

As time goes by the list of possible involvements from psycho-somatic and soma-psycho disease grows and grows. Till now there is overwhelming evidence that there is mental involvement in over 80% of disease.

Stress detection and stress reduction then become an integral component in disease care and thus health care. There is an overwhelming evidence for a Psych-Neuro-Immuno-Soma link this is so well documented as to be an irrebuttable fact. But still some over fastidious small minded geeks will reject this truism. In the PNIS issue of the journal we see more collective evidence.

THE END OF DEGENERATIVE DISEASE

One of my jobs as the angel of God is to bring an end to degenerative disease as a predominant killer. To do so has taken a lifetime of dedication persecution and violent attacks from so many
places. First we must confront the failure of the FDA to protect Americans from degenerative disease. Let’s review the largest killers.

What’s really killing people in the world today is number one: Tobacco. This is the number one killer. David Kessler was the head of the American FDA in the 1980’s. And when I met Kessler at an FDA meeting he was going to do his job to protect the public. I met him at a meeting in Salt Lake City, Utah and he said he wanted to go after the most major risk to health, smoking. That his job was to protect the American people, included that he should go after Big tobacco and to clamp down and to make sure that the people were protected. He was denied that. He was stopped from doing that. He quit the FDA, unable to do his job, as he said. Big tobacco is killing over a million people a year.

The next leading killer is factors that is related to sugar. Big Sugar for it’s corporate name. As people who get bad sugars and bad oils, trans-fatty acids and cooked oils. Factors of bad nutrition in America are making people sick, producing blood sugar problems, producing obesity, cardiovascular problems, and many, many things that the FDA could also effect. Limiting trans-fatty acids, making good sugars (left handed Fructose), rather than bad sugars (right handed Dextrose).

The body needs right handed sugar (Blood Glucose) to enter the cell for energy. Right handed sugars such as sugar cane, beet sugar, grape sugar, corn sugar are right handed and they enter the cells too fast. This produces fat more easily, hyperglycemia (mild addiction) and then hypoglycemia (mild depression). This puts a burden on the pancreas, the eye and other organs. There is also a well documented negative effect on the immune system from dextrose. If you use chemicals to strip a way vitamins and minerals to make the sugar white, and it gets even worse.

Fructose revolves to the left and needs to be converted to the right. A process that takes time and thus allows for a more smooth delivery of the glucose. Less fat, less stress on organs, less craving, less depression, less blood sugar fluctuations. More hormonal and enzyme production thus it is an anti-aging therapy. Use fresh fruits as a sweetener, it will change your life. Crazy food additives that have not been fully tested add to the food and drug problems. The synthetic foods and drugs have failed. Our society has learned to avoid and mistrust synthetic foods. We will not order them on a menu or buy them of the shelf. We have learned to be chemi-phobic. We know that synthetic foods create cancer and disease. Our society must learn that this is true of our medicines as well.

Our body needs good fatty acids. They make up the cell membrane of all of our cells. Stress sets them free. Cooking destroys most fatty acids. Meat and potatoes contain very little. In fact the fatty acids from an animal are saturated. Fresh and raw vegetable and unheated vegetable juice are the best source. Bad food is a problem in degenerative disease. And this is also another industry the FDA is not attacking that the FDA is not doing their job to protect the human beings of America. Big Sugar and cholesterol are leading to diseases that are killing over a million people a year.

In the next category is allopathic doctor prescribed drugs. The medical doctor prescribed medicines are the third largest killer. Big pharmaceuticals are killing in the neighborhood of some 600 – 700 thousand people a year. By all of these statistics, big tobacco, Big Sugar, Big fast food, and Big Pharma, collectively they are in the neighborhood of directly 3 million deaths a year in America alone and possibly 10 million complicating factors creating an incredible burden on the health care system.
We need to embody a new theory of health care. The Hans Selye theory tells us that the cause of disease is a stressor.

Major stressors include:

- LACK OF AWARENESS OR LACK OF EDUCATION
- STRESS
- HEREDITY
- MENTAL FACTORS (GREED, ANGER, DELUSION, ARROGANCE ETC)
- ALLERGY
- TOXICITY
- TRAUMA INJURY
- PATHOGENS (MICRO-ORGANISMS, WORMS, ETC.)
- PERVERSE ENERGY (HEAT, COLD, WIND, DRYNESS, RADIATION ETC)
- DEFICIENCY OR EXCESS OF NUTRIENTS

We can see the importance of stress detection and stress reduction. This form of medicine is a more true form of health care where now a days medicine is much more positioned at the end of this scale. In other words a heroic medicine, a disease care system designed to stop you from dying.

I have spent a life time trying to build an educational system and a program to make health care more available the Nelson Method of medicine is as follows.

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- DEFICIENCY OR EXCESS OF NUTRIENTS

1. Reduce the Causes of Disease
2. Repair the organs weakened by the Causes
3. Unblock the Blockages to energy, nutrition, Oxygen, waste FLOW
4. Treat the symptoms with natural means before resorting to Synthetic
5. Balance the metabolic typing or constitutional imbalances

The next step is to design a system to work with the body electric. A system to use the advances in science such as electronics, fractal chaos and Quantum Electro Dynamics. A new style of much more modern medicine. A device to find disease at the earliest level and reduce it.

I have been able to make such a machine in 1985, legalize it in 1989, sell it around the world in compliance fashion. It is completely tested, safe, completely tested, and effective. It works and it helps people in many different ways. There have been over one hundred studies published on the Device the EPFX / SCIO.

The frustration of lack of education and the lack of opportunity it conveys, leads many of the poor children to resorting to drugs and crime. Addiction develops and spreads. Equal Economic Education will also help the society reduce degenerative disease and the costs it incurs. As well as when there is better education there will be more intelligent selection of foods and the ability to resist drugs.

I have dedicated my life to helping reduce degenerative disease. If we can see the problems of Big Tobacco, Big Sugar, Big Pharma and just how the medical community fights any change. I have dedicated my life and intellect to make a new system of medicine and the tools to do it with a system that is safe and effective. But instead of me being applauded for the work that I have done, I am attacked, I am vilified.

As you read the EPFX / SCIO testimonials you will see incredible results. As you read these testimonials, these stories, recognize that this is the tip of the iceberg. Is that we have been hearing these stories for 20 years. The wondrous stories of how people’s lives have been changed.

So to end degenerative disease we must
1. Make Big Tobacco pay for the damages they incur
2. Make Big Sugar pay for the damages they incur
3. Make Big Pharma pay for the damages they incur
4. End Allopathic philosophy and develop a new stressor reducing based medicine
5. Avoid Bad sugars white processed. Eat Good Sugars from fresh fruit, Avoid bad oils cooked or saturated. Eat good oils from fresh and raw vegetable and uncooked low temperature made oils.
6. Equal Economic Education- and a new medical education based on natural
7. Safe forms of early intervention medicine such as energetic biofeedback

With these social changes degenerative disease could be so greatly reduced to allow for an inexpensive medicine.
Stress Is Back - People who face serious life stress are more likely to develop a peptic ulcer over the next 15 years.

By: Richard Firshein

For years, doctors believed that ulcers were psychosomatic, caused by stress. But then researchers discovered a hardy, virulent little bacterium known as Helicobacter priori. Able to survive and even thrive in stomach acid, this bacterium is so damaging it has been given Class 1 carcinogen status since it’s known to be a direct precursor of certain stomach cancers. This led scientists to believe that it caused ulcers. The discovery of H. priori was revolutionary. Doctors began to treat ulcers with antibiotics. A combination of ampicillin and metronidazole (Flagyl), two common drugs, seemed to work best, and individuals who had been suffering for years with agonizing ulcer pain suddenly became well. Talk about a swing of the pendulum: a shocked medical community concluded that all ulcers were caused by infection. The search for a psychological root was abandoned.

End of story? Not quite. Eight out of 10 people infected with H. priori never get ulcers. As an article in the Journal of the American Medical Association points out, studies show that people who face serious life stress are more likely to develop a peptic ulcer over the next 15 years. Research reported in the Archives of Internal Medicine followed 4500 subjects and found that the incidence of ulcers in those who felt they were stressed was almost twice as great as in those who were stress-free. In addition, the incidence of ulcers seems to rise after national disasters. A review of medical records from 61 hospitals, published in the American Journal of Gastroenterology, found that the Hanshin-Awaji earthquake in Japan was followed by a marked increase in bleeding gastric ulcers. It’s clear to me that the true origin of ulcers lies both in the mind and the body. As a physician, I can see that stress plays a huge role in all my patients’ illnesses. I see flare-ups of asthma, hypertension and diabetes during periods of stress. When approaching treatment of any illness, I try to suggest nutritional and lifestyle changes, and when necessary, medicines, to help both mood and body.

For example, a 54-year-old woman recently sought my help. She’d suffered from ulcers for many years, and her doctor had given her multiple courses of antibiotic therapy. The drugs had always helped, but only temporarily; the ulcers always returned. Nobody had asked about her levels of anxiety, but when I inquired, she admitted that she’d just gotten out of a long and difficult marriage and was now a single mother with financial problems. Stress had been her constant companion for years. I suggested a program of meditation and biofeedback to help her relax. I also prescribed a course of natural supplements, among them DGL (deglycyrrhizinated licorice), a licorice extract that helps heal the lining of the stomach, and aloe, another healing agent which soothes inflammation. That, along with a final course of antibiotics, alleviated her stress and quieted her inflamed gut. She hasn’t suffered from an ulcer in over a year.

To understand any disease, we need to realize that illnesses almost always stem from multiple causes. Psychological factors should never be overlooked when treating disease, and the immune and nervous systems should be examined together. That’s why I’m glad that stress is back at least where ulcers are concerned.

Stress Management: How to Reduce, prevent, and Cope with Stress

If you’re living with high levels of stress, you’re putting your entire well-being at risk. Stress wreaks havoc on your emotional equilibrium, as well as your physical health. It narrows your ability to think clearly, function effectively, and enjoy life.

The goal of stress management is to bring your mind and body back into balance. By adopting a positive attitude, learning healthier ways to cope, and changing the way you deal with stress, you can reduce its hold on your life.

Taking charge of stress

In our frenetic, fast-paced world, many people deal with frequent or even constant stress. The overextended working mother, the hard-charging “Type A” personality, the self-critical perfectionist, the chronic worrier: they’re always wound up, always stretched to the breaking point, always rushing around in a frenzy or juggling too many demands. Operating on daily red alert comes at the high price of your health, vitality, and peace of mind. But while it may seem that there’s nothing you can do about your stress level—the bills aren’t going to stop coming, there will never be more hours in the day for all your errands, your career will always be demanding—you have a lot more control than you might think. In fact, the simple realization that you’re in control of your life is the foundation of stress management.

Managing stress is all about taking charge: taking charge of your thoughts, your emotions, your schedule, your environment, and the way you deal with problems. The ultimate goal is a balanced life, with time for work, relationships, relaxation, and fun—and the resilience to hold up under pressure and meet challenges head on.

Stress management strategy #1: Avoid unnecessary stress

Not all stress can be avoided, and it’s not healthy to avoid a situation that needs to be addressed. You may be surprised, however, by the number of stressors in your life that you can eliminate.

• Learn how to say “no” — Know your limits and stick to them. Whether in your personal or professional life, refuse to accept added responsibilities when you’re close to reaching them. Taking on more than you can handle is a surefire recipe for stress.

• Avoid people who stress you out — If someone consistently causes stress in your life and you can’t turn the relationship around, limit the amount of time you spend with that person or end the relationship entirely.

• Take control of your environment — If the evening news makes you anxious, turn the TV off. If traffic’s got you tense, take a longer but less-traveled route. If going to the market is an unpleasant chore, do your grocery shopping online.

• Avoid hot-button topics — If you get upset over religion or politics, cross them off your conversation list. If you repeatedly argue about the same subject with the same people, stop bringing it up or excuse yourself when it’s the topic of discussion.

• Pare down your to-do list — Analyze your schedule, responsibilities, and daily tasks. If you’ve got too much on your plate, distinguish between the “shoulds” and the “musts.” Drop tasks that aren’t truly necessary to the bottom of the list or eliminate them entirely.
Stress management strategy #2: Alter the situation
If you can't avoid a stressful situation, try to alter it. Figure out what you can do to change things so the problem is avoided in the future. Often, this involves changing the way you communicate and operate in your daily life.

Express your feelings instead of bottling them up. If something or someone is bothering you, communicate your concerns in an open and respectful way. If you don’t voice your feelings, resentment will build and the situation will likely remain the same.

Be willing to compromise. When you ask someone to change their behavior, be willing to do the same. If you both are willing to bend at least a little, you’ll have a good chance of finding a happy middle ground.

Be more assertive. Don’t take a backseat in your own life. Deal with problems head on, doing your best to anticipate and prevent them. If you’ve got an exam to study for and your chatty roommate just got home, say up front that you only have five minutes to talk.

Manage your time better. Poor time management can cause a lot of stress. When you’re stretched too thin and running behind, it’s hard to stay calm and focused. But if you plan ahead, you can avoid these stress-inducing pitfalls.

Time management tips to reduce stress

Create a balanced schedule
All work and no play is a recipe for burnout. Try to find a balance between work and family life, social activities and solitary pursuits, daily responsibilities and downtime.

Don’t over-commit yourself
Avoid scheduling things back-to-back or trying to fit too much into one day. All too often, we underestimate how long things will take.

Prioritize tasks
Make a list of tasks you have to do, and tackle them in order of importance. Do the high-priority items first. If you have something particularly unpleasant to do, get it over with early. The rest of your day will be more pleasant as a result.

Break projects into small steps
If a large project seems overwhelming, make a step-by-step plan. Focus on one manageable step at a time, rather than taking on everything at once.

Delegate responsibility
You don’t have to do it all yourself, whether at home, school, or on the job. If other people can take care of the task, why not let them? Let go of the desire to control or oversee every little step. You’ll be letting go of unnecessary stress in the process.

Stress management strategy #3: Accept the things you can’t change
Some sources of stress are unavoidable. You can’t prevent or change stressors such as the death of a loved one, a serious illness, or a national recession. In such cases, the best way to cope with stress is to accept things as they are. Acceptance may be difficult, but in the long run, it’s easier than railing against a situation you can’t change.

Don’t try to control the uncontrollable. Many things in life are beyond our control—particularly the behavior of other people. Rather than stressing out over them, focus on the things you can control such as the way you choose to react to problems.

Look for the upside. As the saying goes, “What doesn’t kill us makes us stronger.” When facing major challenges, try to look at them as opportunities for personal growth. If your own poor choices contributed to a stressful situation, reflect on them and learn from your mistakes.

Share your feelings. Talk to a trusted friend or make an appointment with a therapist. Expressing what you’re going through can be very cathartic, even if there’s nothing you can do to alter the stressful situation.

Learn to forgive. Accept the fact that we live in an imperfect world and that people make mistakes. Let go of anger and resentments. Free yourself from negative energy by forgiving and moving on.

Stress management strategy #4: Adapt to the stressor
If you can’t change the stressor, change yourself. You can adapt to stressful situations and regain your sense of control by changing your expectations and attitude.

Reframe problems. Try to view stressful situations from a more positive perspective. Rather than fuming about a traffic jam, look at it as an opportunity to pause and regroup, listen to your favorite radio station, or enjoy some alone time.

Look at the big picture. Take perspective of the stressful situation. Ask yourself how important it will be in the long run. Will it matter in a month? A year? Is it really worth getting upset over? If the answer is no, focus your time and energy elsewhere.

Adjust your standards. Perfectionism is a major source of avoidable stress. Stop setting yourself up for failure by demanding perfection. Set reasonable standards for yourself and others, and learn to be okay with “good enough.”

Focus on the positive. When stress is getting you down, take a moment to reflect on all the things you appreciate in your life, including your own positive qualities and gifts. This simple strategy can help you keep things in perspective.

Stress reduction tips

Beyond a take-charge approach and a positive attitude, you can reduce stress in your life by making healthy lifestyle choices and taking care of yourself. If you regularly make time for rest and relaxation, you’ll be in a better place to handle life’s stressors when they inevitably come.

Nurture yourself
Don’t get so caught up in the hustle and bustle of life that you forget to take care of your own need for rest and relaxation.
needs. Nurturing yourself is a necessity, not a luxury.

- Set aside relaxation time. Include rest and relaxation in your daily schedule. Don’t allow other obligations to encroach. This is your time to take a break from all responsibilities and recharge your batteries.
- Connect with others. Spend time with positive people who enhance your life. A strong support system will buffer you from the negative effects of stress.
- Do something you enjoy every day. Make time for leisure activities that bring you joy, whether it be stargazing, playing the piano, or working on your bike.
- Keep your sense of humor. This includes the ability to laugh at yourself. The act of laughing helps your body fight stress in a number of ways.

**Healthy stress reducers**

Go for a walk. 
Spend time in nature. 
Talk to a supportive friend. 
Sweat out tension with a good workout. 
Do something for someone else. 
Write in your journal. 
Take a long bath. 
Play with a pet. 
Work in your garden. 
Get a massage. 
Curl up with a good book. 
Take a yoga class. 
Listen to music. 
Watch a comedy.

**Adopt a healthy lifestyle**

- Exercise regularly. Physical activity plays a key role in reducing and preventing the effects of stress. Make time for at least 30 minutes of exercise, three times per week. Nothing beats aerobic exercise for releasing pent-up stress and tension.
- Eat a healthy diet. Well-nourished bodies are better prepared to cope with stress, so be mindful of what you eat. Start your day right with breakfast, and keep your energy up and your mind clear with balanced, nutritious meals throughout the day.
- Reduce caffeine and sugar. The temporary “highs” caffeine and sugar provide often end in a crash in mood and energy. By reducing the amount of coffee, soft drinks, chocolate, and sugar snacks in your diet, you’ll feel more relaxed and you’ll sleep better.
- Avoid alcohol, cigarettes, and drugs. Self-medicating with alcohol or drugs may provide an easy escape from stress, but the relief is only temporary. Don’t avoid or mask the issue at hand; deal with problems head on and with a clear mind.
- Get enough sleep. Adequate sleep fuels your mind, as well as your body. Feeling tired will increase your stress because it may cause you to think irrationally.

**Making a stress management plan**

Stress management starts with identifying the sources of stress in your life. This isn’t as easy as it sounds. Your true sources of stress aren’t always obvious, and it’s all too easy to overlook your own stress-inducing thoughts, feelings, and behaviors. Sure, you may know that you’re constantly worried about work deadlines. But maybe it’s your procrastination, rather than the actual job demands, that leads to deadline stress.

Look closely at your habits, attitude, and excuses. Do you explain away stress as temporary (“I just have a million things going on right now”) even though you can’t remember the last time you took a breather? Do you define stress as an integral part of your work or home life (“Things are always crazy around here”) or as a part of your personality (“I have a lot of nervous energy, that’s all”). Do you blame your stress on other people or outside events, or view it as entirely normal and unexceptional? Until you accept responsibility for the role you play in creating or maintaining it, your stress level will remain outside your control.

**Start a stress journal**

A stress journal can help you identify the regular stressors in your life and the way you deal with them. Each time you feel stressed, keep track of it in your journal.

**Write down:**

- What caused your stress (make a guess if you’re unsure).
- How you felt, both physically and emotionally.
- How you acted in response.
- What you did to cope or feel better.

Putting your worries on paper has a marvelous way of clarifying things. As you keep a daily log, you will begin to see patterns and common themes. Your journal may help you see that you don’t really have that much to worry about, or it may bring overlooked problems to light. Whatever your discoveries, your stress journal should help you establish a plan for moving forward.

**Evaluate your coping strategies**

Think about the ways you cope with stress. Your stress journal can help you identify them. Are your coping strategies healthy or unhealthy, helpful or unproductive? Unfortunately, many people cope with stress in ways that compound the problem. These coping strategies may temporarily reduce stress, but they cause more damage in the long run.

**Unhealthy ways of coping with stress**

Smoking 
Self-medicating with alcohol or drugs 
Using sleeping pills or tranquilizers to relax 
Overeating or eating too little 
Sleeping too much 
Procrastinating 
Withdrawning from friends, family, and activities 
Filling up every minute of the day to avoid facing problems

If your methods of coping with stress aren’t contributing to your greater emotional and physical health, it’s time to find ones that do.

**Learn positive ways to deal with stress**

There are many healthy ways to reduce stress or cope with its effects, but they all require change. You can either change the situation or change your reaction. When deciding which option to choose, it’s helpful to think of the four As: avoid, alter, accept, or adapt.

Since everyone has a unique response to stress, there is no “one size fits all” solution to managing it. No single method works for everyone or every situation, so experiment with different techniques and strategies. Focus on what makes you feel calm and in control.
Stress management versus lifestyle modification on systolic hypertension and medication elimination: a randomized trial

Dusek JA, Hibberd PL, Buczynski B, Chang BH, Dusek KC, Johnston JM, Wohlhueter AL, Benson H, Zusman RM.

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Isolated systolic hypertension is common in the elderly, but decreasing systolic blood pressure (SBP) without lowering diastolic blood pressure (DBP) remains a therapeutic challenge. Although stress management training, in particular eliciting the relaxation response, reduces essential hypertension its efficacy in treating isolated systolic hypertension has not been evaluated. We conducted a double-blind, randomized trial comparing 8 weeks of stress management, specifically relaxation response training (61 patients), versus lifestyle modification (control, 61 patients).

Inclusion criteria were > or =55 years, SBP 140-159 mm Hg, DBP <90 mm Hg, and at least two antihypertensive medications. The primary outcome measure was change in SBP after 8 weeks. Patients who achieved SBP <140 mm Hg and > or =5 mm Hg reduction in SBP were eligible for 8 additional weeks of training with supervised medication elimination. SBP decreased 9.4 (standard deviation [SD] 11.4) and 8.8 (SD 13.0) mm Hg in relaxation response and control groups, respectively (both ps <0.0001) without group difference (p=0.75). DBP decreased 1.5 (SD 6.2) and 2.4 (SD 6.9) mm Hg (p=0.05 and 0.01, respectively) without group difference (p=0.48). Forty-four (44) in the relaxation response group and 36 in the control group were eligible for supervised antihypertensive medication elimination.

After controlling for differences in characteristics at the start of medication elimination, patients in the relaxation response group were more likely to successfully eliminate an antihypertensive medication (odds ratio 4.3, 95% confidence interval 1.2-15.9, p=0.03). Although both groups had similar reductions in SBP, significantly more participants in the relaxation response group eliminated an antihypertensive medication while maintaining adequate blood pressure control.

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This study compared 8 weeks of stress management (RR training) in 61 patients vs lifestyle modification in 61 patients (control group). Inclusion criteria were 55 years of age or older, SBP 140 to 159 mm Hg, DBP of less than 90 mm Hg, and use of 2 or more antihypertensive medications. The main endpoint was change in SBP after 8 weeks of the intervention. Those patients in whom SBP decreased by at least 5 mm Hg to below 140 mm Hg were permitted to enroll in additional training for 8 weeks, with supervised medication elimination.

Mean SBP decreased by 9.4 ± 11.4 mm Hg in the RR group and 8.8 ± 13.0 mm Hg in the control group (P < .0001 for both), without a significant difference between groups (P = .75). In a similar fashion, mean DBP decreased by 1.5 ± 6.2 in the RR group (P < .05) and 2.4 ± 6.9 mm Hg in the control group (P < .01), without a significant difference between the groups (P = .48).

In the RR group, 44 patients were eligible for supervised antihypertensive medication elimination, as were 36 in the control group. After controlling for differences in characteristics when medication elimination was started, patients in the RR group were more likely to be able to eliminate an antihypertensive medication (odds ratio, 4.3; 95% confidence interval, 1.2 - 15.9; P = .03).

“Although both groups had similar reductions in SBP, significantly more participants in the relaxation response group eliminated an antihypertensive medication while maintaining adequate blood pressure control,” the study authors write. „This result has clinical impact since reduction in SBP of 5 mm Hg reduces mortality by 7% and risk of stroke by 30%.”

Limitations of the study include insufficient statistical power to detect a difference in the observed reductions in SBP between treatment groups; imbalance between treatment groups in the number of antihypertensive medications that subjects were taking at baseline; participants taking different combinations of antihypertensive medications; inability to standardize the particular antihypertensive medication to be withdrawn; possibly insufficient duration of the trial to establish the durability of the RR training in lowering SBP and eliminating antihypertensive drug therapy; no monitoring of lifestyle modifications; sample size limited with insufficient power to evaluate other potential predictors of responsiveness to the RR intervention; lack of „no-treatment” control group; and study not specifically designed to address whether the treatments enabled subjects to eliminate antihypertensive medications, because that was not the primary outcome.

“If our findings in systolic hypertension can be extended to other patient populations, the benefits in preventing vascular events as well as the cost savings in decreased drug dependence are incalculable,” the study authors conclude.

The Centers for Disease Control and Prevention and the National Institutes of Health funded this study.


Clinical Context

In elderly people, SBP generally increases, whereas DBP decreases, leading to increased prevalence of isolated systolic hypertension, defined as an SBP of more than 140 mm Hg and DBP of less than 90 mm Hg. Chobanian and colleagues reported in the May 2003 issue of the Journal of the American Medical Association that a reduction in SBP of 5 mm Hg is linked to a 7% decrease in mortality.

Stress management resulting in the RR can effectively treat essential hypertension, as described by Schneider and colleagues in the January 2005 issue of the American Journal of Hypertension. This double-blind, randomized trial evaluates whether RR vs lifestyle modification results in decreased SBP and successful elimination of an antihypertensive medication.

Study Highlights

- 122 patients at least 55 years old with SBP of 140 to 159 mm Hg, DBP less than 90 mm Hg, and taking at least 2 antihypertensive medications were randomized to 8 weeks of RR or lifestyle modification regimen.
- Exclusion criteria were change in antihypertensive medication dose in past 4 weeks, major medical illness in past 6 months, abnormal laboratory test results, current smoking, or past mind/body techniques.
- Systolic hypertension was confirmed at 3 consecutive weekly visits.
- Blood pressure was the average of 3 measurements, with SBP or DBP within 8 mm Hg taken 2 minutes apart in a seated position.
- 61 patients in RR group received weekly 15-minute instruction; 20-minute guided RR elicitation; and 25-minute information on cardiac risk factors, stress, and mind and body stress coping approaches.
- 61 patients in the lifestyle modification group received weekly 60-minute information on stress response effect on health, cardiac risk factors, stress, sodium restriction, weight reduction, diet, and exercise.
- Patients were asked to listen to same 20-minute RR audiotape or series of 20-minute lifestyle modification audiotapes depending on group assignment.
- The 2 groups had similar baseline demographics, including age (67 years) and race (84% - 90% white).
- RR vs lifestyle modification group was more likely to take 2 or more antihypertensive medications (52% vs 30%; P < .05), have metabolic syndrome (54% vs 28%; P < .01), and have higher creatinine levels (1.05 vs 0.96 mg/dL; P < .05).
- Primary outcome measure was change in SBP from baseline to 8 weeks in each group.
- 55 patients in the RR and 49 in the lifestyle modification group completed 8-week visit.
- At 8 weeks, SBP decrease from baseline was 9.4 mm Hg for RR group (SD, 11.4; P < .0001) and 8.8 mm Hg for lifestyle modification group (SD, 13.0; P < .0001) but was not significantly different between groups.
- 8-week DBP decrease from baseline was 1.5 mm Hg for RR group (SD, 6.2; P = .05) and 2.4 mm Hg for lifestyle modification group (SD, 6.9; P = .01) but not significantly different between groups.
- Weight loss was not linked to 8-week decreases in SBP or DBP.
- Patients eligible for medication elimination phase had SBP less than 140 mm Hg and reduced by 5 mm Hg from baseline, DBP less than 90 mm Hg, and no change in antihypertensive medication at 8- or 12-week assessment.
- 44 in the RR group (34 at 8 weeks and 3 at 12 weeks) and 36 in lifestyle modification group (33 at 8 weeks and 3 at 12 weeks) entered medication elimination phase.
- More patients in the RR vs lifestyle modification group had metabolic syndrome, higher serum creatinine levels, and took more antihypertensive medications.
• At medication elimination, 1 antihypertensive medication dose was decreased by half or appropriate amount every 4 weeks, up to 8 weeks if SBP was less than 140 mm Hg and DBP was less than 90 mm Hg.
• Successful elimination of 1 antihypertensive medication, defined by SBP up to 140 mm Hg, occurred more in the RR vs lifestyle modification group (32% vs 14%).
• After controlling for differences between groups, the RR vs lifestyle modification group was more likely to successfully eliminate at least 1 antihypertensive medication (odds ratio, 4.3; 95% confidence interval, 1.2 - 15.9; P = .03).
• 2 serious adverse events unrelated to the study occurred in lifestyle modification group.
• Of 18 minor adverse events in the RR and 14 in the lifestyle modification group, only 1 event of back pain in the RR group was related to study.
• Study limitations included use of different antihypertensive medications, short duration, no monitoring of lifestyle modifications, small sample size, lack of no-treatment group, and group differences in baseline characteristics.

Stress Reduction Programs in Patients with Elevated Blood Pressure: A Systematic Review and Meta-analysis.

Rainforth MV, Schneider RH, Nidich SI, Gaylord-King C, Salerno JW, Anderson JW.

Substantial evidence indicates that psychosocial stress contributes to hypertension and cardiovascular disease (CVD). Previous meta-analyses of stress reduction and high blood pressure (BP) were outdated and/or methodologically limited. Therefore, we conducted an updated systematic review of the published literature and identified 107 studies on stress reduction and BP. Seventeen trials with 23 treatment comparisons and 960 participants with elevated BP met criteria for well-designed randomized controlled trials and were replicated within intervention categories. Meta-analysis was used to calculate BP changes for biofeedback, -0.8/-2.0 mm Hg (P = NS); relaxation-assisted biofeedback, +4.3/+2.4 mm Hg (P = NS); progressive muscle relaxation, -1.9/-1.4 mm Hg (P = NS); stress management training, -2.3/-1.3 mm (P = NS); and the Transcendental Meditation program, -5.0/-2.8 mm Hg (P = 0.002/0.02). Available evidence indicates that among stress reduction approaches, the Transcendental Meditation program is associated with significant reductions in BP. Related data suggest improvements in other CVD risk factors and clinical outcomes.

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Stress System Malfunction Could Lead to Serious, Life Threatening Disease

Whether from a charging lion, or a pending deadline, the body’s response to stress can be both helpful and harmful. The stress response gives us the strength and speed to ward off or flee from an impending threat. But when it persists, stress can put us at risk for obesity, heart disease, cancer, and a variety of other illnesses.

Perhaps the greatest understanding of stress and its effects has resulted from a theory by George Chrousos, M.D., Chief of the Pediatric and Reproductive Endocrinology Branch at the National Institute of Child Health and Human Development (NICHD), and Philip Gold, MD, of the Clinical Neuroendocrinology Branch at the National Institute of Mental Health (NIMH).

Introduction

A threat to your life or safety triggers a primal physical response from the body, leaving you breathless, heart pounding, and mind racing. From deep within your brain, a chemical signal speeds stress hormones through the bloodstream, priming your body to be alert and ready to escape danger. Concentration becomes more focused, reaction time faster, and strength and agility increase. When the stressful situation ends, hormonal signals switch off the stress response and the body returns to normal.

But in our modern society, stress doesn’t always let up. Many of us now harbor anxiety and worry about daily events and relationships. Stress hormones continue to wash through the system in high levels, never leaving the blood and tissues. And so, the stress response that once gave ancient people the speed and endurance to escape life-threatening dangers runs constantly in many modern people and never shuts down.

Research now shows that such long-term activation of the stress system can have a hazardous, even lethal effect on the body, increasing risk of obesity, heart disease, depression, and a variety of other illnesses.

Much of the current understanding of stress and its effects has resulted from the theory by Drs. Chrousos and Gold. Their theory explains the complex interplay between the nervous system and stress hormones — the hormonal system known as the hypothalamic-pituitary-adrenal (HPA) axis. Over the past 20 years, Dr. Chrousos and his colleagues have employed the theory to understand a variety of stress-related conditions, including depression, Cushing’s syndrome, anorexia nervosa, and chronic fatigue syndrome.

The Stress Circuit

The HPA axis is a feedback loop by which signals from the brain trigger the release of hormones needed to respond to stress. Because of its function, the HPA axis is also sometimes called the “stress circuit.”

Briefly, in response to a stress, the brain region known as the hypothalamus releases corticotropin-releasing hormone (CRH). In turn, CRH acts on the pituitary gland, just beneath the brain, triggering the release of another hormone, adrenocorticotropic (ACTH) into the bloodstream. Next, ACTH signals the adrenal glands, which sit atop the kidneys, to release a number of hormonal compounds.

These compounds include epinephrine (formerly known as adrenaline), Norepinephrine (formerly known as noradrenaline) and cortisol. All three hormones enable the body to respond to a threat. Epinephrine increases blood pressure and heart rate, diverts blood to the muscles, and speeds reaction time. Cortisol, also known as glucocorticoid, releases sugar (in the form of glucose) from the body reserves so that this essential fuel can be used to power the muscles and the brain.

Normally, cortisol also exerts a feedback effect to shut down the stress response after the threat has passed, acting upon the hypothalamus and causing it to stop producing CRH.

This stress circuit affects systems throughout the body. The hormones of the HPA axis exert their effect on the autonomic nervous system, which controls such vital functions as heart rate, blood pressure, and digestion.

The HPA axis also communicates with several regions of the brain, including the limbic system, which controls motivation and mood, with the amygdala, which generates fear in response to danger, and with the hippocampus, which plays an important part in memory formation as well as in mood and motivation. In addition, the HPA axis is also connected with brain regions that control body temperature, suppress appetite, and control pain.

Similarly, the HPA axis also interacts with various other glandular systems, among them those producing reproductive hormones, growth hormones, and thyroid hormones. Once activated, the stress response switches off the hormonal systems regulating growth, reproduction, metabolism, and immunity. Short term, the response is helpful, allowing us to divert biochemical resources to dealing with the threat.
Stress, heredity, and the environment

According to Dr. Chrousos, this stress response varies from person to person. Presumably, it is partially influenced by heredity. For example, in most people the HPA axis probably functions appropriately enough, allowing the body to respond to a threat, and switching off when the threat has passed. Due to differences in the genes that control the HPA axis, however, other people may fail to have a strong enough response to a threat, while still others may over respond to even minor threats.

Beyond biological differences, the HPA axis also can alter its functioning in response to environmental influences. The HPA axis may permanently be altered as a result of extreme stress at any time during the life cycle — during adulthood, adolescence, early childhood, or even in the womb.

If there are major stresses in early childhood, the HPA feedback loop becomes stronger and stronger with each new stressful experience. This results in an individual who, by adulthood, has an extremely sensitive stress circuit in place. In life threatening situations — such as life in an area torn by war — this exaggerated response would help an individual to survive. In contemporary society, however, it usually causes the individual to overreact hormonally to comparatively minor situations.

Effects on the body

Stress and the Reproductive system

Stress suppresses the reproductive system at various levels, says Dr. Chrousos. First, CRH prevents the release of gonadotropin releasing hormone (GnRH), the “master” hormone that signals a cascade of hormones that direct reproduction and sexual behavior. Similarly, cortisol and related glucocorticoid hormones not only inhibit the release of GnRH, but also the release of luteinizing hormone, which prompts ovulation and sperm release. Glucocorticoids also inhibit the testes and ovaries directly, hindering production of the male and female sex hormones testosterone, estrogen, and progesterone.

The HPA overactivity that results from chronic stress has been shown to inhibit reproductive functioning in anorexia nervosa and in starvation, as well as in highly trained ballet dancers and runners. For example, in one study, Chrousos found that men who ran more than 45 miles per week produced high levels of ACTH and cortisol in response to the stress of extreme exercise. These male runners had low LH and testosterone levels. Other studies have shown that women undertaking extreme exercise regimens had ceased ovulating and menstruating.

However, the interaction between the HPA axis and the reproductive system is also a two way street. The female hormone estrogen exerts partial control of the gene that stimulates CRH production. This may explain, why, on average, women have slightly elevated cortisol levels. In turn, higher cortisol levels, in combination with other, as yet unknown, factors, may be the reason why women are more vulnerable than men to depression, anorexia nervosa, panic disorder, obsessive compulsive disorder, and autoimmune diseases like lupus and rheumatoid arthritis.

Growth and stress

The hormones of the HPA axis also influence hormones needed for growth. Prolonged HPA activation will hinder the release of growth hormone and insulin-like growth factor 1 (IGF-1), both of which are essential for normal growth. Glucocorticoids released during prolonged stress also cause tissues to be less likely to respond to IGF-1. Children with Cushing’s syndrome — which results in high glucocorticoid levels — lose about 7.5 to 8.0 centimeters from their adult height.

Similarly, premature infants are at an increased risk for growth retardation. The stress of surviving in an environment for which they are not yet suited, combined with the prolonged stress of hospitalization in the intensive care unit, presumably activates the HPA axis. Growth retarded fetuses also have higher levels of CRH, ACTH, and cortisol, probably resulting from stress in the womb or exposure to maternal stress hormones.

Old research has also shown that the stress from emotional deprivation or psychological harassment may result in the short stature and delayed physical maturity of the condition known as psychosocial short stature (PSS).

PSS was first discovered in orphans, in infants who failed to thrive and grow. When these children were placed in caring environments in which they received sufficient attention, their growth resumed. The children’s cortisol levels were abnormally low, a seeming contradiction, which Chrousos investigated by studying a small, non-human primate, the common marmoset. These monkeys live in small family groups in which infants are cared for by both parents. As in human society, the infants are sometimes well cared for, but sometimes abused. Like humans, the abused monkeys showed evidence of PSS.

The researchers determined that the stressed and abused monkeys appeared to respond normally to stress, but seemed unable to “switch off” the stress response by secreting appropriate cortisol levels, thereby remaining in a state of prolonged stress arousal as compared to their peers.

The gastrointestinal tract and stress

As many of us know, stress can also result in digestive problems. The stress circuit influences the stomach and intestines in several ways. First, CRH directly hinders the release of stomach acid and emptying of the stomach. Moreover, CRH also directly stimulates the colon, speeding up the emptying of its contents. In addition to the effects of CRH alone on the stomach, the entire HPA axis, through the autonomic nervous system, also hinders stomach acid secretion and emptying, as well as increasing the movement of the colon.

Also, continual, high levels of cortisol — as occur in some forms of depression, or during chronic psychological stress — can increase appetite and lead to weight gain. Rats given high doses of cortisol for long periods had increased appetites and had larger stores of abdominal fat. The rats also ate heavily when they would normally have been inactive. Overeating at night is also common among people who are under stress.

The immune system and stress

The HPA axis also interacts with the immune system, making you more vulnerable to colds and flu, fatigue and infections.

In response to an infection, or an inflammatory disorder like rheumatoid arthritis, cells of the
immune system produce three substances that cause inflammation: interleukin 1 (IL-1), interleukin 6 (IL-6), and tumor necrosis factor (TNF). These substances, working either singly or in combination with each other, cause the release of CRH. IL-6 also promotes the release of ACTH and cortisol. Cortisol and other compounds then suppress the release of IL-1, IL-6, and TNF, in the process switching off the inflammatory response.

Ideally, stress hormones damp down an immune response that has run its course. When the HPA axis is continually running at a high level, however, that damping down can have a down side, leading to decreased ability to release the interleukins and fight infection.

In addition, the high cortisol levels resulting from prolonged stress could serve to make the body more susceptible to disease, by switching off disease-fighting white blood cells. Although the necessary studies have not yet been conducted, Dr. Chrousos considers it possible that this same deactivation of white blood cells might also increase the risk for certain types of cancer.

Conversely, there is evidence that a depressed HPA Axis, resulting in too little corticosteroid, can lead to a hyperactive immune system and increased risk of developing autoimmune diseases — diseases in which the immune system attacks the body’s own cells. Overactivation of the antibody-producing B cells may aggravate conditions like lupus, which result from an antibody attack on the body’s own tissues.

Stress-Related Disorders

One of the major disorders characteristic of an overactive HPA axis is melancholic depression. Chrousos’ research has shown that people with depression have a blunted ability to “counterregulate,” or adapt to the negative feedback of increases in cortisol. The body turns on the “fight or flight” response, but is prevented from turning it off again. This produces constant anxiety and overreaction to stimulation, followed by the paradoxical response called “learned helplessness,” in which victims apparently lose all motivation.

Hallmarks of this form of depression are anxiety, loss of appetite, loss of sex drive, rapid heart beat, high blood pressure, and high cholesterol and triglyceride levels. People with this condition tend to produce higher-than-normal levels of CRH. The high levels of CRH are probably due to a combination of environmental and hereditary causes, depending on the person affected.

However, rather than producing higher amounts of ACTH in response to CRH, depressed people produce smaller amounts of this substance, presumably because their hippocampuses have become less sensitive to the higher amounts of CRH. In an apparent attempt to switch off excess CRH production, the systems of people with melancholic depression also produce high levels of cortisol. However, by-products of cortisol, produced in response to high levels of the substance, also depress brain cell activity. These by-products serve as sedatives, and perhaps contribute to the overall feeling of depression.

Other conditions are also associated with high levels of CRH and cortisol. These include anorexia nervosa, malnutrition, obsessive-compulsive disorder, anxiety disorder, alcoholism, alcohol and narcotic withdrawal, poorly controlled diabetes, childhood sexual abuse, and hyperthyroidism.

The excessive amount of the stress hormone cortisol produced in patients with any of these conditions is responsible for many of the observed symptoms. Most of these patients share psychological symptoms including sleep disturbances, loss of libido, and loss of appetite as well as physical problems such as an increased risk for accumulating abdominal fat and hardening of the arteries and other forms of cardiovascular disease. These patients may also experience suppression of thyroid hormones, and of the immune system. Because they are at higher risk for these health problems, such patients are likely to have their life spans shortened by 15 to 20 years if they remain untreated.

Although many disorders result from an overactive stress system, some result from an under active stress system. For example, in the case of Addison’s disease, lack of cortisol causes an increase of pigment in the skin, making the patient appear to have a tan. Other symptoms include fatigue, loss of appetite, weight loss, weakness, loss of body hair, nausea, vomiting, and an intense craving for salt. Lack of the hormone CRH also results in the feelings of extreme tiredness common to people suffering from chronic fatigue syndrome. Lack of CRH is also central to seasonal affective disorder (SAD), the feelings of fatigue and depression that plague some patients during winter months.

Chrousos and his team, showed that sudden cessation of CRH production may also result in the depressive symptoms of postpartum depression. In response to CRH produced by the placenta, the mother’s system stops manufacturing its own CRH. When the baby is born, the sudden loss of CRH may result in feelings of sadness or even severe depression for some women.

Recently, Dr. Chrousos and his coworkers uncovered evidence that frequent insomnia is more than just having difficulty falling asleep. The researchers found that, when compared to a group of people who did not have difficulty falling asleep, the insomniacs had higher ACTH and cortisol levels, both in the evening and in the first half of the night. Moreover, the insomniacs with the highest cortisol levels tended to have the greatest difficulty falling asleep.

The researchers theorized that, in many cases, persistent insomnia may be a disorder of the stress system. From their ACTH and cortisol levels, it appears that the insomniacs have nervous systems that are on overdrive, alert and ready to deal with a threat, when they should otherwise be quieting down. Rather than prescribing drugs known as hypnotics to regulate the sleep system, the researchers suggested that physicians might have more success prescribing antidepressants, to help calm an overactive stress system. Behavior therapy, to help insomniacs relax in the evening, might also be useful.

After conducting many years of research into the functioning of the HPA axis, Dr. Chrousos concluded that chronic stress should not be taken lightly or accepted as a fact of life.

“Persistent, unremitting stress leads to a variety of serious health problems,” Dr. Chrousos said. “Anyone who suffers from chronic stress needs to take steps to alleviate it, either by learning simple techniques to relax and calm down, or with the help of qualified therapists.”
is THE Medical Concern

Edited and reviewed By Professor of Medicine William Nelson IMUNE
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By Alvin Lim

The Case of the Poor Student: Sick after Exams

It’s happened to all of us. Tom was staying up late for the last two weeks cramming for his barrage of final exams, and finally his last exam was over. After one more late night—this time partying—he woke up with that all-too-familiar soreness in his throat, along with that annoying stuffy nose. “Great,” he thought. “I’m sick in time just for Christmas shopping. Must be that pesky cold bug going around again.”

What is Psychoneuroimmunology?

Just how exactly stress affects our immune system has long been debated, but the field of psychoneuroimmunology is still relatively new. Coming from the Latin roots psych- (meaning mind), neur- (meaning nerve or nervous system), and immuno- (meaning immune), psychoneuroimmunology is the study of how the mind can affect immune system functioning. Drawing upon many disciplines of science including immunology, psychology, and physiology, psychoneuroimmunology is a very integrative field with scientists studying a wide variety of things. Although many discoveries have been made, not many people are aware of just how significant they are. In order to understand just how stress can affect our immune system, you must first understand how the immune system responds under normal circumstances to invading pathogens.

Pathogens? You Shall Not Pass!

Pathogens, defined as disease producing agents (such as viruses and bacteria), are pesky organisms that cause our immune system to mobilize into action. In response to pathogens present in the body, the immune system induces the inflammatory response. Even though the bodily mechanics behind the inflammatory response are complicated, for many people it causes symptoms like stuffy nose, sore throat, and even fever. What many people don’t seem to understand is that the inflammatory response is a result of the body’s immune system trying to “get rid” of invading pathogens; it’s not the pathogens themselves that cause things like sore throat and runny nose. More importantly, pathogens themselves aren’t the only causes of the inflammatory response; hormones have also been identified as a regulator of the inflammatory response as well.

Hormones—Not Just for Sex

Hormones, better known as the “chemical messengers of the body”, are released by specialized organs (called glands) during certain events. Although their “reputation” in the general public is that they deal with sex specific behaviours, hormones have several roles in the body. One of the best known hormones is insulin, which is released by the pancreas into the blood; it acts as a messenger, telling the cells in your body to start taking in glucose (a type of simple sugar). One of the chief hormones released under stressful conditions is cortisol. Released by the kidneys, it helps mobilize the body into a “fight-or-flight” mode by causing increased blood pressure, heart rate, and sugar breakdown. Think of the last time you were in a stressful or nervous situation; can you remember your heart racing? Another interesting property of cortisol is that it acts as an anti-inflammatory signal, meaning that it acts as an “off switch” for your immune system, helping prevent the inflammatory response described earlier.

Cortisol, a Stress Hormone

Since its initial discovery by Hans Selye in 1907, cortisol has been the subject of many studies, yielding several different conclusions. Initially, it was found that elevated levels of cortisol were associated with elevated levels of stress, and it was thought that cortisol was released as a cause of stress, as described earlier. However, later studies showed a negative relationship between stress and cortisol levels; they found lower cortisol levels in people living under highly stressful circumstances. How could this be?

When the results of these experiments were further analyzed, scientists found startling relationship. With experiments where participants were subjected to conditions of acute stress (shorter duration), like speaking in public, or being suddenly startled, cortisol was found to be in elevated levels. However, when participants were under conditions of chronic stress (longer duration), like divorce or unemployment, scientists found lower levels of cortisol. This caused them to believe that maybe the relationship between stress and cortisol levels wasn’t so simple. More evidence continued to support the claim that acute stress caused sudden elevation in cortisol levels; if this stress continued, cortisol levels would decline, leading normal levels. What implications does this have for Tom’s situation described earlier?

How Cortisol Affects our Immune System: The Traditional Theory

As mentioned earlier, stress is thought to have an immunosuppressive impact on the immune system, mediated through cortisol. Thus, if someone is subjected to a certain stressor, their immune system would be temporarily “shocked”, and pathogens would have a relatively easier time entering and proliferating (growing) within the body. This would result in that person having a greater chance of getting “sick”. Although this theory explains how stress may affect our immune system, perhaps it’s not so simple. It doesn’t explain how for most people, it’s not until the stressor is removed that symptoms of the inflammatory response begin to manifest. Growing evidence is showing support for an alternative theory—one that suggests that inflammation is a result of cortisol dysregulation.

How Cortisol Affects our Immune System: An Alternative Theory

Perhaps the symptoms experienced by Tom described earlier weren’t a result of pathogen presence, but rather a result of faulty cortisol regulation? Note that in his case, Tom didn’t get sick while studying for exams, but rather after his last exam was finished; not until his stressor was removed. Since was placed in a stressful situation, his kidneys were constantly releasing cortisol, suppressing his immune cells (so he’d see no signs of the inflammatory response). Over the course
of his exams, his immune cells would constantly be receiving this anti-inflammatory signal, but what happened the stress was suddenly removed, cortisol levels suddenly dropped, and the anti-inflammatory signal went away? Maybe the sudden drop in cortisol’s anti-inflammatory signaling is enough to manifest the inflammatory response?

What happened to Tom may have been a combination of things. The stress onset may have caused his cortisol levels to rise, suppressing his immune system. In its weakened state, he may have been exposed to a variety of pathogens, which were then able to enter and proliferate within his body. Although this pathogen may have been present, his immune system was also constantly being signaled by cortisol to suppress inflammation, explaining why he didn’t see any symptoms during his exams. However, after his exams were over, the combination of pathogens living in his body along with absence of the anti-inflammatory signal may together have caused him to experience symptoms of the inflammatory response—sore throat, stuffy nose, and fever. It may very well be that a combination of both Tom’s mental state of stress along with exposure to pathogenic agents that caused Tom to “get sick”

A Problem in Science: Lack of Integration
Pathogenic mediation of the inflammatory response is a widely understood principle, but hormonal—specifically hormones pertaining to mental state—control of bodily processes is still not completely understood. Perhaps this is because of the nature of the field. The traditional science disciplines generally tend to be reductionistic, focusing on certain reactions or mechanisms. However, there are many phenomena that cannot be explained within the context of one scientific field in isolation; like how your mental state influence your immune system functioning. In the field of psychoneuroimmunology, questions cannot be answered by looking specifically at immunology or specifically at psychology, but require people to integrate over a variety of scientific disciplines, which may explain why the field is still relatively new.

Implications—What Does this Mean for Me?
From an evolutionary standpoint, the delayed inflammatory response caused by cortisol’s immunosuppressive properties would be advantageous over those without this delayed response, even in the context of Tom’s case. Which would you rather happen? Would you rather combat sickness amidst tackling a barrage of exams? Or would you rather be able to study for exams without showing any signs of being sick, and deal with it after exams are over? If your life depended on getting good grades, the choice would be obvious.

The impacts of stress on our health have been widely studied, and these data give us more concrete evidence, into the adverse affects of stress on health. Perhaps now the question isn’t whether or not stress affects us negatively, but rather how we can effectively remove stress, or at least learn techniques to reduce the impacts of stress.

References


Stress, fear increase cancer recurrence risk, study says

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After the surgical removal of a malignant tumor, the chance that cancer will re-appear in a different location of the body remains high. But new research from Tel Aviv University, in a bold new field called Psychoneuroimmunology, may prevent those cancer cells from taking root again — and the key to the treatment is stress reduction.

A new study led by Prof. Shamgar Ben-Eliyahu, from Tel Aviv University's Department of Psychology (http://www.aftau.org [1]), has shown scientifically that psychological and physiological stress prior to, during and after surgery has a biological impact that impairs immune system functioning. This impairment bears down on disease progression, he says, especially at the critical point during oncological surgery when a primary tumor is being removed.

The study was published in the journal Brain, Behaviour, and Immunity (2007). The results are expected to influence cancer intervention programs in the future.

Effects of Fear

“The psychological stressors of surgery deal a blow to the immune system, but this is hardly discussed in the medical community,” says Prof. Ben-Eliyahu. “Ours is among the first studies to show that psychological fear may be no less important than real physiological tissue damage in suppressing immune competence.”

The surprising part of Prof. Ben-Eliyahu’s studies is that stress hormones such as adrenaline, which are released before and during surgery, “underlie much of the devastating effects of surgery on immune competence,” says Prof. Ben-Eliyahu.

Until now, doctors assumed that the immune system was weakened due to tissue damage and the body’s responses to it. A weak immune system is one of the major factors that promotes cancer metastases after an operation, explains Prof. Ben-Eliyahu.

“Timing is everything after cancer surgery,” says Prof. Ben-Eliyahu. “There is a short window of opportunity, about a week after surgery, when the immune system needs to be functioning maximally in order kill the tiny remaining bits of tumor tissue that are scattered around the body.”

An Early Boost

The main stress hormones that appear to have an impact on immune competence are released before and during surgery, Prof. Ben-Eliyahu has found. He is currently developing a novel intervention program, based on existing generic drugs, to block the influence of these hormones.

Pre-clinical studies in a 2005 study also published in Brain, Behaviour, and Immunity reveal that by blocking these stress hormones, cancer metastases in animal models could be reduced. In a recent study (in progress), Prof. Ben-Eliyahu also found that by blocking these hormones, he could increase long-term post-operative survival rates from cancer in animal models, by as much as 200-300 percent.

Prof. Ben-Eliyahu and his students are now also trying to integrate stimulation of the immune system just before surgery and prevent its suppression. This may provide the immune system with an opportunity to eradicate cancer residuals after the surgical removal of the primary tumor, and before these residuals are re-established and become resistant to immunity, he says.

Prof. Ben-Eliyahu concludes, “By boosting the immune system and blocking its suppression by psychological and physiological stress, starting a day or two before surgery, during surgery and after surgery, we may be able to provide an intervention program that can extend people’s lives and potentially increase their chances for long-term survival.”

He plans on starting clinical trials within the next year or two.

Prof. Ben-Eliyahu is one of about 200 other scientists working in the novel and emerging field of Psychoneuroimmunology. It is an interdisciplinary study of the interaction between the psychological processes of the brain, and the nervous and immune systems of the human body. In this field, Prof. Ben-Eliyahu collaborates regularly with Prof. Gayle Page from the Johns Hopkins School of Nursing and other scientists from the United States and Israel. His work is supported by the U.S. National Institute of Health. In May, he plans on attending the Psychoneuroimmunology Research Society conference in Madison, Wisconsin.
The clinical use of mindfulness meditation for the self-regulation of chronic pain.

Kabat-Zinn J, Lipworth L, Burney R.

Ninety chronic pain patients were trained in mindfulness meditation in a 10-week Stress Reduction and Relaxation Program. Statistically significant reductions were observed in measures of present-moment pain, negative body image, inhibition of activity by pain, symptoms, mood disturbance, and psychological symptomatology, including anxiety and depression. Pain-related drug utilization decreased and activity levels and feelings of self-esteem increased. Improvement appeared to be independent of gender, source of referral, and type of pain. A comparison group of pain patients did not show significant improvement on these measures after traditional treatment protocols. At follow-up, the improvements observed during the meditation training were maintained up to 15 months post-meditation training for all measures except present-moment pain. The majority of subjects reported continued high compliance with the meditation practice as part of their daily lives. The relationship of mindfulness meditation to other psychological methods for chronic pain control is discussed.

PMID: 3897551 [PubMed - indexed for MEDLINE]
The impact of a meditation-based stress reduction program on fibromyalgia.

Kaplan KH, Goldenberg DL, Galvin-Nadeau M.

Arthritis-Fibromyalgia Center, Newton Wellesley Hospital, Massachusetts.

Fibromyalgia is a chronic illness characterized by widespread pain, fatigue, sleep disturbance, and resistance to treatment. The purpose of this study was to evaluate the effectiveness of a meditation-based stress reduction program on fibromyalgia. Seventy-seven patients meeting the 1990 criteria of the American College of Rheumatology for fibromyalgia took part in a 10-week group outpatient program. Therapists followed a carefully defined treatment approach and met weekly to further promote uniformity. Patients were evaluated before and after the program. Initial evaluation included a psychiatric structured clinical interview (SCID). Outcome measures included visual analog scales to measure global well-being, pain, sleep, fatigue, and feeling refreshed in the morning. Patients also completed a medical symptom checklist, SCL-90-R, Coping Strategies Questionnaire, Fibromyalgia Impact Questionnaire, and the Fibromyalgia Attitude Index. Although the mean scores of all the patients completing the program showed improvement, 51% showed moderate to marked improvement and only they were counted as “responders.” These preliminary findings suggest that a meditation-based stress reduction program is effective for patients with fibromyalgia.

Publication Types:
Clinical Trial
Randomized Controlled Trial

PMID: 8307341 [PubMed - indexed for MEDLINE]
Increased numbers of studies support the pathogenic link between chronic stress and exacerbation of disease. Research shows that stress significantly slows wound healing, increases pain intensity, and slows surgery recovery rates. Evidence that psychological stress may influence the course of dermatological disease is also growing, especially in the settings of psoriasis, alopecia areata, and atopic dermatitis. Clearly, there are some psychological components to the etiology of acne, because treatments such as biofeedback relaxation and cognitive imagery have been shown to be effective. More specifically, patients with acne often complain of breakouts following the experience of frustrating or stressful events. It has been observed that postadolescent patients with acne tend to be more intense and ambitious people with high-visibility jobs. Another study linking acne exacerbation with emotional factors reported an increase in acne lesion counts days following an interview during which anger was intentionally provoked.

However, other reports of stress exacerbating acne, as previously outlined, have mainly been anecdotal. Despite widespread patient and physician perception, little research has been undertaken to demonstrate this association in a convincing manner. This study uses established and validated scales of acne severity and perceived stress and the widely accepted model of examination stress to explore the possible interactions between psychological stressors and acne vulgaris.

METHODS

A clinical and questionnaire-based prospective observational cohort study was conducted at the Department of Dermatology, Stanford University School of Medicine. Approval for the study was granted by the university institutional review board. Twenty-two healthy university students (age range, 18-41 years; mean age, 22.25 years) with at least 1 academic examination within the participating academic quarter were recruited for the study by campus advertisements and by recruitment during visits to the general dermatology clinic. The study subjects were roughly representative of the student body in diversity. Twenty-two subjects provided informed consent, 19 (7 men and 12 women) completed the study, and 3 failed to return for the second visit. Of the 19 subjects who completed the study, 7 were white, 6 were Asian, 3 were African American, 1 was Mexican American, 1 was Indian, and 1 was Native American.

All participants were healthy and had an acne severity of at least 0.5 on the photonumeric Leeds acne scale. This scale gives a range of acne vulgaris severity from 0.0 to 10.0, with 0.25-i intervals. Subjects were allowed to use topical or oral acne therapies, excluding isotretinoin, and were also allowed to use oral contraceptives, as long as there was no change in these therapies 8 weeks before enrollment and throughout participation in the study. No subjects were receiving sedatives, antidepressants, or exogenous glucocorticoids.

A single observer (A.C.) graded all subjects’ acne severities according to the Leeds technique twice during the study. The first time was approximately 1 month before any examinations (nonexamination period). The second assessment was within a time frame of 3 days before an examination to 7 days after an examination (examination period). All grading was done without knowledge of the subjects’ perceived stress scores. However, because the investigator still knew whether it was a nonexamination or an examination period, digital photographs were taken of the subjects from a frontal view, left profile, and right profile, in front of a blue background during the nonexamination and the examination periods. A different investigator (S.Y.C.), blinded to which period the photographs were taken, was then asked to identify in which set of photographs the acne severity seemed improved or worse, or if it remained the same. This investigator, who is a board-certified dermatologist, was not asked to give an absolute Leeds acne score because palpation is an important consideration in the grading, and photographic representation did not allow the kind of detail and clarity required for more refined grading.

On both visits, participants’ perceived stress was measured by the Perceived Stress Scale, a 14-item self-questionnaire that measures perceptions of life stress, including how often subjects perceived their life to be uncontrollable, unpredictable, and overwhelming. This scale is widely used in stress research and has demonstrated normative data and reliability, with higher scores indicating increased levels of perceived stress. During each visit, subjects were also asked to estimate how many hours of sleep per night they were experiencing, on average, during the past month; how many meals per day they were eating; and to estimate sleep and diet quality on a scale from 1 to 4 (1, poor; 2, fair; 3, good; and 4, excellent). Statistical analysis using paired t tests, correlation analyses, and regression analyses were completed using Statistical Product and Service Solutions software (SPSS Inc, Chicago, Ill).

RESULTS

By using logistic regression and adjusting for change in sleep hours, change in perceived sleep quality, change in meals per day, and change in perceived diet quality, an increase in stress strongly correlated with a progressive increase in acne severity. In other words, subjects who had the greatest increases in stress during examination periods also had the greatest exacerbations in acne severity. There were 5 students who reported similar stress levels at both visits, with a perceived stress score either the same or within 3 points. In these subjects, acne severity either remained the same during both periods or varied only by 0.25 in either direction. Interestingly, results also suggest that worsening perceived diet quality is significantly associated with acne exacerbation, although its influence on acne severity is weaker than that of increasing stress levels.

Estimated hours of sleep per night had a small and nonsignificant decline during examination periods, from 6.6 to 6.3 hours (P = .10). The association between worsened sleep quality and acne exacerbation was close to significant (P = .06). Of the other lifestyle factors recorded, none were significantly different between the examination and the nonexamination periods, and none were associated with changes in acne severity.

COMMENT

Acne vulgaris is a common inflammatory condition of the skin affecting more than 80% of teenagers and 25% of adults. One third of adults who have acne admit to feeling embarrassed or self-conscious because of their skin.27 Despite the prevalence of this condition and considerable
research, there is still much unsubstantiated myth surrounding the causes of acne. Specifically, stress is often cited as playing a role in acne flares, even though there is little research to support this claim. Although it is well-known that acne can be a source of significant stress and anxiety, there is scientific evidence outside of anecdotal reports that stress itself may worsen acne that has been lacking.

In this study, subjects who demonstrated the greatest increase in perceived stress during examinations also displayed the greatest exacerbation of acne severity in a proportional predictable manner. Although other changes occur in a student’s life during examination periods that can potentially confound this study, the association between stress and worsened acne remained significant even after controlling for changes in diet and sleep habits. The calculated correlation coefficient of 0.61 suggests a convincing association, because this is well above the statistically accepted critical coefficient of 0.44 in a study with 20 subjects. More important, the primary investigator (A.C.) did not know the subjects’ stress scores at the time of acne grading and, thus, could not predict whether they were more or less stressed.

To assess whether investigator bias may have affected the results of the study, we asked a board-certified dermatologist, blinded to examination period status, to grade randomized clinical photographs of the subjects. There was a discrepancy in grading between the clinical and photographic investigators for only 3 of 19 subjects, suggesting that investigator bias was unlikely a significant factor in affecting study results. Differences in grading may have been due to difficulty in detecting deep or noninflamed lesions on photographs or interrater variability.

It is possible that other factors not controlled for in our study, such as menstrual cycle or hormonal influence, facial hygiene, or picking and squeezing of acne lesions, may have contributed to the worsening of acne during examinations. None of the subjects reported acne flaring with their menstrual cycles. Furthermore, the investigator was trained to differentiate between truly worsened acne and manipulated skin, as picking generally results in acne excorièè, characterized by crusts and excoriations.

As in any study, finding a correlation between 2 variables does not necessarily mean a direct cause-and-effect relationship. It is certainly plausible that the correlation observed is in part due to worsened acne itself causing increased stress, instead of the reverse relationship. However, in a high-achieving population such as university students, subjects tended to report becoming less concerned with their appearance during examinations. Thus, it is more likely that increasing stress exacerbates acne instead of the reverse relationship.

Surprisingly, self-perceived worsening of diet quality was also associated with increased acne severity in this study. However, perceived diet quality was recorded in this study, not a quantifiable measure of the subjects’ diets in terms of calories and grams of fat. Furthermore, the scale used to measure diet quality was not a previously validated tool like the Perceived Stress Scale or the Leeds acne scale. These results should, therefore, be interpreted with caution because the hypothesis that diet is an important factor in acne has been largely refuted in previous reports.

Various mechanisms have been proposed for why stress may potentially aggravate acne vulgaris. Some investigators believe that increased glucocorticoids and adrenal androgens, both hormones known to worsen acne and possibly induce sebaceous hyperplasia, are released during periods of emotional stress. And corticotropin-releasing hormone, the body’s coordinator in the stress response, was found to increase sebaceous lipogenesis and up-regulate sebocyte conversion of androgen precursors to testosterone. There is also research suggesting that stress-induced release of neuroactive substances within the epidermis can activate inflammatory processes in the skin. Recently, substance P, a neuropeptide elicited from peripheral nerves by stress, was shown to stimulate the proliferation of sebaceous glands and to up-regulate lipid synthesis in sebaceous cells. Last, psychological stress, including examination stress, can slow wound healing by up to 40%, which could be a factor in slowing the repair of acne lesions.

Just how significant a role stress plays in the pathogenic process of acne vulgaris is yet to be determined. The participants in this study are university students who may be under more stress than the general population. Men were also underrepresented in this study, making up only 37% of the participants. Furthermore, because the subjects studied had acne severities at the lower end of the Leeds acne scale, it is unclear whether the impact of stress will prove to be minimized with more severe forms of disease. On the other hand, the examination stress model studied herein may actually underestimate the true effects of stress on acne, because emotional conflicts, such as relationships and identity, may have an even greater impact on disease than external stressors like examinations.

Ultimately, the relationship between stress and acne is clinically relevant and worth exploration because possible behavioral interventions may become viable options for patients, as may therapeutic approaches that can be adjusted during times of known stressors.

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REFERENCES
The Stress of Parenting

Being a parent can be one of life’s most joyful and rewarding experiences, but there are times in everyone’s life when the demands and hassles of daily living cause stress. The additional stress of caring for children can, at times, make parents feel angry, anxious, or just plain “stressed out”. These tensions are a normal, inevitable part of family life, and parents need to learn ways to cope so that they don’t feel overwhelmed by them.

As parents, we have to learn our jobs as we go along. Although we love our children, we soon realize that love isn’t all that’s needed. We need patience and creativity too, and sometimes, these qualities seem to be in short supply. Learning how to be a parent will probably continue until all your children are grown up. Because each child is unique, what worked with Joe will not necessarily work with Sally, and what worked for Sally probably will not help you cope with George.

Caring for small children is tiring. On bad days, we can feel trapped by the constant responsibility. Caring for older children is less physically draining but more worrisome because they spend much more time outside the home.

If there are young children in the family, there may not be enough time for parents to find time to spend together just enjoying each other’s company. Single parents have difficulty finding time and energy to have a social life. Parents with full-time jobs have difficulty finding family play-time. Calendars tend to become over-scheduled. We all need time for ourselves, to concentrate on hobbies or interests, or just to relax.

Have a realistic attitude

Most parents have high expectations of how things should be—we all want a perfect family and we all worry about how our children will turn out. It is important to remember there are no perfect children and no perfect parents. All children misbehave some times. Parents can make mistakes. Wanting the ideal family can get in the way of enjoying the one you have.

You may worry about whether your children will be successful. Remember—they are each individuals. Accept them for who they are. Children who are loved, encouraged and allowed to grow up at their own pace will develop good self-esteem and confidence.

It is helpful to step back and take a long-range point of view. Have confidence that things will turn out well. Children can go through difficult stages. What is stressful today may resolve itself in a short time.

How to recognize the symptoms of stress

Stress becomes a problem when you feel overwhelmed by the things that happen to you. You may feel “stressed out” when it seems there is too much to deal with all at once, and you are not sure how to handle it all.

When you feel stressed, you usually have some physical symptoms. You can feel tired, get headaches, stomach upsets or backaches, clench your jaw or grind your teeth, develop skin rashes, have recurring colds or flu, have muscle spasms or nervous twitches, or have problems sleeping.

Mental signs of stress include feeling pressured, having difficulty concentrating, being forgetful and having trouble making decisions.

Emotional signs include feeling angry, frustrated, tense, anxious, or more aggressive than usual.

How can you cope?

Coping with the stress of parenting starts with understanding what makes you feel stressed, learning to recognize the symptoms of too much stress, and learning some new ways of handling life’s problems. You may not always be able to tell exactly what is causing your emotional tension, but it is important to remind yourself that it is not your children’s fault.

We all have reactions to life’s events which are based on our own personal histories. For the most part, we never completely understand the deep-down causes of all our feelings. What we must realize is that our feelings of stress come from inside ourselves and that we can learn to keep our stress reactions under control. Here are some tips which can help:

• Make time for yourself. Reserve time each week for your own activities.
• Take care of your health with a good diet and regular exercise. Parents need a lot of energy to look after children.
• Avoid fatigue. Go to bed earlier and take short naps when you can.
• Take a break from looking after the children. Help keep stress from building up. Ask for help from friends or relatives to take care of the children for a while. Exchange babysitting services with a neighbour, or hire a teenager, even for a short time once a week to get some time for yourself.
• Look for community programs for parents and children. They offer activities that are fun, other parents to talk with, and some even have babysitting.
• Talk to someone. Sharing your worries is a great stress reducer!
• Look for parenting courses and groups in your community.
• Learn some ways of unwinding to manage the tension. Simple daily stretching exercises help relieve muscle tension. Vigorous walking, aerobics or sports are excellent ways for some people to unwind and work off tension; others find deep-breathing exercises are a fast, easy and effective way to control physical and mental tension.
• If you’re feeling pressured, tense or drawn out at the end of a busy day, say so. Tell your children calmly that you will be happy to give them some attention soon but first you need a short “quiet time” so that you can relax.
• Practise time management. Set aside time to spend with the children, time for yourself, and time for your spouse and/or friends. Learn to say “no” to requests that interfere with these important times. Cut down on outside activities that cause the family to feel rushed.

Develop good relationships

Family relationships are built over time with loving care and concern for other people’s feelings. Talk over family problems in a warm, relaxed atmosphere. Focus on solutions rather than finding blame. If you are too busy or upset to listen well at a certain time, say so. Then agree on a better time, and make sure to do it. Laugh together, be appreciative of each other, and give compliments often. It may be very hard to schedule time to spend with your family, doing things that you all enjoy, but it is the best time you will ever invest.
Parents and children need time to spend one-to-one. Whether yours is a one or two-parent family, each parent should try to find a little time to spend alone with each child. You could read a bedtime story, play a game, or go for a walk together.

Do you need more help?
If you are considering getting some additional support or information to help you cope with the stress of parenting, there are many different resources available, including books and video tapes on stress management, parenting courses and workshops, professional counselling and self-help groups. Contact a community organization, such as the Canadian Mental Health Association, for more information about services in your community.


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A previous study of 22 medical patients with DSM-III-R-defined anxiety disorders showed clinically and statistically significant improvements in subjective and objective symptoms of anxiety and panic following an 8-week outpatient physician-referred group stress reduction intervention based on mindfulness meditation. Twenty subjects demonstrated significant reductions in Hamilton and Beck Anxiety and Depression scores postintervention and at 3-month follow-up. In this study, 3-year follow-up data were obtained and analyzed on 18 of the original 22 subjects to probe long-term effects. Repeated measures analysis showed maintenance of the gains obtained in the original study on the Hamilton [F(2,32) = 13.22; p < 0.001] and Beck [F(2,32) = 9.83; p < 0.001] anxiety scales as well as on their respective depression scales, on the Hamilton panic score, the number and severity of panic attacks, and on the Mobility Index-Accompanied and the Fear Survey. A 3-year follow-up comparison of this cohort with a larger group of subjects from the intervention who had met criteria for screening for the original study suggests generalizability of the results obtained with the smaller, more intensively studied cohort. Ongoing compliance with the meditation practice was also demonstrated in the majority of subjects at 3 years. We conclude that an intensive but time-limited group stress reduction intervention based on mindfulness meditation can have long-term beneficial effects in the treatment of people diagnosed with anxiety disorders.

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Using Stress, Appraisal, and Coping Theories in Clinical Practice: Assessments of Coping Strategies After Disasters

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Published by Oxford University Press

Abstract: This conceptual article describes transactional theory (R. S. Lazarus, 1999; R. S. Lazarus & S. Folkman, 1984), a framework that integrates stress, appraisal, and coping theories as they relate to how individuals react to psychologically stressful situations and/or environments.

In clinical practice, this theoretical framework can be effectively utilized in the assessment, intervention, and evaluation of an individual’s psychological stress and coping responses. This paper also discusses the role that theory can play in facilitating clinicians’ assessment of the coping strategies their clients use to decrease distress in the aftermath of a disaster. Illustrative examples are drawn from studies on social workers who experienced the World Trade Center disaster in New York City. Theoretical knowledge about stress, more specifically coping with the impact of psychological stress, will provide information that can help clinical professionals more effectively assist clients in resuming positive functioning and well-being after a disaster.

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Yoga for epilepsy

Ramaratnam S, Sridharan KK

Summary

Yoga for epilepsy

No reliable evidence to support the use of yoga as a treatment for control of epilepsy.

Epilepsy is a disorder where recurrent seizures are caused by abnormal electrical discharges in the brain. Most seizures can be controlled by antiepileptic drugs but sometimes seizures develop which are resistant to those drugs. People may also wish to try non drug treatments such as yoga. This review assesses the utility of yoga as a treatment for control of epilepsy. No reliable evidence was found to support the use of yoga and further trials are needed.

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Abstract

Background

Stress is considered an important precipitating factor for seizures. Yoga is believed to induce relaxation and stress reduction. The effect of yoga on the electroencephalogram and the autonomic nervous system has been reported. Yoga would be an attractive therapeutic option for epilepsy (if proved effective), in view of its non pharmacological nature, minimal adverse effects and international acceptance.

Objectives

To assess the efficacy of yoga in the treatment of people with epilepsy.

Search strategy

We searched the Cochrane Epilepsy Group Specialized Register (September 2006), the Cochrane Central Register of Controlled Trials (The Cochrane Library Issue 3, 2006), MEDLINE (1966 to September 2006), and also registries of the Research Council for Complementary Medicine. In addition, we searched the references of all the identified studies.
Selection criteria
Randomized control trials and controlled clinical trials of treatment of epilepsy with yoga.
Data collection and analysis
Two review authors independently selected trials for inclusion and extracted data. Outcomes investigated included: percentage of people rendered seizure free; seizure frequency and duration. Analyses were on an intention-to-treat basis.

Main results
Only one study with 32 participants met the inclusion criteria, 10 to sahaja yoga and 22 to control. Antiepileptic drugs were continued in all. Randomization was by roll of a dice. The results of this study are as follows:

(i) seizure free for six months - the odds ratio (OR) with 95% confidence intervals (CIs) for yoga versus sham yoga group was 14.54 (95% CI 0.67 to 316.69) and for yoga versus no treatment group 17.31 (95% CI 0.80 to 373.45);
(ii) reduction in seizure frequency - the weighted mean difference between yoga versus sham yoga group was -2.10 (95% CI -3.15 to -1.05) and for the yoga versus no treatment group -1.10 (95% CI -1.80 to -0.40);
(iii) more than 50% reduction in seizure frequency - the OR for yoga versus sham yoga group was 81.00 (95% CI 4.36 to 1504.46) and for the yoga versus no treatment group was 158.33 (95% CI 2.42 to 1187.26);
(iv) more than 50% reduction in seizure duration - the OR for yoga versus sham yoga group was 5.78 to 4335.63; and for the yoga versus no treatment group 53.57 (95% CI 2.42 to 1187.26).

Authors’ conclusions
No reliable conclusions can be drawn regarding the efficacy of yoga as a treatment for epilepsy. Further studies are needed.
tion would effectively improve depressive symptoms in patients with RA, and whether disease activity, psychological distress, and well-being would be improved by the program.

The Mindfulness-Based Stress Reduction (MBSR) program is a method developed by Dr. Kabat-Zinn and colleagues at the University of Massachusetts Medical School (8). “Mindfulness” is defined as moment-to-moment non-judgmental awareness and emotional well-being, both developed and cultivated through meditation (9). MBSR teaches participants to notice and relate differently to thoughts and emotions by cultivating a sense of compassion for self and others underlying the endeavor. By continually bringing the mind back to the present moment, mindfulness meditation is thought to increase clarity, calmness, and well-being. A number of descriptive and controlled studies have provided evidence that MBSR leads to improvement of various measures of psychological symptoms in patients with chronic pain (8,10), anxiety disorders (11,12), fibromyalgia (14–16), cancer (17–21), multiple sclerosis (22), and organ transplant (23,24). MBSR has been associated with reductions in depressive symptoms (12,17,19,23,25,26) and has been shown to significantly reduce relapse among patients in remission for major depressive disorder (27,28). However, despite the numerous studies that have provided evidence that MBSR leads to improvement in various measures of psychological symptoms in patients with RA, and whether disease activity, psychological distress, and well-being would be improved by the program.

PATIENTS AND METHODS

Patients. A sample size (n = 80) was calculated assuming an α error of 0.05, a β error of 0.20, an effect size of 0.70, and accounting for a 15% drop-out rate, all using baseline means and standard deviations estimated from the RA and MBSR literature. Adult patients with RA were recruited through advertisements in Baltimore newspapers, presentations to rheumatologists, presentations at community health fairs, and informational flyers widely distributed throughout the Baltimore Chapter of the Arthritis Foundation. Respondents were screened by telephone and, if able and eligible, invited to attend the baseline session. Inclusion criteria were a physician’s diagnosis of RA, age ≥18 years, and, at baseline assessment, not in remission of RA according to criteria established by the American College of Rheumatology (formerly the American Rheumatism Association) (29). Exclusion criteria included major psychiatric illness, active alcohol or drug dependency, denial of symptoms, inability to attend study sessions, concurrent participation in another clinical trial, and scheduled major surgery. All patients received regular care of their rheumatologists throughout the study.

Procedure. Participants deemed eligible following baseline assessment were randomly assigned to either the intervention (MBSR group) or the control group. Those in the intervention group participated in the MBSR class for 8 weeks, after which all participants returned for a 2-month followup visit. The intervention continued with participants attending 1 additional meeting over the following 4 months, with the final assessment made 6 months postbaseline. Participants in the waitlist control group were offered MBSR free of charge if circumstances permitted. Two cohorts of participants took part: cohort 1 (18 MBSR members, 18 controls) was conducted from March through September in 2004 and cohort II (13 MBSR members, 14 controls) was conducted from September 2004 through March 2005.

Randomization was assigned by a computer program and carried out by the research director, who had no patient contact. The general features of the assignment process were as outlined by Meinert (30), and included a documented, reproducible generation scheme. Allocation codes were not assigned until eligibility was determined, consent obtained, and baseline data collected. The assignment schedule involved a fixed allocation ratio of 1:1:1 treatment to control participants, stratified on antidepressant medication status (current prescription or not), using random treatment assignment within randomly selected block sizes to force balance within antidepressant category.

RA disease activity was evaluated by physical examination and blood test, and psychological outcomes were assessed by self-report questionnaires. Both with RA. Participants were taught the classes, all trained through the Center for Mindfulness Meditation in RA Patients.

The Mindfulness-Based Stress Reduction (MBSR) program is a method developed by Dr. Kabat-Zinn and colleagues at the University of Massachusetts Medical School (8). “Mindfulness” is defined as moment-to-moment non-judgmental awareness and emotional well-being, both developed and cultivated through meditation (9). MBSR teaches participants to notice and relate differently to thoughts and emotions by cultivating a sense of compassion for self and others underlying the endeavor. By continually bringing the mind back to the present moment, mindfulness meditation is thought to increase clarity, calmness, and well-being. A number of descriptive and controlled studies have provided evidence that MBSR leads to improvement of various measures of psychological symptoms in patients with chronic pain (8,10), anxiety disorders (11,12), fibromyalgia (14–16), cancer (17–21), multiple sclerosis (22), and organ transplant (23,24). MBSR has been associated with reductions in depressive symptoms (12,17,19,23,25,26) and has been shown to significantly reduce relapse among patients in remission for major depressive disorder (27,28). However, despite the numerous studies that have provided evidence that MBSR leads to improvement in various measures of psychological symptoms in patients with RA, and whether disease activity, psychological distress, and well-being would be improved by the program.

The study flowchart (based on the Consolidated Standards of Reporting Trials recommendations) is shown in Figure 1 (31). Statistical analysis. To assess the effect of the intervention, adjusted means and a priori-defined outcomes of adjusted mean change from baseline at 2 and 6 months were compared between the intervention (MBSR) and control groups using a mixed model repeated measures regression analysis, with MBSR and control conditions compared using group contrasts, as implemented by the MIXED procedure in SAS version 9.1 (SAS Institute; Cary, NC; 2003). The effect of the 8-week MBSR class as a stand-alone intervention was evaluated by the change in the severity index of the 4-month maintenance program was estimated by results at 6 months. Means were adjusted for confounding variables, which were selected a priori to change the group (intervention vs. control) β coefficient by more than 10% and remained significant when included in the multivariable model. Analyses were carried out in intent-to-treat fashion, with all available participant data included, regardless of compliance to protocol (37). To evaluate the effect of missing data, all models were rerun with missing data imputed as last value carried forward. Because results using imputed data were similar to those using nonimputed data, we elected to use the latter in the final analyses. Factors associated with intervention, such as age, duration and the sum and frequency of practice time over the first 2 months, were assessed within the treatment group alone, using linear regression models for outcomes at 2 months and 6 months separately.

Figure 1. Flowchart of the Mindfulness Intervention for Rheumatoid Arthritis study (n = 63). RA = rheumatoid arthritis; MBSR = Mindfulness-Based Stress Reduction group.

The study flowchart (based on the Consolidated Standards of Reporting Trials recommendations) is shown in Figure 1 (31). Statistical analysis. To assess the effect of the intervention, adjusted means and a priori-defined outcomes of adjusted mean change from baseline at 2 and 6 months were compared between the intervention (MBSR) and control groups using a mixed model repeated measures regression analysis, with MBSR and control conditions compared using group contrasts, as implemented by the MIXED procedure in SAS version 9.1 (SAS Institute; Cary, NC; 2003). The effect of the 8-week MBSR class as a stand-alone intervention was evaluated by the change in the severity index of the 4-month maintenance program was estimated by results at 6 months. Means were adjusted for confounding variables, which were selected a priori to change the group (intervention vs. control) β coefficient by more than 10% and remained significant when included in the multivariable model. Analyses were carried out in intent-to-treat fashion, with all available participant data included, regardless of compliance to protocol (37). To evaluate the effect of missing data, all models were rerun with missing data imputed as last value carried forward. Because results using imputed data were similar to those using nonimputed data, we elected to use the latter in the final analyses. Factors associated with intervention, such as age, duration and the sum and frequency of practice time over the first 2 months, were assessed within the treatment group alone, using linear regression models for outcomes at 2 months and 6 months separately.

RESULTS

The concept of mindfulness is integral to MBSR. The Mindfulness Attention Awareness Scale (MAAS) was created to assess the state of mindfulness by evaluating one of its core characteristics: attention to what is taking place in the present (36). The range of the MAAS score is 1–6, with higher scores indicating greater mindfulness.

Psychological intervention. The MBSR course was 8 weeks in length, with participants meeting once weekly for 2.5 hours, and also attending a full-day retreat. Classes consisted of conceptual training in mindfulness, discussions of its application in daily life, and experiential training in meditation and gentle yoga. Meditation was introduced in 4 formats: sitting meditation using the breath as an anchor of attention, sitting meditation characterized by a state of open awareness, progressive body relaxation meditation, and contemplative walking. Yoga poses were tailored according to participants’ needs. Participants were asked to practice at home 5 minutes a day, 6 days a week, aided by an audio CD. Three certified MBSR teachers taught the classes, all recruited through the Center for Mindfulness at the University of Massachusetts Medical School. Standard course materials were used. Intervention participants agreed to document the number of minutes spent daily on each practice at home in the first 2 months.

Statistical analysis. To assess the effect of the intervention, adjusted means and a priori-defined outcomes of adjusted mean change from baseline at 2 and 6 months were compared between the intervention (MBSR) and control groups using a mixed model repeated measures regression analysis, with MBSR and control conditions compared using group contrasts, as implemented by the MIXED procedure in SAS version 9.1 (SAS Institute; Cary, NC; 2003). The effect of the 8-week MBSR class as a stand-alone intervention was evaluated by the change in the severity index of the 4-month maintenance program was estimated by results at 6 months. Means were adjusted for confounding variables, which were selected a priori to change the group (intervention vs. control) β coefficient by more than 10% and remained significant when included in the multivariable model. Analyses were carried out in intent-to-treat fashion, with all available participant data included, regardless of compliance to protocol (37). To evaluate the effect of missing data, all models were rerun with missing data imputed as last value carried forward. Because results using imputed data were similar to those using nonimputed data, we elected to use the latter in the final analyses. Factors associated with intervention, such as age, duration and the sum and frequency of practice time over the first 2 months, were assessed within the treatment group alone, using linear regression models for outcomes at 2 months and 6 months separately.

Figure 1. Flowchart of the Mindfulness Intervention for Rheumatoid Arthritis study (n = 63). RA = rheumatoid arthritis; MBSR = Mindfulness-Based Stress Reduction group.
Two-month outcome. Results at 2 months are shown in Table 2. There were no significant differences between groups in any of the outcomes at 2 months.

Six-month outcome. Results at 6 months are shown in Table 3. The model for depressive symptoms had a marginally significant group by time interaction (F = 3.16, 56 df, P = 0.08), suggesting a trend toward treatment effect over 6 months. There was a significant impact of the intervention on psychological distress (F = 0.02, 56 df, P = 0.04). Although reductions of similar magnitude were observed for depressive symptoms and psychological distress, only the latter was statistically significant; this is likely due to the smaller variance observed for psychological distress. There also was a significant impact on well-being (F = 5.23, 56 df, P = 0.03). The improvement in mindfulness was marginally significant (F = 2.96, 56 df, P = 0.09). No impact of the intervention was observed on RA disease activity (F = 0.50, 52 df, P = 0.48).

Practice variables. With respect to the relation between the practice of MBSR and outcomes within the treatment group alone, neither overall sum of practice time nor sum of time spent on a specific practice predicted change in any measure by 2 months. However, frequency was important. From baseline to 2 months, each 1-day increase in practice was associated with improvement of ~0.03 in depressive symptoms (P = 0.04) and ~0.01 in psychological distress (P = 0.09). These small changes were associated with larger improvements when multiplied, such that practicing MBSR 40 versus 30 days, for example, was associated on average with improvement of ~0.10 in psychological distress, or 23% of the baseline mean. At 6 months, no MBSR class variable was associated with change, except having been taught by 1 specific teacher of the 3 who participated. Being taught by this teacher for the course and maintenance program was associated with improvement of ~0.30 (P = 0.03) in depressive symptoms and ~0.15 (P = 0.05) in psychological distress when compared with the other 2 baselines.

Compliance to MBSR class attendance and practice was high. Of a total of 6 classes, the median (interquartile range [IQR]) was 6 (0–6). Participant logs indicated the mean ± SD total home practice time was 47.12 ± 21.26 hours, or just over an hour a day for 6 weeks. Of 49 possible days during which practice could have been undertaken, the median (IQR) was 42 (30–48) (data not shown).

At the 6-month interview, 85.7% of MBSR participants present reported undertaking the practices in the 2 weeks before the visit, indicating continued engagement with the program. Those MBSR participants reported receiving very high value from using the mindfulness techniques in everyday life situations (71.4%), learning/personal growth (85.7%), socializing in class (67.9%), and meeting study staff (78.6%) (data not shown). There were no study-related adverse events reported at any time.

**DISCUSSION**

We conducted a pilot study with a randomized, waitlist-controlled design to assess an intervention comprising an 8-week mindfulness-based stress reduction program (MBSR) in RA patients to determine whether it could be effective as an adjuvant to disease-modifying antirheumatic drugs (DMARDs). The primary measure was psychological distress. There was a significant impact on psychological distress. There also was a significant impact on well-being. The improvement in mindfulness was marginally significant. The unadjusted means by visit of each outcome are shown in Figure 2.

**Figure 2.** Unadjusted means at baseline (BL), 2 months (2M), and 6 months (6M) in the Mindfulness Intervention for Rheumatoid Arthritis study *.

**Table 1.** Baseline characteristics of 63 patients participating in the Mindfulness Intervention in Rheumatoid Arthritis study *.

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>MBSR group (n = 31)</th>
<th>Control group (n = 32)</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female</td>
<td>26 (84)</td>
<td>29 (91)</td>
<td>0.47</td>
</tr>
<tr>
<td>White</td>
<td>22 (71)</td>
<td>23 (72)</td>
<td>0.57</td>
</tr>
<tr>
<td>College degree or higher</td>
<td>17 (55)</td>
<td>22 (69)</td>
<td>0.30</td>
</tr>
<tr>
<td>Married</td>
<td>18 (58)</td>
<td>22 (69)</td>
<td>0.44</td>
</tr>
<tr>
<td>Family income ≤$50,000</td>
<td>17 (54)</td>
<td>22 (69)</td>
<td>0.31</td>
</tr>
<tr>
<td>History of clinical depression</td>
<td>0 (0)</td>
<td>7 (22)</td>
<td>0.01</td>
</tr>
<tr>
<td>Age, mean ± SD years</td>
<td>56 ± 9</td>
<td>53 ± 11</td>
<td>0.23</td>
</tr>
<tr>
<td>Duration of RA, mean ± SD years</td>
<td>6 ± 7</td>
<td>11 ± 12</td>
<td>0.06</td>
</tr>
<tr>
<td>Pain at past week, mean ± SD on 0–100 scale</td>
<td>42 ± 25</td>
<td>43 ± 18</td>
<td>0.80</td>
</tr>
</tbody>
</table>

RA medications

| DMARDs | 27 (87) | 22 (69) | 0.33 |
| Corticosteroids | 13 (42) | 12 (38) | 0.80 |
| Biologic response modifiers | 6 (19)  | 5 (16)  | 0.75 |
| NSAIDs (n=0) | 8 (26)  | 7 (22)  | 1.00  |

Baseline outcomes, mean ± SD

| Depression       | 0.62 ± 0.51 | 0.64 ± 0.54 | 0.84 |
| Psychological distress | 0.43 ± 0.34 | 0.42 ± 0.31 | 0.91 |
| Well-being       | 199.71 ± 27.96 | 207.75 ± 28.60 | 0.26 |
| Mindfulness      | 4.41 ± 0.93 | 4.62 ± 0.95 | 0.36 |
| RA disease activity (DAS28) | 3.85 ± 1.10 | 4.06 ± 1.19 | 0.47 |

P < 0.05 indicates a significant difference from Fisher’s exact test, mean by Student’s t-test.

* Including cyclooxygenase 2 inhibitors.

† Frequencies tested by Fisher’s exact test, means by Student’s t-test.

‡ Including cyclooxygenase 2 inhibitors.

### Table 2. Adjusted mean outcomes at baseline and 2 months of 63 patients participating in the Mindfulness Intervention in Rheumatoid Arthritis study *

<table>
<thead>
<tr>
<th>Outcome</th>
<th>MBSR</th>
<th>Control</th>
<th>P (df)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Depression</td>
<td>§</td>
<td>0.43 (58)</td>
<td>0.52</td>
</tr>
<tr>
<td>Baseline</td>
<td>0.66 ± 0.09</td>
<td>0.58 ± 0.09</td>
<td>0.44</td>
</tr>
<tr>
<td>2 months</td>
<td>0.43 ± 0.08</td>
<td>0.40 ± 0.08</td>
<td>0.78</td>
</tr>
<tr>
<td>Change</td>
<td>−0.23 ± 0.07</td>
<td>−0.16 ± 0.07</td>
<td>0.52</td>
</tr>
<tr>
<td>Psychological distress §</td>
<td>1.27 (57)</td>
<td>0.27</td>
<td></td>
</tr>
<tr>
<td>Baseline</td>
<td>0.44 ± 0.06</td>
<td>0.37 ± 0.06</td>
<td>0.42</td>
</tr>
<tr>
<td>2 months</td>
<td>0.30 ± 0.05</td>
<td>0.30 ± 0.05</td>
<td>0.97</td>
</tr>
<tr>
<td>Change</td>
<td>−0.14 ± 0.04</td>
<td>−0.08 ± 0.04</td>
<td>0.27</td>
</tr>
<tr>
<td>Well-being</td>
<td>2.23 (57)</td>
<td>0.14</td>
<td></td>
</tr>
<tr>
<td>Baseline</td>
<td>198.18 ± 4.08</td>
<td>210.47 ± 4.88</td>
<td>0.09</td>
</tr>
<tr>
<td>2 months</td>
<td>207.34 ± 5.06</td>
<td>213.47 ± 4.91</td>
<td>0.39</td>
</tr>
<tr>
<td>Change</td>
<td>9.08 ± 2.93</td>
<td>2.99 ± 2.82</td>
<td>0.14</td>
</tr>
<tr>
<td>Mindfulness§</td>
<td>0.33 (58)</td>
<td>0.57</td>
<td></td>
</tr>
<tr>
<td>Baseline</td>
<td>4.33 ± 0.17</td>
<td>4.73 ± 0.17</td>
<td>0.30</td>
</tr>
<tr>
<td>2 months</td>
<td>4.34 ± 0.16</td>
<td>4.80 ± 0.15</td>
<td>0.03</td>
</tr>
<tr>
<td>Change</td>
<td>0.03 ± 0.14</td>
<td>0.12 ± 0.13</td>
<td>0.57</td>
</tr>
<tr>
<td>DAS28</td>
<td>1.04 (51)</td>
<td>0.31</td>
<td></td>
</tr>
<tr>
<td>Baseline</td>
<td>3.93 ± 0.19</td>
<td>4.04 ± 0.18</td>
<td>0.67</td>
</tr>
<tr>
<td>2 months</td>
<td>4.34 ± 0.20</td>
<td>4.02 ± 0.19</td>
<td>0.68</td>
</tr>
<tr>
<td>Change</td>
<td>0.22 ± 0.17</td>
<td>−0.02 ± 0.16</td>
<td>0.31</td>
</tr>
</tbody>
</table>

* MBSR = Mindfulness-Based Stress Reduction meditation group; DAS28 = Disease Activity Score in 28 joints.

† By mixed model repeated measures analysis, adjusted for history of clinical depression.

‡ Change indicates improvement.

§ Positive change indicates improvement.
### Table 3. Adjusted mean outcomes at baseline and 6 months of 63 patients participating in the Mindfulness Intervention in Rheumatoid Arthritis study

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Group ± time interaction</th>
<th>MBSR</th>
<th>Control</th>
<th>F (df)</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Depressive symptoms‡</td>
<td>Baseline</td>
<td>0.70</td>
<td>0.09</td>
<td>0.57</td>
<td>0.09</td>
</tr>
<tr>
<td>6 months</td>
<td>0.44</td>
<td>0.08</td>
<td>0.51</td>
<td>0.08</td>
<td>0.56</td>
</tr>
<tr>
<td>Change</td>
<td>0.26</td>
<td>0.08</td>
<td>0.06</td>
<td>0.08</td>
<td>0.08</td>
</tr>
<tr>
<td>Psychological distress</td>
<td>Baseline</td>
<td>0.48</td>
<td>0.06</td>
<td>0.36</td>
<td>0.06</td>
</tr>
<tr>
<td>6 months</td>
<td>0.31</td>
<td>0.05</td>
<td>0.34</td>
<td>0.05</td>
<td>0.07</td>
</tr>
<tr>
<td>Change</td>
<td>0.17</td>
<td>0.05</td>
<td>0.03</td>
<td>0.05</td>
<td>0.04</td>
</tr>
<tr>
<td>Disease Activity Score</td>
<td>Baseline</td>
<td>197.24</td>
<td>5.13</td>
<td>212.08</td>
<td>5.09</td>
</tr>
<tr>
<td>6 months</td>
<td>202.79</td>
<td>5.25</td>
<td>206.60</td>
<td>5.13</td>
<td>0.62</td>
</tr>
<tr>
<td>Change</td>
<td>5.55</td>
<td>3.44</td>
<td>5.47</td>
<td>3.38</td>
<td>0.03</td>
</tr>
<tr>
<td>mindfulness§</td>
<td>Baseline</td>
<td>4.31</td>
<td>0.17</td>
<td>4.74</td>
<td>0.18</td>
</tr>
<tr>
<td>6 months</td>
<td>4.28</td>
<td>0.14</td>
<td>4.74</td>
<td>0.14</td>
<td>0.17</td>
</tr>
<tr>
<td>Change</td>
<td>0.45</td>
<td>0.15</td>
<td>0.09</td>
<td>0.14</td>
<td>0.09</td>
</tr>
<tr>
<td>Psychological distress</td>
<td>Baseline</td>
<td>3.92</td>
<td>0.20</td>
<td>4.02</td>
<td>0.21</td>
</tr>
<tr>
<td>6 months</td>
<td>3.62</td>
<td>0.21</td>
<td>3.90</td>
<td>0.18</td>
<td>0.34</td>
</tr>
<tr>
<td>Change</td>
<td>0.30</td>
<td>0.17</td>
<td>0.12</td>
<td>0.16</td>
<td>0.65</td>
</tr>
</tbody>
</table>

‡ Negative change indicates improvement.
§ Non-change indicates improvement.

8-week MBSR class and a 4-month maintenance program. Patients were looked at the impact of this intervention on depressive symptoms, psychological distress, well-being, mindfulness, and disease activity in patients with RA. Significant effects associated with the intervention were observed, indicating psychological distress at baseline was 38% lower than in the control group. Mindfulness, as measured in our study, was the most predictive variable, as measured in the same instrument in previous MBSR studies of patients with chronic pain (8). This may have reduced our ability to detect a difference in mindfulness improvement. Additionally, both the control group and the intervention group improved at 2 months with respect to depressive symptoms, psychological distress, well-being, and mindfulness. Although symptoms improved marginally significant by study end. The increased trajectory after 2 months suggests different mechanisms underlying the change. MBSR participants reported continued practice of mindfulness through 6 months, while maintaining or continuing to improve in psychological outcomes. With controls returning essentially to baseline levels by study end, their 2-month improvements appear to have been placebo or Hawthorne effect-related. The opportunity to observe group comparisons from a 6-month perspective allowed us to see the sustained influence of mindfulness meditation above and beyond what was, perhaps, the nonenduring influence of being in a clinical trial or receiving study staff attention. The importance of employing a controlled design when evaluating an intervention such as this is highlighted by these findings.

By study end, the MBSR group achieved a significant 35% reduction in psychological distress. This net improvement in psychological symptoms is a highly meaningful advantage over usual care. The design of the trial allowed us to distinguish patterns relating to real life applications of MBSR, with improvements appearing to have been placebo or Hawthorne effect-related. The opportunity to observe group comparisons from a 6-month perspective allowed us to see the sustained influence of mindfulness meditation above and beyond what was, perhaps, the nonenduring influence of being in a clinical trial or receiving study staff attention. The importance of employing a controlled design when evaluating an intervention such as this is highlighted by these findings.

Table 3 shows the adjusted mean outcomes of the 63 patients participating in the Mindfulness Intervention in Rheumatoid Arthritis study. The table compares the MBSR group and the control group at baseline and 6 months. The outcomes measured include depressive symptoms, psychological distress, well-being, and mindfulness. The MBSR group showed significant improvements in all four outcomes compared to the control group, with reductions of 0.14 in the GSI score for depressive symptoms and 4.02 in psychological distress at baseline, and 0.31 in depressive symptoms and 0.04 in psychological distress at 6 months. These results are atypical for 8-week mindfulness-based stress reduction interventions.

In the MBSR group, significant improvements were observed in depressive symptoms, psychological distress, well-being, and mindfulness at 6 months compared to baseline. These results are consistent with previous studies of mindfulness-based stress reduction interventions in rheumatoid arthritis. In a randomized controlled trial of mindfulness meditation for RA, we found significant improvements in depressive symptoms and mindfulness, with reductions of 0.14 in the GSI score for depressive symptoms and 4.02 in psychological distress at baseline, and 0.31 in depressive symptoms and 0.04 in psychological distress at 6 months. These results are atypical for 8-week mindfulness-based stress reduction interventions.

In contrast, the control group showed little improvement in psychological distress and mindfulness. The control group did not receive the mindfulness meditation intervention and was not involved in any mindfulness practice. The lack of improvement in psychological distress and mindfulness in the control group suggests that the mindfulness meditation intervention may be beneficial in reducing psychological distress and improving mindfulness in patients with RA. The results of this study add to the growing body of evidence supporting the use of mindfulness meditation in the management of rheumatoid arthritis.

### acknowledgments

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REFERENCES


Effects of Stress Reduction on Carotid Atherosclerosis in Hypertensive African Americans

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Background and Purpose—African Americans suffer disproportionately higher cardiovascular disease mortality rates than do whites. Psychosocial stress influences the development and progression of atherosclerosis. Carotid intima-media thickness (IMT) is a valid surrogate measure for coronary atherosclerosis, is a predictor of coronary outcomes and stroke, and is associated with psychosocial stress factors. Stress reduction with the Transcendental Meditation (TM) program decreases coronary heart disease risk factors and cardiovascular mortality in African Americans. B-mode ultrasound is useful for the noninvasive evaluation of carotid atherosclerosis.

Methods—This randomized controlled clinical trial evaluated the effects of the TM program on carotid IMT in hypertensive African American men and women, aged >20 years, over a 6- to 9-month period. From the initially enrolled 138 volunteers, 60 subjects completed pretest and posttest carotid IMT data. The assigned interventions were either the TM program or a health education group. By use of B-mode ultrasound, mean maximum IMT from 6 carotid segments was used to determine pretest and posttest IMT values. Regression analysis and ANCOVA were performed.

Results—Age and pretest IMT were found to be predictors of posttest IMT values and were used as covariates. The TM group showed a significant decrease of −0.098 mm (95% CI −0.198 to 0.003 mm) compared with an increase of 0.054 mm (95% CI 0.05 to 0.158 mm) in the control group (P = 0.058, 2-tailed).

Conclusions—Stress reduction with the TM program is associated with reduced carotid atherosclerosis compared with health education in hypertensive African Americans. Further research with this stress-reduction technique is warranted to confirm these preliminary findings. (Stroke. 2000;31:568-573.)

Key Words: atherosclerosis • blacks • carotid arteries • stress • ultrasonography

African Americans suffer disproportionately higher total mortality rates than do whites. Cardiovascular diseases (CVDs), in particular, coronary heart disease (CHD) and stroke, are the major contributors to this differential. Prevalence of CHD is ~50% higher and mortality rates for stroke are 4 to 5 times higher in African Americans than in whites. Hypertension is also disproportionately high in African Americans and is a major contributor to their risk for atherosclerotic CVD mortality. Psychosocial stress has been reported to influence the development and progression of atherosclerosis in the general population and in African Americans, and may explain part of the differential and psychosocial cardiovascular morbidity and mortality in African Americans and in the general population.

Population-based and intervention studies have shown that carotid intima-media thickness (IMT) measured by B-mode ultrasound is a valid and reliable surrogate measure of coronary atherosclerosis. Carotid IMT is a significant predictor of coronary outcome and of prevalent and incident stroke and correlates with traditional and psychosocial cardiovascular risk factors in the general population. Carotid IMT is higher in African Americans than in whites, and this finding represents an increased risk for clinical CHD, stroke, and death.
several demonstrated advantages of B-mode ultrasound over angiography: (1) being noninvasive, B-mode ultrasound is especially suitable for stress evaluation; (2) it provides information in asymptomatic individuals; (3) it allows eval-
uation of early stages of the arterial disease process; (4) it provides a comprehensive analysis of IMT; and (5) compared with angiography, B-mode ultrasound requires a smaller sample size.\textsuperscript{7,10}

The present study hypothesizes that stress reduction through use of the TM program compared with a health education comparison group will regress or slow progression of carotid atherosclerosis as measured by B-mode ultrasound in a population of high-risk hypertensive urban African Americans.

Subjects and Methods
The present study was an ancillary study to a larger randomized clinical trial comparing a stress-reduction intervention, the TM program, with a health education comparison group for the treatment of hypertensive heart disease in African Americans. Subjects were tested for primary and secondary outcomes at baseline and had an intervention period after randomization of 6 to 9 months. One hundred thirty-eight men and women aged >20 years, self-identified as African American and residing in Los Angeles, with high normal blood pressure (130 to 139 mm Hg systolic blood pressure [SBP] and 80 to 85 mm Hg diastolic blood pressure [DBP]), stage I hypertension (140 to 159 mm Hg SBP and 90 to 99 mm Hg DBP), or stage II hypertension (160 to 179 mm Hg SBP and 100 to 109 mm Hg DBP) were recruited through local radio and press advertising and from community organizations. They were eligible if they had consistently elevated blood pressure (20 minutes twice a day), and expectancy of beneficial outcomes. Neither group required change in personal beliefs. Number and length of meetings were similar in both groups: TM and educ-
tion groups (see Table 1).

Baseline factors included age, sex, weight, blood pressure, pulse, mobility, and scheduling conflicts were the main reasons for attrition, reducing the health education group (56.7%) (\textit{P} = 0.025). Correlation between attendance to meetings and change in IMT scores were found to be significant for the TM group (\textit{r} = –0.42, \textit{P} = 0.018) but not for the health education group (\textit{r} = 0.11, \textit{P} = 0.56).

As seen on Table 2, the TM group showed statistically significant within-group changes in SBP, DBP, pulse, and pressure. The health education group showed significant reduction in SBP and DBP.

Discussion
This preliminary randomized controlled trial suggests that stress reduction with the TM program is associated with reduced carotid atherosclerosis in African Americans with hypertension compared with a health education comparison group. This finding is consistent with those reported in other studies of stress and lifestyle interventions: reduced heart rate, improvements in quality of life, and reduction in blood pressure. This study extends these findings to early-stage carotid disease.

Conclusion
The main finding of this study is that stress reduction with the TM program is associated with reduced carotid atherosclerosis in a population of African Americans with hypertension compared with a health education comparison group. This study is the first to report the effect of stress reduction on IMT change and suggests that this result may be related to the reduction in blood pressure achieved with TM.

\textbf{TABLE 1. Stroke Characteristics}

<table>
<thead>
<tr>
<th>Varible</th>
<th>TM Group</th>
<th>Health Education Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age, years</td>
<td>55.2±9.2</td>
<td>52.5±10.0</td>
</tr>
<tr>
<td>Male, %</td>
<td>29.0</td>
<td>34.8</td>
</tr>
<tr>
<td>SBP, mm Hg</td>
<td>145.5±13.2</td>
<td>149.0±13.7</td>
</tr>
<tr>
<td>DBP, mm Hg</td>
<td>83.4±9.9</td>
<td>87.6±12.2</td>
</tr>
<tr>
<td>Pulse, bpm</td>
<td>79.8±10.6</td>
<td>75.14±10.7</td>
</tr>
</tbody>
</table>
| Pulse pressure, mm Hg | 62.1±17.3 | 63.2±17.6 | 0.96
| Antithrombosis medication, % | 67.7 | 72.4 | 0.11 |
| Weight, kg       | 186.6±33.6| 184.0±42.4            |
| Total cholesterol, mg/dL | 2166.4±117 | 2206.1±47.2 | 0.76 |
| HDL cholesterol, mg/dL | 55.2±14.5 | 80.5±11.4 | 0.23 |
| LDL cholesterol, mg/dL | 136.7±37.1 | 142.8±38.2 | 0.58 |
| Smoking, cigarette | 1.37±4.6 | 0.73±3.7 | 0.56 |
| Carotid IMT, mm | 5.7±0.35 | 5.8±0.45 | 0.38 |

Comparative effects of TM and health education (HED) on carotid IMT in hypertensive African Americans. Graph shows mean change in IMT scores and 95% CI.

\textbf{References}

or lipid peroxidation in the progression of carotid atherosclerosis; therefore, these factors cannot be ruled out. Future studies will address these issues.

The sex distribution in the present study sample reflects the population of other clinical trials with African Americans.1,7,8 A low proportion of male participants may limit the generalizability of our findings, but they were equally distributed in the TM group (n = 92) and control group (n = 90) without affecting the observed IMT difference between groups. The analysis by sex strengthened the difference in change in IMT between groups (P = 0.02). The effect of hormonal replacement therapy in the women’s subgroup was minimal because only 3 women in the TM group and 2 women in the control group used hormone replacement therapy. The use of combined hormone therapy was not associated with a decrease in IMT in the TM group, improved arterial compliance reflected in the reduction of pulse pressure with persistent changes in blood pressure and heart rate may have had hemodynamic effects that influenced the observed IMT reduction. These results support supposition that changes in pulse pressure as a strong predictor of carotid atherosclerosis and suggest a reduction in sympathetic activation with the practice of the TM program.

For the perspective of Maharishi Vedic Medicine, stress and disease arise from a lack of integration of the various physiological systems with the holistic “inner intelligence” of the body.29 By this method, we have shown that stress reduction improves the cardiovasculature system that could be expressed as higher blood pressure or increased atherosclerosis. The practice of the TM technique involves a set of adaptive responses at the cortical, autonomic, neuroendocrine, and cardiovascular levels that would restore homeostatic and self-repair mechanisms.30 Further research on the effects of TM and the regression of atherosclerosis may help verify the proposed mechanistic hypotheses.

The present study evaluated the effects of a stress-reduction technique to prevent atherosclerosis in African Americans at high risk of cardiovascular complications. The results have potentially important implications for the prevention and treatment of atherosclerosis and its clinical and epidemiological mechanisms.24 The study was designed to evaluate the effects of TM in the primary prevention of atherosclerotic cardiovascular disease in blacks. The study results are in agreement with previous studies that showed an effect of TM on arterial stiffness as measured by pulse pressure, carotid IMT, and flow-mediated dilatation.25-28 The change in IMT scores between groups (Table 3) revealed that a significant dose-response relation existed between attendance at meetings and change in IMT scores (P = 0.017). The effect of TM on the cardiovascular system. The changes found in the present study may be related to several accelerated mechanisms of self-regulation and self-actualization occurring in concert to halt early atherosclerotic pathophysiological mechanisms. A likely mechanism explaining the reduction of IMT of the carotid wall is the decrease in excessive systemic nervous system activation. Evidence indicates that chronic psychosocial stress induces excessive adrenergic activation and sympatho-adrenal hyperactivity in carotid atherosclerosis.46,47 In the present study, stress reduction with either TM or changes in diet and exercise led to statistically significant declines in blood pressure within each group. Decrease in blood pressure in the control group, however, was not associated with a corresponding decrease in IMT. In the TM group, improved arterial compliance reflected in the reduction of pulse pressure together with changes in blood pressure and heart rate may have had hemodynamic effects that influenced the observed IMT reduction. These results support supposition that changes in pulse pressure as a strong predictor of carotid atherosclerosis and suggest a reduction in sympathetic activation with the practice of the TM program.

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10. Seeman T,鸡肉 M, Kupfer DB. The effect of mental disorders on the risk of myocardial infarction by approximately the same percentage. Similarly, based on the observation of Loeary et al.40 of the correlation between IMT and incidence of stroke, a reduction of 0.1-mm IMT would represent a 7.7% to 15% reduction in risk of stroke. With the use of different approach scores, we have determined that TM may be due to the intrinsic studies will address these issues. A likely mechanism explaining the reduction of IMT of the carotid wall is the decrease in excessive systemic nervous system activation. Evidence indicates that chronic psychosocial stress induces excessive adrenergic activation and sympatho-adrenal hyperactivity in carotid atherosclerosis.46,47 In the present study, stress reduction with either TM or changes in diet and exercise led to statistically significant declines in blood pressure within each group. Decrease in blood pressure in the control group, however, was not associated with a corresponding decrease in IMT. In the TM group, improved arterial compliance reflected in the reduction of pulse pressure together with changes in blood pressure and heart rate may have had hemodynamic effects that influenced the observed IMT reduction. These results support supposition that changes in pulse pressure as a strong predictor of carotid atherosclerosis and suggest a reduction in sympathetic activation with the practice of the TM program.

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Preface

The Agency for Healthcare Research and Quality (AHRQ), through its Evidence-based Practice Centers (EPCs), sponsors the development of evidence reports and technology assessments to assist public- and private-sector organizations in their efforts to improve the quality of healthcare in the United States. This report was requested and funded by the National Center for Complementary and Alternative Medicine (NCCAM). The reports and assessments provide organizations with comprehensive, science-based information on common, costly medical conditions and new healthcare technologies. The EPCs systematically review the relevant scientific literature on topics assigned to them by AHRQ and conduct additional analyses when appropriate prior to developing their reports and assessments.

To bring the broadest range of experts into the development of evidence reports and health technology assessments, AHRQ encourages the EPCs to form partnerships and enter into collaborations with other medical and research organizations. The EPCs work with these partner organizations to ensure that the evidence reports and technology assessment they produce will become building blocks for healthcare quality improvement projects throughout the Nation. The reports undergo peer review prior to their release.

AHRQ expects that the EPC evidence reports and technology assessments will inform individual health plans, providers, and purchasers as well as the healthcare system as a whole by providing important information to help improve healthcare quality.

We welcome comments on this evidence report. They may be sent by mail to the Task Order Officer named below at: Agency for Healthcare Research and Quality, 540 Gaither Road, Rockville, MD 20850, or by email to epc@ahrq.gov.

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Structured Abstract

Objective: To review and synthesize the state of research on a variety of meditation practices, including: the specific meditation practices examined; the research designs employed and the conditions and outcomes examined; the efficacy and effectiveness of different meditation practices for the three most studied conditions; the role of effect modifiers on outcomes; and the effects of meditation on physiological and neuropsychological outcomes.

Data Sources: Comprehensive searches were conducted in 17 electronic databases of medical and psychological literature up to September 2005. Other sources of potentially relevant studies included hand searches, reference tracking, contact with experts, and gray literature searches.

Review Methods: A Delphi method was used to develop a set of parameters to describe meditation practices. Included studies were comparative, on any meditation practice, had more than 10 adult participants, provided quantitative data on health-related outcomes, and published in English. Two independent reviewers assessed study relevance, extracted the data and assessed the methodological quality of the studies.

Results: Five broad categories of meditation practices were identified (Mantra meditation, Mindfulness meditation, Yoga, Tai Chi, and Qi Gong). Characterization of the universal or supplemental components of meditation practices was precluded by the theoretical and terminological heterogeneity among practices. Evidence on the state of research in meditation practices was provided in 813 predominantly poor-quality studies. The three most studied conditions were hypertension, other cardiovascular diseases, and substance abuse. Sixty-five intervention studies examined the therapeutic effect of meditation practices for these conditions. Meta-analyses based on low-quality studies and small numbers of hypertensive participants showed that TM®, Qi Gong and Zen Buddhist meditation significantly reduced blood pressure. Yoga helped reduce stress. Yoga was no better than Mindfulness-based Stress Reduction at reducing anxiety in patients with cardiovascular diseases. No results from substance abuse studies could be combined. The role of effect modifiers in meditation practices has been neglected in the scientific literature. The physiological and neuropsychological effects of meditation practices have been evaluated in 312 poor-quality studies. Meta-analyses of results from 55 studies indicated that some meditation practices produced significant changes in healthy participants.

Conclusion: Many uncertainties surround the practice of meditation. Scientific research on meditation practices does not appear to have a common theoretical perspective and is characterized by poor methodological quality. Firm conclusions on the effects of meditation practices in healthcare cannot be drawn based on the available evidence. Future research on meditation practices must be more rigorous in the design and execution of studies and in the analysis and reporting of results.
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Executive Summary

Introduction

The University of Alberta Evidence-based Practice Center (UAEPC) reviewed and synthesized the published literature on the state of the research of meditation practices for health. The research questions were organized under five general topics:

1. The practice of meditation;
2. The state of research on the therapeutic use of meditation practices in healthcare;
3. The evidence on the efficacy and effectiveness of meditation practices;
4. The evidence on the role of effect modifiers for the practice of meditation; and
5. The evidence on the physiological and neuropsychological effects of meditation practices.

Meditation has been a spiritual and healing practice in some parts of the world for more than 5,000 years. During the last 40 years, the practice of meditation has become increasingly popular in Western countries as a complementary mind-body therapeutic strategy for a variety of health-related problems. Meditation and its therapeutic effects have been characterized in many ways in the scientific literature. The complex nature of meditation and the coexistence of many perspectives adopted to describe the characteristics of the practice have contributed to great variations in the reports of its therapeutic effects across the studies. There is a need to evaluate the evidence that has emerged within the past several decades on the effects of meditation practices in healthcare.

Methodology

The UAEPC established a prospectively designed protocol for this evidence report. A Technical Expert Panel (TEP) was invited to provide high-level content and methodological expertise in the development of the report. Due to the lack of general consensus on a definition of meditation in the scientific literature, a set of parameters to describe meditation practices was evaluated by the TEP members using a modified Delphi methodology.

Literature Sources

Comprehensive searches were conducted in 17 relevant electronic databases up to September 2005. Other sources of potentially relevant studies included hand searches, reference tracking, contact with experts, and gray literature searches.

Study Selection

A set of strict eligibility criteria was used to include potentially relevant studies. They had to be comparative, be on any meditation practice, have more than 10 adult participants, provide quantitative data on health-related outcomes, and be published in English. The criteria of study methodology were modified to address each of the research topics of the review. Sources of secondary data (e.g., systematic reviews, narrative reviews, and book chapters) were used for topic I. Topics II to V included studies with a comparison/control group or control period: randomized controlled clinical trials (RCTs), nonrandomized controlled clinical trials (NRCTs) (topics III to V), prospective and retrospective observational studies with controls (topic II), case-control studies (topic II), uncontrolled before-and-after studies (topics II and V), and cross-sectional studies with controls (topic II).

Data extraction and Assessment of Study Quality

Trained research assistants extracted the data using a comprehensive and pretested data extraction form. One reviewer verified the accuracy and completeness of the data.

Studies included in the descriptive overview on the practice of meditation (topic I) were not assessed for methodological quality. For topics II to V, the methodological quality of RCTs and NRCTs was assessed using the criteria for concealment of allocation and the Jadad Scale. The quality of observational analytical studies (e.g., prospective and retrospective observational studies, case-control studies, and cross-sectional studies with controls) was assessed using the Newcastle-Ottawa Scales (NOS). The quality of the before-and-after studies was evaluated against four criteria adapted from the NOS.

Two independent reviewers assessed study relevance, extracted the data and assessed the methodological quality of the studies. Disagreements among reviewers were adjudicated by a third reviewer.

Synthesis of the Evidence

Data for topic I on the practice of meditation were synthesized qualitatively. A combination of qualitative and quantitative approaches was used to synthesize the data in Topics II to V. Details of individual studies were summarized in evidence tables including information on the article source, study design, study population (e.g., sample size, age, and gender), treatment groups, and outcomes. Meta-analyses using the standard inverse variance and random effects model were planned to derive pooled estimates from individual studies to support inferences regarding the magnitude and direction of the effect of meditation practices. Forest plots were used to display the individual and pooled results. An analysis of publication bias was also planned.

Results

Topic I. The Practice of Meditation

Five broad categories of meditation practices were identified in the included studies: Mantra meditation (comprising the Transcendental Meditation® technique [TM®], Relaxation Response [RR], and Clinically Standardized Meditation [CSM]), Mindfulness meditation (comprising Vipassana, Zen Buddhist meditation, Mindfulness-based Stress Reduction [MBSR], and Mindfulness-based Cognitive Therapy [MBCT]), Yoga, Tai Chi, and Qi Gong. Given the variety of the practices and the fact that some are single entities (TM®, RR, and CSM, Vipassana,
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MBSR, and MBCT) while others are broad categories that encompass a variety of different techniques (Yoga, Tai Chi, Qi Gong), it is impossible to select components that might be considered universal or supplemental across practices. Though some statement about the use of breathing is universal among practices, this is not a reflection of a common approach toward breathing. The control of attention is putatively universal; however, there are at least two aspects of attention that might be employed and a wide variety of techniques for anchoring the attention. The spiritual or belief component of meditation practices is poorly described in the literature and it is unclear in what way and to what extent spirituality and belief play a role in the successful practice of meditation. The amount of variation in the described frequency and duration of practice make it difficult to draw generalizations about the training requirements for meditation techniques. The criteria for successful meditation practice have also not been described well in the literature.

Topic II. State of Research on the Therapeutic Use of Meditation Practices in Healthcare

Eight hundred and thirteen studies provided evidence regarding the state of research on the therapeutic use of meditation practices. The studies were published between 1956 and 2005, with half of the studies published after 1994. Most of the studies were published as journal articles. Studies were conducted mainly in North America (61 percent). Of the 813 studies included, 67 percent were observational studies (149 cohort and 117 cross-sectional studies), and 33 percent were intervention studies (286 RCTs, 114 NRCTs and 147 before-and-after studies), and 33 percent were observational analytical studies (149 cohort and 117 cross-sectional studies).

Quality of studies. Overall, we found the methodological quality of meditation research to be poor, with significant threats to validity in every major category of quality measured, regardless of study design. The majority of RCTs did not adequately report the methods of randomization, blinding, withdrawals, and concealment of treatment allocation. Observational studies were subject to bias arising from uncertain representativeness of the target population, inadequate methods for ascertaining exposure and outcome, insufficient followup period, and high or inadequately described losses to followup.

Meditation practices. Mantra meditation practices such as the TM® technique and the RR were the most frequently studied meditation practices. Other mantra practices such as CSB, Acem meditation, Ananda Marga, concentrative prayer, and Cayce’s meditation have been examined less frequently. The second category of meditation practices most frequently examined is Yoga. It includes a heterogeneous group of techniques such as Hatha yoga, Kundalini yoga, and Sahaja yoga. Mindfulness meditation, which includes MBSR, MBCT, and Zen Buddhist meditation, constitutes the third most studied group of meditation practices, Tai Chi the fourth, and Qi Gong the fifth. Finally, less than 5 percent of the studies on meditation have failed to explicitly describe the meditation practice.

Control groups. The number of control groups used in the 668 controlled studies ranged from one to four. The majority of the studies utilized an active, concurrent control. Among the RCTs and NRCTs, the practice of exercise and other physical activities constituted the most frequent active comparator followed by conditions involving states of rest and relaxation, health education, and progressive muscle relaxation. Almost half of the RCTs and NRCTs included comparison groups consisting of participants assigned to waiting lists, or participants that did not receive any intervention. The vast majority of observational studies used comparison groups consisting of individuals that had not been exposed to any type of meditation practice.

Topic III. Evidence on the Efficacy and Effectiveness of Meditation Practices

We summarized the evidence from RCTs and NRCTs on the effects of meditation practices for the three most studied clinical conditions identified in the scientific literature: hypertension (27 trials), other cardiovascular diseases (21 trials), and substance abuse disorders (17 trials). A few studies of overall poor methodological quality were available for each comparison in the meta-analyses, most of which reported nonsignificant results. TM® had no advantage over health education to improve measures of systolic blood pressure and diastolic blood pressure, body weight, heart rate, stress, anger, self-efficacy, cholesterol, dietary intake, and level of physical activity in hypertensive patients; RR was not superior to biofeedback in reducing blood pressure in hypertensive patients; Yoga did not produce clinical or statistically significant effects in blood pressure when compared to nontreatment; Zen Buddhist meditation was no better than blood pressure checks to reduce systolic blood pressure in hypertensive patients. Yoga was no better than physical exercise to reduce body weight in patients with cardiovascular disorders. When the relative effectiveness of a variety of meditation practices was assessed using indirect meta-analysis, we found that there were no significant differences between MBSR and Yoga to control anxiety symptoms in cardiovascular patients. Meta-analysis of the effects of meditation practices for substance abuse was not possible due to the diversity of practices, comparison groups, and outcome measures reported in each of the studies reviewed.

The results of the three highest quality trials (Jadad score = 3/5) examining, respectively, Mindfulness meditation, RR, and Yoga are inconclusive with respect to the effectiveness of meditation practices. The study comparing Mindfulness meditation with usual care (NS) for alcohol and cocaine abuse found little indication that Mindfulness meditation enhanced treatment outcomes for substance abuse patients. The study comparing RR with PMR and rest groups for alcohol abuse found generalized effects for BP, but not for the other outcome measures (anxiety, HR, and GSR). The RR and PMR groups did not exhibit increased BP as observed in control subjects. RR and PMR produced significant changes in tension. The study comparing Yoga with exercise for alcohol abuse found a significantly greater recovery rate for the Yoga group.

Statistical and clinical heterogeneity among the trials constituted a frequent and considerable problem when pooling the results, and in some cases, it precluded summarizing data across the studies. The poor methodological quality of the trials limits the strength of inference regarding the observed treatment effects reported in this review. The lack of description of the methods of allocation concealment, randomization, description of withdrawals and dropouts per treatment

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group, the absence of appropriate blinding, and the use of incompatible or inappropriate control groups undermine the validity of the results of many clinical studies.

**Topic IV. Evidence on the Role of Effect Modifiers for the Practice of Meditation**

The role of patient or meditation characteristics as effect modifiers in the practice of meditation is a topic that has so far been neglected in the scientific literature. Few studies have systematically examined factors such as dose, duration, or other specific features of meditation as moderators of the effects on outcomes. Evidence from RCTs and NRCTs regarding the interaction of meditation with other variables in populations of patients with hypertension, cardiovascular disorders, or substance abuse is scarce. A few studies conducted exploratory post hoc analyses (i.e., a subgroup analysis, multiple regression, or analysis of variance) that were intended to be hypothesis generating. No conclusions on the role of effect modifiers can be drawn from the analysis of the individual studies. Individual patient data is required to appropriately examine this issue.

**Topic V. Evidence on the Physiological and Neuropsychological Effects of Meditation Practices**

The physiological and neuropsychological effects of meditation practices were evaluated in 311 studies. The majority of studies have been conducted in healthy participants. Meta-analysis revealed that the most consistent and strongest physiological effects of meditation practices in healthy populations occur in the reduction of heart rate, blood pressure, and cholesterol. The strongest neuropsychological effect is in the increase of verbal creativity. There is also some evidence from before-and-after studies to support the hypothesis that certain meditation practices decrease visual reaction time, intraocular pressure, and increase breath holding time. As found in current literature, the overall low methodological quality of the studies indicates that most of the studies suffered from methodological problems that may result in overestimations of the treatment effects or compromise the generalizability of the study results. Particularly, the lack of a concurrent control group in the before-and-after studies results in an inability to control for temporal trends, regression to the mean, and sensitivity to methodological features. Therefore, results from meta-analyses of the physiological and neuropsychological effects of meditation practices should be interpreted cautiously.

The very small number of trials available for each comparison precluded testing for publication bias.

**Future Research**

Future research in meditation has several challenges. There is a need to develop a consensus on a working definition of meditation applicable to a heterogeneous group of practices. Another area of future inquiry consists of systematically comparing the effects of different meditation practices that research shows have promise. Special attention to the appropriate selection of controls is also paramount and future research should be directed toward investigating the unique challenges that meditation studies present in designing controls. In addition, more research should be done on the “dose response” of meditation practices to determine appropriate study durations and to help standardize courses of therapeutic meditation.

Because it is difficult to determine causation using uncontrolled before-and-after designs, it is recommended that these study designs be avoided in future research on the effectiveness of meditation practices. Researchers should aim to employ designs and analytic strategies that optimize the ability to make causal inferences (in some cases this may require the use of uncontrolled before-and-after designs). Future studies would benefit from using larger samples and employing concurrent controlled designs, using disease-specific measures and providing clearer descriptions of intervention components. Finally, the quality of reporting of meditation research would be improved by a wider dissemination and stricter enforcement of the CONSORT (Consolidated Standards of Reporting Trials) guidelines within the complementary and alternative medicine community.

**Conclusions**

The field of research on meditation practices and their therapeutic applications is beset with uncertainty. The therapeutic effects of meditation practices cannot be established based on the current literature. Further research needs to be directed toward the ways in which meditation may be defined, with specific attention paid to the kinds of definitions that are created. A clear conceptual definition of meditation is required and operational definitions should be developed. The lack of high-quality evidence highlights the need for greater care in choosing and describing the interventions, controls, populations, and outcomes under study so that research results may be compared and the effects of meditation practices estimated with greater reliability and validity. Firm conclusions on the effects of meditation practices in healthcare cannot be drawn based on the available evidence. It is imperative that future studies on meditation practices be rigorous in the design, execution, analysis, and reporting of the results.
Chapter 1. Introduction and Background

Meditation has been a spiritual and healing practice in some parts of the world for more than 5,000 years. The word “meditation” is derived from the Latin “meditari,” which means “to engage in contemplation or reflection.”

Historically, religious or spiritual aims were intrinsic to any form of meditation. These traditional practices held some type of spiritual growth, enlightenment, personal transformation, or transcendental experience as their ultimate goal. During the last 40 years, the practice of meditation has become increasingly popular and has been adapted to the specific interests and orientation of Western culture as a complementary therapeutic strategy for a variety of health-related problems. Both secular forms of meditation and forms rooted in religious and spiritual systems have increasingly attracted the interest of clinicians, researchers, and the general public, and have gained acceptance as important mind-body interventions within integrative medicine (the combination of evidence-based conventional and alternative approaches that address the biological, psychological, social, and spiritual aspects of health and illness). With an estimated 10 million practitioners in the United States and hundreds of millions of practitioners worldwide, meditation was the first mind-body intervention to be widely adopted by mainstream healthcare providers and incorporated into a variety of therapeutic programs in hospitals and clinics in the United States and abroad.

Definition and Types of Meditation

Meditation has been characterized in many ways in the scientific literature and there is no consensus definition of meditation. This diversity in definitions reflects the complex nature of the practice of meditation and the coexistence of a variety of perspectives that have been adopted to describe and explain the characteristics of the practice. Therefore, we recognize that any single definition limits the practice artificially and fails to account for important nuances that distinguish one type of meditation from another.

Cardoso et al. developed a detailed operational definition of meditation broad enough to include traditional belief-based practices and those that have been developed specifically for use in clinical settings. Using a systematic approach based on consensus techniques, they defined any practice as meditation if it (1) utilizes a specific and clearly defined technique, (2) involves muscle relaxation somewhere during the process, (3) involves logic relaxation (i.e., not “to intend” to analyze the possible psychophysical effects, not “to intend” to judge the possible results, not “to intend” to create any type of expectation regarding the process), (4) a self-induced state, and (5) the use of a self-focus skill or “anchor” for attention. From a cognitive and psychological perspective, Walsh et al. defined meditation as a family of self-regulation practices that aim to bring mental processes under voluntary control through focusing attention and awareness. Other behavioral descriptions emphasize certain components such as relaxation, concentration, an altered state of awareness, suspension of logical thought processes, and maintenance of self-observing attitude. From a more general perspective, Manocha described meditation as a discrete and well-defined experience of a state of “thoughtless awareness” or mental silence, in which the activity of the mind is minimized without reducing the level of alertness. Meditation also has been defined as a self-experience and self-realization exercise.

Despite the lack of consensus in the scientific literature on a definition of meditation, most investigators would agree that meditation implies a form of mental training that requires either stilling or emptying the mind, and that has as its goal a state of “detached observation” in which practitioners are aware of their environment, but do not become involved in thinking about it. All types of meditation practices seem to be based on the concept of self-observation of immediate psychic activity, training one’s level of awareness, and cultivating an attitude of acceptance of process rather than content.

Meditation is an umbrella term that encompasses a family of practices that share some distinctive features, but that vary in important ways in their purpose and practice. This lack of specificity of the concept of meditation precludes developing an exhaustive taxonomy of meditation practices. However, in order to systematically address the question of the state of research of meditation practices in healthcare, we must attempt to identify the components that are common to the many practices that are claimed to be meditation or that incorporate a meditative component, and also clearly distinguish meditation practices from other therapeutic and self-regulation strategies such as self-hypnosis or visualization and from other relaxation techniques that do not contain a meditative component.

Meditation practices may be classified according to certain phenomenological characteristics: the primary goal of practice (therapeutic or spiritual), the direction of the attention (mindfulness, concentrative, and practices that shift between the field or background perception and experience and an object within the field), the kind of anchor employed (a word, breath, sound, object or sensation), and according to the posture used (motionless sitting or moving). Like other complex and multifaceted therapeutic interventions, meditation practices involve a mixture of specific and vaguely defined characteristics, and they can be practiced on their own or in conjunction with other therapies. As pointed out by many authors, any attempt to create a taxonomy of meditation only approximates the multidimensional experience of the practices.

Meditation Practices as a Part of Healing and Healthcare

The interest in meditation practices as healing strategies comes with the need to acquire a deeper knowledge of the intricate connections between body and mind, and how the mental and spiritual state of an individual directly affects psychological and physical well-being. Meditation practices have been advocated as mind-body treatments for health-related problems and as methods to attain or maintain general wellness. There is a growing body of scientific literature on the effects of meditation practices for a variety of psychiatric disorders such as depression, anxiety, panic disorders, binge eating disorders, and substance abuse among others. Effects of meditation practices have been also documented using measures of emotional distress and cognitive abilities.

The effects of meditation practices as complementary treatments for medical conditions other than mental illness have been evaluated using a variety of methods and outcomes. These clinical conditions include hypertension and other cardiovascular disorders, pain syndromes and musculoskeletal diseases, respiratory disorders (e.g., asthma, congestive obstructive pulmonary disease), dermatological problems (e.g., psoriasis, allergies), immunological disorders, and treatment-related symptoms of breast and prostate cancer.

There is also a considerable interest in understanding the physiological and neuropsychological effects of certain meditation practices. Research conducted in this area
has used a variety of methodological approaches and formal evaluations of the methodological quality of this body of evidence have not been conducted.

There is a need to evaluate the evidence that has emerged within the past several decades on the effects of meditation practices in healthcare. Reports on the therapeutic effects of a variety of meditation practices vary greatly across studies. Numerous authors have claimed that most of the studies in this area are methodologically flawed and often have small sample sizes.\textsuperscript{3,4} The magnitude and direction of the effect often varies from one type of practice to another; however, authors agree that some meditation practices hold some promise of therapeutic benefit for a variety of diseases or conditions. Therefore, there is a great need to clarify and address a host of clinical and research questions regarding the benefits of these interventions.

It is also important to systematically evaluate the role that effect modifiers (e.g., age, gender, duration of practice, other characteristics of meditators, training conditions) may have in influencing the outcomes of the types of meditation. By elucidating important clinical questions regarding the therapeutic effects of meditation practices, consensus on standards of practice can be reached with a view to integrate mind-body approaches more effectively into conventional medical care.

**Objectives of the Review**

- To provide a descriptive overview and synthesis of information on meditation practices in terms of the main components of the practice, the role of spirituality, training requirements, and criteria for success.
- To conduct a systematic review and synthesis of the evidence on (1) the state of research on the therapeutic use of meditation practices in healthcare, (2) the efficacy and effectiveness of meditation practices in healthcare, (3) the role of effect modifiers for the practices, and (4) the effects of meditation practices on physiological and neuropsychological outcomes.
Chapter 2. Methods

Overview

In this chapter we document a prospectively designed protocol that the University of Alberta Evidence-based Practice Center (UAEPSC) used to develop this comprehensive evidence report on the state of research of meditation practices in healthcare.

To accomplish the tasks as directed, a core research team at the UAEPSC was assembled to review and refine the methodology of the task order. All the reviewers at the UAEPSC are trained and experienced in systematic review methodology and critical analysis of the scientific literature. In consultation with the Agency for Healthcare Research and Quality (AHRQ) Task Order Officer (TOO) and National Center for Complementary and Alternative Medicine (NCCAM) representatives, a Technical Expert Panel (TEP) was invited to provide high-level content and methodological expertise in the development of the report. The list of technical experts and their curriculum vitae were submitted to the AHRQ TOO for approval (Appendix A).

Throughout the development of the report, the UAEPSC project staff worked closely with TEP members and AHRQ and NCCAM representatives to refine the research questions. Guidance was provided through a series of teleconferences and, when needed, through individual telephone calls and e-mail.

To provide a framework for the report, we first present the key questions of the review and our analytic approach to address them. We then describe the literature review methods, including a description of how we developed a set of parameters to describe meditation practices. We outline our inclusion and exclusion criteria, the search strategy for identifying articles relevant to the key questions, and the process for abstracting and synthesizing information from eligible studies. We also describe the methods for assessing the methodological quality of individual studies and the criteria for evaluating the strength of the evidence as a whole. The methods for data analysis and synthesis and the peer review process are described at the end of the chapter.

Key Questions and Analytic Approach

The key questions of this review have been organized under five general topics:

1. What is known about the practice of meditation?

a. What are the main components of the various meditation practices (e.g., breathing, chanting, mantras, and relaxation)? Which components are universal and which ones are supplemental?
b. How is breathing incorporated in these practices? Are there specific breathing patterns that are integral elements of meditation? Is breathing passive or directed?
c. For each type of meditation practice, where is the attention directed during meditation (e.g., mantra, breath, image, nothing)?
d. To what extent is spirituality a part of meditation? To what extent is belief a part of meditation?
e. What are the training requirements for the various meditation practices (e.g., the range of training periods, frequency of training, individual and group approaches)
f. How is the success of the meditation practice determined (i.e., was it practiced properly)? What criteria are used to determine successful meditation practice?

2. What meditation practices have been examined in clinical trials and observational studies? What control groups are used?

3. Can these practices be separated by the diseases, conditions, and populations for which they have been examined?

4. What outcome measures are used? Are psychosocial outcomes included in these studies? If so, what types?

5. What is the evidence that meditation practices are efficacious for the three most studied diseases or conditions identified in question 2 above?

6. If more than one form of meditation has been studied for a particular disease or condition (as identified in question 2 above), does the efficacy of these practices differ?

7. For specific disease populations, are meditation practices that are used as a complement to conventional therapy more effective than either the conventional therapy or meditation therapy alone?

Appendices and evidence tables cited in this report are provided electronically at http://www.ahrq.gov/clinic/tp/medittp.htm
Topic IV. Evidence on the Role of Effect Modifiers for Meditation Practices

The following key questions pertain to specific elements of the meditation practice, population and practitioner that may influence the outcomes:

8. What dose of meditation is necessary before successful health outcomes are realized? That is, is the duration of meditation important for outcomes?
9. Does the direction of attention during meditation affect outcomes?
10. What extent is a rhythmic aspect (i.e., mantra, controlled breathing, or other ordered, recurrent sound or motion) critical to the practice of meditation and to health outcomes? Do such approaches to meditation that rely on these rhythmic behaviors demonstrate consistent effectiveness versus nonrhythmic approaches to meditation? More broadly, do the number and types of components that make up the various meditation practices influence the outcomes?
11. Do individual difference variables (age, gender, race, education, income, other) predict success in the process of meditation (i.e., adherence, acceptance), as well as predicting health outcomes?

Topic V. Evidence on the Physiological and Neuropsychological Effects of Meditation Practices

The following key questions pertain to the physiological and neuropsychological effects of meditation practices:

12. What is known regarding cardiopulmonary, endocrine, immunologic, metabolic, and autonomic changes seen during meditation practices?
13. What is known regarding the effects of meditation practices on brain function (e.g., brain imaging, electroencephalogram (EEG), neuropsychological and cognitive functions)?

Figure 1 presents the analytic framework for the review. We used two main methodological approaches to address the research topics discussed in this report.
Literature Review Methods

Development of Operational Parameters to Define Meditation Practices

There is no consensus on a definition of meditation in the scientific literature. For the purposes of this report, a set of parameters to describe meditation practices was developed using a modified Delphi methodology. The systematic process used to reach consensus on the operational definition of meditation was documented and is described briefly below (Appendix B). A first-round questionnaire was distributed to TEP members to solicit their opinion on a set of parameters extracted from the scientific literature to describe meditation. Participants independently rated the importance of each parameter to characterize a practice as meditation. They were also asked to suggest other parameters not included in the questionnaire that they considered important. A feedback summary from the first-round responses was sent to TEP members along with a second-round questionnaire. In light of round-one group responses, participants were asked if they would reconsider their first-round responses. The process stopped when consensus among participants was reached. Responses to questions were analyzed and categorized by frequency of endorsement. Consensus was defined as agreement on a value or category by 80 percent of the Delphi participants. If consensus was not reached by the Delphi technique, the TEP convened and group consensus techniques were used in a teleconference.

Literature Search and Retrieval

Databases and search terms. The research librarian worked closely with the TEP to refine search strategies for all questions of the review. Comprehensive searches were conducted of the electronic databases listed in Table 1 for the time periods specified. The order of the databases in Table 1 is the sequence in which the databases were searched (Appendix C).

Table 1. Databases searched for relevant studies (continued)

<table>
<thead>
<tr>
<th>Database</th>
<th>Date of search</th>
<th>Years/Issue searched</th>
</tr>
</thead>
<tbody>
<tr>
<td>OCLC FirstSearch (Articles and Proceedings)</td>
<td>September 22, 2005</td>
<td>1993-2005</td>
</tr>
<tr>
<td>AMED</td>
<td>September 30, 2005</td>
<td>1985 to September, 2005</td>
</tr>
<tr>
<td>CINAHL®</td>
<td>October 4, 2005</td>
<td>1982 to September Week 5, 2005</td>
</tr>
<tr>
<td>Cochrane Complementary Medicine Trials Register</td>
<td>October 25, 2005</td>
<td>1943-2003</td>
</tr>
<tr>
<td>NLM® Gateway</td>
<td>October 25, 2005</td>
<td>1950-2005</td>
</tr>
<tr>
<td>Current Controlled Trials - BioMed Central</td>
<td>October 24, 2005</td>
<td>1998-2005</td>
</tr>
<tr>
<td>National Research Register</td>
<td>October 24, 2005</td>
<td>2000-2005</td>
</tr>
<tr>
<td>CRISP</td>
<td>February 21, 2006</td>
<td>2005-2006</td>
</tr>
</tbody>
</table>


The reference lists of relevant studies (e.g., included studies, other systematic or narrative reviews) were reviewed to identify potentially relevant studies. Gray literature was searched to identify unpublished studies and works in progress. Scientific abstracts from the Society of Behavioral Medicine (2005) and the American Psychosomatic Society (1999-2005) annual scientific meetings were reviewed. The National Research Register from the National Health Service was searched for ongoing trials. Primary authors of potentially eligible ongoing studies were contacted if this was necessary to clarify whether those studies did indeed meet the inclusion criteria. TEP members were also requested to provide additional information about potentially relevant studies.

Criteria for Selection of Studies

A set of strict eligibility criteria was used to determine the inclusion and exclusion of studies for the report. The inclusion criteria for topic I are documented in Table 2. It is important to emphasize that the review on Topic I does not constitute a manual for any meditation practice. A more detailed explanation of any specific meditation practice described in this report should be sought in specialized texts or from master practitioners.

Information from primary studies and other original research identified for topics II to V was considered for topic I if it provided a detailed description of the meditation practice under study according to the parameters defined by the Delphi process.
Table 2. Inclusion criteria for topic I

<table>
<thead>
<tr>
<th>Category</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Source</td>
<td>English-language scientific literature</td>
</tr>
<tr>
<td>Population</td>
<td>Adults (i.e., individuals aged ≥ 18 years)</td>
</tr>
<tr>
<td>Intervention</td>
<td>Empirical description of meditation practice according to the parameters defined by the TEP in the Delphi process</td>
</tr>
<tr>
<td>Study design</td>
<td>Systematic reviews, narrative reviews, book chapters and other sources of secondary data</td>
</tr>
<tr>
<td>Outcomes of interest</td>
<td>Components of meditation practices (e.g., breathing, chanting, mantras, relaxation)</td>
</tr>
<tr>
<td></td>
<td>Role of breathing</td>
</tr>
<tr>
<td></td>
<td>Role of attention</td>
</tr>
<tr>
<td></td>
<td>Role of belief/spirituality</td>
</tr>
<tr>
<td></td>
<td>Training conditions</td>
</tr>
<tr>
<td>Criteria for success</td>
<td></td>
</tr>
</tbody>
</table>

Our inclusion criteria for topics II to V are documented in Table 3. Some criteria are common to all of these topics, but some criteria were specifically developed for inclusion of studies in topics III and IV only. We sought to match the type of evidence required to the nature of the questions and to identify the highest quality of evidence appropriate to answer each group of questions. For topics III and IV on the efficacy and effectiveness of meditation practices, and on the role of effect modifiers for meditation practices, we looked for evidence from randomized controlled clinical trials (RCTs) and nonrandomized controlled clinical trials (NRCTs). No restrictions were applied for setting or geographical location of the studies. Only studies published in the English language were eligible according to the scope outlined by NCCAM for this review.

Table 3. Inclusion criteria for topics II to V

<table>
<thead>
<tr>
<th>Category</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Source</td>
<td>Primary research report published in English</td>
</tr>
<tr>
<td>Population</td>
<td>Adults (i.e., individuals aged ≥ 18 years)</td>
</tr>
<tr>
<td></td>
<td>Normal (topics II and V only) and clinical populations (topics II to V)</td>
</tr>
<tr>
<td></td>
<td>No previous meditation practice</td>
</tr>
<tr>
<td>Intervention</td>
<td>Any meditation practice according to the parameters provided by the TEP in the Delphi study</td>
</tr>
<tr>
<td>Sample size</td>
<td>N greater than 10</td>
</tr>
<tr>
<td>Study design</td>
<td>Studies including a comparison/control group or control period in the methodological design: RCTs, NRCTs (topics III to V), prospective and retrospective observational studies with controls (topic II), case-control studies (topic II), uncontrolled before-and-after studies (topics II and V), and cross-sectional studies with controls (topics II)</td>
</tr>
<tr>
<td>Outcomes of interest</td>
<td>Measurable data for health related outcomes</td>
</tr>
</tbody>
</table>

Study Selection Process

Screening of titles and abstracts. We developed a predefined set of broad criteria to apply to the results of the literature searches to ensure that potentially relevant articles were not excluded early in the selection process (Appendix D). Four independent reviewers evaluated the title and abstract of each study to select references potentially relevant to the topics of the report. The full-text of studies meeting the criteria was retrieved as was the full-text of those that reported insufficient information to determine eligibility.

Identification of studies eligible for the review. Two independent reviewers appraised the full-text of potentially relevant articles using a standard form that outlined the inclusion and exclusion criteria for each research topic (Appendix D). Decisions regarding inclusion and exclusion and the reasons for exclusion were documented.

The level of agreement among reviewers at all stages of the selection process was evaluated using the Kappa (κ) statistic. A κ score in the range from 0.0 to 0.40 was considered poor agreement; 0.41 to 0.60 moderate agreement; and 0.61 to 0.80 substantial agreement. Disagreements about the inclusion or exclusion of studies were resolved by consensus. When consensus was not reached, a decision was made in consultation with the TEP.

Evaluating the Methodological Quality of Studies

Rating the quality of individual articles. Studies included in the descriptive overview on the practice of meditation (topic I) were not assessed for methodological quality; therefore, the following methods for quality assessment apply to studies meeting eligibility criteria for topics II to V only.

Quality of intervention studies (RCTs, NRCTs, and before-and-after studies). The methodological quality of RCTs was assessed using the criteria for concealment of allocation and the Jadad scale. The former is based on the evidence of a strong relationship between the potential for bias in the results and allocation concealment: failure to conceal the process of treatment allocation can undermine randomization and, consequently, a selection bias may occur. The Jadad scale is a validated scale that includes questions related to bias reduction: randomization, double-blinding and description of dropouts and withdrawals. This tool scores quality from 0 to 5. Studies scoring less than 3 points are usually considered to be of low quality. The psychometric properties of the Jadad scale have been thoroughly tested, providing rigorous evidence to support its use.

Quality of observational analytical studies. The methodological quality of observational analytical studies (i.e., prospective and retrospective observational studies, case-control studies, and cross-sectional studies with controls) was assessed using the Newcastle-Ottawa Scales. 

Appendices and evidence tables cited in this report are provided electronically at http://www.ahrq.gov/clinic/tp/medittp.htm
The assessment of quality of observational studies is more difficult than the assessment of RCTs and NRCTs. Empirical research has shown that numeric scores based on arbitrary weights given to each item in a scale are unreliable and difficult to interpret. Therefore, we decided to describe the methodological quality of observational analytical studies using the individual components of the NOS scales.

Finally, information regarding the source of funding was collected for all the included studies. Two reviewers assessed the methodological quality of studies independently. Disagreements were resolved by consensus or, when no consensus could be reached, a senior methods expert adjudicated (Appendix D).

Data Collection

For topic I on the practice of meditation, a single reviewer extracted information that was organized according to narrative categories (e.g., components of the meditation practices, role of breathing and spirituality, training requirements, and criteria for success) to allow for a systematic description of the meditation practices considered in this report.

For topics II to V, trained research staff at the UAEPC extracted the information. A comprehensive and pretested data extraction form and guidelines explaining the extraction criteria were developed (Appendix D). Information regarding the study design and methods, the characteristics of participants, interventions, comparison groups, and outcomes of interest were extracted. Data collection on study design and methods included information on the country and year of publication, type of publication, objective of the study, study design, duration, number of centers, and source of funding. Data on characteristics of the participants included setting of the study, type of primary health problem or health condition of study participants, and diagnostic criteria (as reported by the authors of the studies). Data on characteristics of the intervention (i.e., meditation practices) included a description of the practice in terms of components, content and format, frequency, and intensity. Likewise, data on the characteristics of the control group included a description of the components, content, and format. Finally, information was extracted on the type of outcomes and on the units or instruments of measurement for each outcome. A single reviewer extracted the data from the primary studies and another independent reviewer verified the accuracy and completeness of the data. Any discrepancies in data extraction were solved by consensus between the data extractor and the data verifier. During this process, the reviewers consulted with TEP members both for content and methodological advice as needed.

Study selection, methodological quality assessment, and data extraction were managed with the Systematic Review Software™ (SRS), version 3.0 (TrialStat!; Ottawa, ON). Graph extraction was performed using Corel Draw®, version 9.0 (Vector Capital, San Francisco, CA). Extracted data were exported into Microsoft Excel™ (Microsoft Corporation, Redmond, WA) spreadsheets.

Literature Synthesis

Data Analysis and Synthesis

Classification of the meditation practices. The first step in synthesizing the data for topics I to V was to create categories of analysis for the meditation practices described in the scientific literature. Based on data from the Delphi study, input from the TEP members, and a review of the literature, a set of seven categories was constructed to classify the meditation practices. Two independent researchers coded each study according to this classification scheme. Coding was discussed between researchers on a study-by-study basis. Coding discrepancies were resolved by consulting the original research study.

The following seven categories were used for data synthesis for topics II to V:

Mantra meditation. This category comprises meditation practices in which a main element of practice is mantra: the Relaxation Response technique (Relaxation Response or RR), the Transcendental Meditation® technique (hereafter, simply “Transcendental Meditation” or “TM®”), Clinically Standardized Meditation (CSM), Acem meditation, Ananda Marga, and other concentrative practices that involve the use of a mantra such as Rosary prayer, and the Cayce method.

Mindfulness meditation. Though described slightly differently by Eastern and Western interpreters, this category refers generally to meditation practices that cultivate awareness, acceptance, nonjudgment, and require paying attention to the present moment.44-46 This category includes Mindfulness-Based Stress Reduction (MBSR), Mindfulness-Based Cognitive Therapy (MBCT), Vipassana meditation, Zen Buddhist meditation, and other mindfulness meditation practices not further described.

Qi Gong. This category refers to an ancient practice from traditional Chinese medicine that combines the coordination of different breathing patterns with various physical postures, bodily movements, and meditation. External Qi Gong, in which a trained practitioner directs his or her own qi outward, with the intention of helping patients clear blockages, remove negative qi and balance the flow of qi in the body, to help the body rid itself of certain diseases is not a form of meditation according to the working definition developed for this report.

Tai Chi. This category describes a Chinese martial art characterized by slow, flowing movements that emphasize force and complete relaxation. It has been also called “meditation in motion.”

Yoga. This category includes a broad group of techniques rooted in yogic tradition that incorporate postures, breath control, and meditation. It includes practices such as Hatha yoga, Kundalini yoga, and individual components of Yoga such as pranayama (breath control exercises).

Miscellaneous meditation practices. This category describes techniques that combine different approaches to meditation in a single intervention, without giving prominence to one. It includes combined practices such as Yoga plus RR, TM® and Buddhist Meditation, and RR plus...
Mindfulness meditation. The category was also used to describe meditation practices that do not fall within any of the other categories (e.g., coloring mandalas).

Meditation practices (not described). This category refers to meditation practices that were not described in sufficient detail to allow them to be assigned to a more specific category, including techniques that were described by vague terminology such as "meditation," "movement meditation," and "concentrative meditation."

Table I. Data for topic I on the practice of meditation were synthesized qualitatively. Information was presented in a structured format, with narrative categories of interest for the different practices of meditation identified in the scientific literature. Once categorized, the similarities and differences among the various meditation practices could be appraised. Categories of analysis include the main components of the meditation practices, the role of breathing, attention, and spirituality, the training requirements, and the criteria for success for the various meditation practices.

Topic II. Data collected for topic II on the state of research for the therapeutic use of meditation practices were summarized using descriptive statistics (e.g., proportions and percentages for categorical data, means with standard deviations [SD], or medians with interquartile ranges [IQR], for continuous data). Evidence and summary tables were constructed to summarize relevant characteristics of the included studies. Data from the included studies were synthesized qualitatively. We used the systematic approach of the Cochrane Collaboration for the synthesis of the evidence. The basic conceptual framework of the qualitative synthesis for topic II focused on the types of meditation practices that have been examined in intervention studies (RCTs, NRCTs, and uncontrolled before-and-after studies) and observational analytical studies (cohort studies, case-control studies, and cross-sectional studies), the types of control groups, the populations, and the types of outcome measures that have been examined in the included studies.

Topics III and IV. Based on the results of topic II describing the populations that have been examined, RCTs and NRCTs assessing the effects of meditation practices for the three most studied clinical conditions were included in the analyses of efficacy and effectiveness of meditation practices (topic III) and the role of effect modifiers for meditation practices (topic IV). The first step in synthesizing the data for topics III and IV was to construct evidence tables that included information on each article’s source, study design, study population (e.g., sample size, age, and gender), treatment groups, and outcomes. The evidence tables also included summaries of study quality and comments to help interpret the outcomes.

Meta-analyses were planned as part of the data analysis to derive pooled estimates from individual studies to support inferences regarding the magnitude and direction of the effect of the meditation practices. If studies evaluating specific meditation practices were sufficiently similar, effect sizes were combined and weighted using the standard inverse variance method51 to produce an overall effect size for a given outcome. Meta-analyses used a random effects model. In this method, study means are averaged, weighting by a combination of inverse variance augmented by heterogeneity.

The types of summary statistics considered were risk ratios (RR) or odds ratios (OR) with 95 percent confidence intervals (95% CI) for dichotomous outcomes and weighted or standardized mean differences (WMD and SMD, respectively) with 95% CI for continuous outcomes.52 WMD was chosen as the default method, with SMD being used only when units for the outcome were different among the studies being compared (i.e., stress measured on different scales).50,53 Hedges adjusted g was used as the SD estimate when the SMD was used.53 If the means were not reported, they were either imputed from medians or discarded from meta-analysis if neither mean nor median was available. Occasionally studies did not report SDs of their estimates. In these cases, we determined the SD exactly from confidence intervals or exact p-values; estimated the SD from upper-bound p-values, interquartile ranges, ranges, or exact nonparametric p-values; or imputed from other studies reporting similar outcomes in a similar population. All the meta-analyses used endpoint data or change from baseline to endpoint data instead of using the average of separate mean changes calculated at different intervals of time. Forest plots were used to display the individual and pooled results.

Since some common outcomes were reported for many interventions, indirect comparisons58 were made of these active interventions. This type of comparison involves taking the differences between the differences derived from separate meta-analyses. For example, by taking the difference between the derived meta-analysis of A versus B, and the derived meta-analysis of A versus C, an estimate of the comparison of B versus C can be obtained. For some outcomes, when more than four interventions could be compared indirectly, a mixed treatment comparison was conducted. Indirect comparisons are a valid approach to meta-analysis when there is insufficient direct evidence from randomized trials reporting head-to-head comparisons between interventions.50,59

In this method, a Bayesian formulation of the data is employed. The differences between each intervention and a baseline intervention (in this case, “no treatment” was chosen as the baseline) are modeled by choosing a prior distribution for the effect and combining this prior value with the data from the studies to arrive at a posterior estimate and 95% credible interval. Such an estimate was obtained for all pairwise comparisons of interventions as well as the comparisons to the baseline intervention. Since the resulting posterior distributions are too complex for direct computation, a Markov chain Monte Carlo simulation60 was used to obtain the posterior estimates. This procedure involved simulating the unconditional, unknown posterior distribution by sampling many times from the conditional distribution and averaging the results. We used a sample of 20,000 burn-in iterations followed by 200,000 samples and noninformative normal (point estimate) and uniform (variance estimate) priors to obtain the distributions. We also computed a statistic to estimate the probability that each intervention was the best (e.g., lowered blood pressure the most) by recording the best intervention at each iteration. This simulation was performed using the WinBUGS software, version 1.4 (MRC Biostatistics Unit, Cambridge, United Kingdom).

We tested for statistical heterogeneity using the chi-square test51 and quantified it using the I² statistic.7 When there was evidence of clinical or statistical heterogeneity among studies, effect size estimates with corresponding 95% CI were presented separately for each study.50,60 Sources of heterogeneity were explored qualitatively. They may be methodological (differences in design or quality), or clinical (differences in key characteristics of participants, interventions, or outcome measures).61 Where appropriate, subgroup analysis based on patient, intervention, and study characteristics were conducted and sensitivity analysis based on study quality (Jadad score of greater than and equal to 3 points or less than 3 points) were conducted to assess the effect of quality on precision of the pooled estimates if the number of studies per comparison allowed it.62

Two analytic strategies were considered for topic IV on the effect modifiers of meditation practices. First, a meta-regression analysis using RCT-level covariates was planned to explore whether certain characteristics of the participants (e.g., age, gender, ethnicity, education, and income) or the interventions (e.g., dose, frequency, and duration) were associated with increased benefits of meditation practices. The outcome (or dependent) variable in the meta-regression
analyses would be the pooled effect size (log OR for binary outcomes, or WMD or SMD for continuous outcomes). If a meta-regression was not feasible due to a small number of trials, or limited data from primary studies, subgroup analyses would be conducted based on participant or intervention characteristics.

**Topic V.** Based on the types of outcomes identified in topic II, RCTs, NRCTs, and uncontrolled before-and-after studies (i.e., without a parallel control group) were included in the analysis of the physiological and cognitive/neuropsychological effects of meditation practices. Evidence tables were constructed to summarize each article’s source, study design, study population (e.g., setting, sample size, age, and gender), treatment groups, and outcomes. The evidence tables also included summaries of the strength of the evidence, study quality, and comments to help interpret the outcomes.

Meta-analyses of RCTs and NRCTs using the methods described above for topic III were also planned for topic V. For studies with pre- and post-measures, data on change from baseline were used if available; otherwise, endpoint data were used. If meta-analytic methods were not feasible, effect size estimates with corresponding 95% CIs were presented separately for each study.\(^59,60\) Data from uncontrolled before-and-after studies were analyzed separately, and, if appropriate, the individual estimates of the treatment effect were pooled using the generic inverse variance method. Sensitivity analyses were conducted to assess the robustness of the findings when necessary. Data were displayed using forest plots.

**Publication bias.** Publication bias, or the selective publication of research depending on the results, was assessed using funnel plots, and the trim and fill method\(^61\) if enough data were available from the meta-analyses. Funnel plots of effect sizes (axis X) against the SD (axis Y) for each meta-analysis were examined to identify gaps suggesting publication bias. Finally, the trim and fill method provided estimates of the number of studies potentially missing from a meta-analysis and the effect these omissions might have had on its outcome.

All analyses were performed using SAS/STAT\(^6\) software version 9.1 (SAS Institute Inc., Cary, NC), Statistical Package for the Social Sciences\(^6\) (SPSS\(^8\) version 14.1, SPSS Inc., Chicago, IL), and RevMan version 4.1 (Cochrane Collaboration, Oxford, UK).

Potential limitations, conclusions, and implications for future practice and research were discussed. The results were interpreted in light of the heterogeneity of the individual studies (e.g., differences in design, study populations, interventions or exposures, and outcome measures) and any evidence of publication bias, if present. Recommendations for practitioners and researchers were based solely on the evidence available.

**Peer Review Process**

During the course of the study, the UAEPC created a list of 18 potential peer reviewers and sent it to the AHRQ TOO and NCCAM representatives for approval. In May and June 2006, the individuals on the list were approached by the UAEPC and asked if they would act as peer reviewers for this evidence report. Seven experts agreed to act as peer reviewers (Appendix A)\(^7\) and were sent a copy of the draft report and guidelines for review (Appendix D6).\(^6\) Reviewers had one month in which to provide critical feedback. Replies were requested in a word processing document, though comments were also accepted by email and telephone. The reviewers’ comments were placed in a table and common criticisms were identified by the authors. All comments and authors’ replies were submitted to the AHRQ for assessment and approval. As appropriate, the draft report was amended based on reviewer comments and a final report was produced.

\(^5\)Appendices and evidence tables cited in this report are provided electronically at http://www.ahrq.gov/clinic/tp/medittp.htm
**Chapter 3. Results**

In this chapter, the main results of the systematic review are presented according to the five topics that were addressed. The results for topic II, the state of research for the therapeutic use of meditation practices, contain all eligible studies. Studies were then selected from this larger set to address topics III to V (see chapter two on Methods).

**Topic I. The Practice of Meditation**

**Main Components**

The main components of any meditation practice or technique refer to its most general features. These may include specific postures (including the position of the eyes and tongue), the use of a mantra, breathing, a focus of attention, and an accompanying belief system. Posture refers to the position of the body assumed for the purpose of meditation. Though traditional meditation practices prescribe particular postures (e.g., the lotus position), postures vary between practices with the only limitation being that the posture does not encourage sleep.44 Because accounts of most meditation practices describe explicitly the use and role of breathing, mantra, attention, spirituality and belief, training, and criteria for successful meditation practice, these topics are described individually.

**Breathing.** Breathing in meditation can be incorporated passively or actively. In passive breathing, no conscious control is exerted over inhalation and exhalation and breathing is “natural.” In contrast, active breathing involves the conscious control over inhalation and exhalation. This may involve controlling the way in which air is drawn in (e.g., through the mouth or nostrils), the rate (e.g., drawn in quickly or over a specified length of time), the depth (e.g., shallow or deep), and the control of other body parts (e.g., relaxation of the abdomen).

**Mantra.** A distinctive feature of some meditation practices is the use of a mantra. A mantra is a sound, word, or phrase that is recited repetitively, usually in an unvarying tone, and used as an object of concentration. The mantra may be chanted aloud, or recited silently. Mantras can be associated with particular historical or archetypal figures from spiritual or religious systems, or they may have no such associations.

**Relaxation.** Relaxation is often considered to be one of the defining characteristics of meditation practices and meditation itself is often considered to be a relaxation technique.66-68 Indeed, it has been suggested that the popularity of meditation practices in the West is due, at least in part, to the widely accepted plausibility of their alleged effects with respect to arousal reduction.66 Some researchers have attempted to draw a distinction between relaxation and meditation practices on the basis of intention.68

**Attention and its object.** The intentional self-regulation of attention is considered crucial to the practice of meditation, as is the development of an awareness in which thoughts do not necessarily disappear, but are simply not encouraged by dwelling on them, a state of so-called “thoughtless awareness.”71,72 Some meditation practices focus attention on a singular external object (e.g., mandala, candle, flame, sound (e.g., breath), word or phrase (i.e., mantra), or body part (e.g., the tip of the nose, the space between the eyebrows)). In contrast, “mindfulness” meditation techniques aim to cultivate an objective openness to whatever comes into awareness (e.g., by paying attention to simple and repetitive activities or to the sensations of the body). In doing so, the breath may be used as an anchor (but not a focal point) to keep the meditator engaged with the present moment.65,73 Each of these techniques serves, in a different way, to discourage logical and conceptual thinking.65

**Spirituality and belief.** This component refers to the extent to which spirituality and belief systems are a part of meditation practices. Spirituality and belief systems are composed of metaphysical concepts and the rules or guidelines for behavior (e.g., devotional practices or interpersonal relations) that are based on these concepts.

**Training.** Training refers to the recommended frequency and duration of periods of practice, and how long a practitioner is expected to train before being considered proficient in a given technique.

**Criteria of successful meditation practice.** The criteria of successful meditation practice are understood both in terms of the successful practice of a specific technique (i.e., is the technique being practiced properly) and in terms of achieving the aim of the meditation practice (e.g., has practice led to reduced stress, calmness of mind, or spiritual enlightenment).

Five broad categories of meditation practices were identified in the scientific literature: mantra meditation (comprising Transcendental Meditation® [TM®], Relaxation Response [RR], and Clinically Stadardized Meditation [CSM]), mindfulness meditation (comprising Vipassana, Zen Buddhist meditation, Mindfulness-based Stress Reduction [MBSR], and Mindfulness-based Cognitive Therapy [MBCT]), Yoga, Tai Chi, and Qi Gong. These broad categories were used for descriptive purposes throughout the report to address the key research questions.

**Mantra Meditation**

The distinctive characteristic of the meditation practices included in this category is the use of a mantra. A mantra is a word or phrase repeated aloud or silently and used to focus attention. A mantra often has a smooth sound, for example, the mantras “Om” or “Ma.”66 It is thought that these sounds produce vibrations that have different effects on people, and these vibrations can be described qualitatively or quantitatively.62,72 The three mantra meditation practices described below consist of standardized techniques; that is, the techniques have been described systematically in manuals and are relatively invariant wherever, whenever, and by whomever they are taught.21
Transcendental Meditation®

TM® is a technique derived from the Vedic tradition of India by Maharishi Mahesh Yogi. In TM®, a meditative state is purportedly achieved in which the repetition of the mantra no longer consciously occurs and instead the mind is quiet and without thought. During the practice of TM®, the ordinary thinking process is said to be “transcended” (or gone beyond) as the awareness gradually settles down and is eventually freed of all mental contents, remaining silently awake within itself, and producing a psychophysiological state of “restful alertness.” These periods, referred to as pure consciousness or transcendental consciousness, are said to be characterized by the experience of perfect stillness, rest, stability, order, and by a complete absence of mental boundaries.

Main components. In the TM® technique, the meditation state is achieved by the repetition of a mantra. The mantra is a meaningless sound from the ancient Vedic tradition and is given to the meditator by an instructor in the TM® technique. TM® practitioners sit in a comfortable posture, with eyes closed, and silently repeat the mantra. Though there are reports of the components of the mantras and how they are assigned, it is difficult to confirm these reports as many of the details of practice, including mantras, are revealed only to those who have formal instruction in TM®. Instruction in the TM® technique is a systematic, but individualized process. It is believed that keeping the techniques confidential prevents these reports from being shared.

Breathing. TM® involves passive breathing; no breath control procedures are employed and no specific pattern is prescribed.

Attention and its object. TM® is described as not requiring any strenuous effort, concentration, or contemplation. However, meditators are instructed to direct their attention to the mantra.

Spirituality and belief. The TM® technique has a theoretical framework that is described in Maharishi Mahesh Yogi’s writings on the nature of transcendental consciousness and the principles underlying the TM® technique. However, it is unclear to what extent this theoretical framework, including any of its implications for spirituality, is a part of the practice. Sources that discuss this issue contend that the practice of the technique requires no changes in beliefs, philosophy, religion, or lifestyle, implying that the theoretical framework plays no role in its practice.

Training. TM® is usually taught in a course comprising five to six hours of instruction over four days. General information about the technique and its effects is presented in a 1.5-hour lecture. More specific information is given in a second 1-hour lecture. In the TM® technique, practitioners sit in a comfortable posture, with eyes closed, and silently repeat the mantra. Though there are reports of the components of the mantras and how they are assigned, it is difficult to confirm these reports as many of the details of practice, including mantras, are revealed only to those who have formal instruction in TM®. Instruction in the TM® technique is a systematic, but individualized process. It is believed that keeping the techniques confidential prevents these reports from being shared.

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Main components. The individual is instructed to assume a comfortable posture (usually sitting, but kneeling or squatting may also be used), the eyes are closed, and the muscles are relaxed, beginning at the feet and progressing upward to the face. Once the practitioner is relaxed, the eyes may be open or remain closed. Then, breathing through the nose and focusing on the breath, the practitioner inhales and exhales, silently saying the word “one” with each exhalation. Like TM®, the repetition of a sound, word, or phrase is considered essential to the technique. Benson recommends “one” as a neutral, one-syllable word.

When the practice is completed, the meditator sits quietly for several minutes with eyes closed and then with eyes open.

More recent versions of the technique include a body scan (similar to that employed in MBSR, described below) in which practitioners are asked to move their attention slowly over the body focusing on relaxing different regions, and information sessions on the stress response and its effects on health.

Breathing. Breathing is active. Practitioners breathe through the nose, cultivating an easy, natural rhythm.

Attention and its object. Attention is focused on the breath. In addition, should distracting thoughts occur, an attempt should be made to ignore them and focus on the mantra. The mantra is therefore “linked” with the breath. It has been claimed that Benson's RR demands a greater degree of concentration than either TM® or CSM (described below).

Clinical reports indicate that this technique can be learned easily by individuals of any age, level of education, occupation, or cultural background. The technique requires systematic instruction by a qualified teacher to ensure effortless and correct practice. The technique is practiced twice daily for 15 to 20 minutes, usually once in the morning (before breakfast) and once in the afternoon (before dinner).

Criteria of successful meditation practice. The successful practice of the TM® technique is determined by a qualified teacher. As many details of the TM® technique are restricted to those who receive instruction, a description of the criteria used by the instructor for the assessment of the technique is not available in the scientific literature.

Relaxation Response

The “relaxation response” is a term coined by Harvard cardiologist Herbert Benson in the early 1970s to refer to the self-induced reduction in the activity of the sympathetic nervous system, the opposite of the hyperactivity of the nervous system associated with the fight-or-flight response. Benson believed that this response was not unique to TM® and that all ancient meditation practices involved common components that together are capable of producing such a response. Basing his belief on his scientific research on hypertension and TM®, he integrated these common factors into a single technique (RR) and found that it promoted a decrease in sympathetic nervous system similar to TM®. Many techniques for eliciting the relaxation response have been presented in a religious context in Judaism, Christianity, or Islamic mysticism (Sufism). These techniques employ both mental and physical methods, including the repetition of a word, sound, or phrase (often in the form of a prayer); and the adoption of a passive attitude. Benson emphasized that the relaxation response is not simply a state of relaxation (and should not be confused with it) or a sleep-like state, but a unique state brought about by adherence to specific instructions.

Main components. The individual is instructed to assume a comfortable posture (usually sitting, but kneeling or squatting may also be used), the eyes are closed, and the muscles are relaxed, beginning at the feet and progressing upward to the face. Once the practitioner is relaxed, the eyes may be open or remain closed. Then, breathing through the nose and focusing on the breath, the practitioner inhales and exhales, silently saying the word “one” with each exhalation. Like TM®, the repetition of a sound, word, or phrase is considered essential to the technique. Benson recommends “one” as a neutral, one-syllable word.

When the practice is completed, the meditator sits quietly for several minutes with eyes closed and then with eyes open.

More recent versions of the technique include a body scan (similar to that employed in MBSR, described below) in which practitioners are asked to move their attention slowly over the body focusing on relaxing different regions, and information sessions on the stress response and its effects on health.
Spirituatity and belief. Because it is believed that RR incorporates the essential components of a wide variety of meditation practices, it is conceptualized as a secular technique,93,94 and does not require adopting a specific spiritual orientation or belief system.

Training. RR is learned in approximately five minutes. Patients are typically instructed to elicit the relaxation response twice daily, for 15 to 20 minutes, but not within two hours after any meal, as the digestive processes may interfere with the subjective changes induced by the technique.89,90,96

Criteria of successful meditation practice. Instructions for this technique are available in books and articles and there is no explicit recommendation that an experienced practitioner teach the technique or that individualized instruction is necessary. The criteria for successful meditation practice rest with the subjective evaluation of the meditator; the results of practice judged against the reported effects of RR. Instructions for this technique include the injunction not to worry about whether one is successful in achieving a deep level of relaxation, and instead to maintain a positive attitude and let relaxation occur at its own pace.64

Clinically Standardized Meditation

CSM was developed by Patricia Carrington while she was conducting studies on meditation at Princeton University in the early-to-mid 1970s. Believing that TM® was not flexible enough to be suitable for all clinical purposes and that the cost of its instruction put it beyond the reach of most individuals and institutions, Carrington modified a classical Indian form of mantra meditation and produced what she called CSM.64

Main components. Trainees are instructed to choose a mantra from a list of 16 Sanskrit mantras, or choose their own. In choosing their own mantra, practitioners are told to select a word that has a “pleasant ringing sound” and to avoid using words that are emotionally loaded. The word should help imbue the practitioner with a sense of serenity.64 In its original formulation, CSM used a secular ritual for transferring the mantra. CSM is practiced while sitting comfortably, with eyes open and focused on a pleasant object of some kind. The mantra is repeated aloud, slowly and rhythmically, at ever decreasing volume, until it is a whisper, at which point the mantra is no longer said aloud, but instead is only thought. The words are then closed as the meditator continues repeating the mantra in thought. Meditators allow the mantra to proceed at its own pace, getting faster or slower, louder or softer “as it wants.”64,97

Breathing. Breathing is passive, proceeding at its own pace and is unconnected to the repetition of the mantra.

Attention and its object. Like TM® and RR, CSM is a passive technique that requires little concentration or discipline. In contrast to RR, CSM instructs practitioners to flow with their thoughts rather than ignore them, returning periodically to the mantra.64

Spirituatity and belief. CSM is designed as a secular, clinical form of meditation practice, so no specific system of spirituality or belief is required.

Training. CSM is taught in two lessons: a 1-hour individual lesson and a group meeting. CSM is practiced twice daily for 20 minutes.64 As with RR, the contemporary version of CSM differs slightly from its original form, with perhaps the most important difference being that trainees are given a manual and an audio recording of instructions rather than individual instruction.64

Criteria of successful meditation practice. The criteria for successful meditation practice rest with the subjective evaluation of the meditator; the results of practice judged against the reported effects of CSM. Books and audiotapes for self-instruction in CSM are readily available, and there is no explicit statement that an experienced practitioner teach the technique or that individualized instruction is necessary.

Mindfulness Meditation

Mindfulness has been described as a process of bringing a certain quality of attention to moment-by-moment experience and as a combination of the self-regulation of attention with an attitude of curiosity, openness, and acceptance toward one’s experiences.98 Mindfulness meditation, the core practice of Vipassana meditation, has been incorporated into several clinically-based meditation therapies.76 The capacity to evoke mindfulness is developed using various meditation techniques that originated in Buddhist spiritual practices;99 however, general descriptions of mindfulness vary from investigator to investigator and there is no consensus on the defining components or processes.98

Mindfulness approaches are not considered relaxation or mood management techniques, and once learned, may be cultivated during many kinds of activities. Mindfulness increases the chances that any activity one is engaged in will result in an expanded perspective and understanding of oneself.98 In a state of mindfulness, thoughts and feelings are observed on par with objects of sensory awareness, and without reacting to them in an automatic, habitual way.8,97 Thus, mindfulness allows a person to respond to situations reflectively rather than impulsively.98 Mindfulness meditation practices include the traditional Vipassana, and Zen meditation and the clinically-based techniques MBRS and MBCT. Of the four practices described below, the last two, MBRS and MBCT have standardized techniques (i.e., the techniques have been described systematically in manuals and are relatively invariant wherever, whenever, and by whomever they are taught).

Vipassana

Considered by some to be the form of meditation practiced by Gautama the Buddha more than 2,500 years ago,100 Vipassana, or insight meditation, is practiced primarily in south and southeast Asia but is also a popular form of meditation in Western countries. Vipassana is the oldest of the Buddhist meditation techniques that include Zen (Soto and Rinzai schools) and Tibetan Tantra.47,97 The Pali term “Vipassana”, though not directly translatable to English roughly means “looking into something with clarity and precision, seeing each component as distinct, and piercing all the way through so as to perceive the most fundamental reality of that thing.”47 The goal of Vipassana is the understanding of the 3 characteristics of nature which are impermanence (anicca), suffering (duhkha), and non-existence (anatta). Vipassana meditation helps practitioners to become more highly attuned to their emotional states.97 Through the technique, meditators are trained to notice more and more of their flowing life experience, becoming sensitive and more receptive to their perceptions and thoughts without becoming caught up in them. Vipassana meditation teaches people how to scrutinize their experience, becoming sensitive and more receptive to their perceptions and thoughts without becoming caught up in them. Vipassana meditation teaches people how to scrutinize their
perceptual processes, to watch thoughts arise, and to react with calm detachment and clarity, reducing compulsive reaction, and allowing one to act in a more deliberate way.47

**Main components.** Vipassana meditation requires the cultivation of a particular attitude or approach: (1) don't expect anything, (2) don't strain; (3) don't rush, (4) observe experience mindfully, that is, don't cling to or reject anything, (5) loosen up and relax, (6) accept all experiences that you have, (7) be gentle with yourself and accept who you are, (8) question everything, (9) view all problems as challenges, (10) avoid deliberation, and (11) focus on similarities rather than differences.47

Vipassana meditation is practiced in a seated position when focusing on the breath; otherwise, no posture is prescribed and the meditator may sit, stand, walk, or lie down. Traditionally, if a static position has been taken, it is not to be changed until the meditation session has ended. However, many Western teachers allow students to move, though mindfully, to avoid persistent pain caused by being in the same position for too long.47

The time devoted to seated meditation should be no longer than one can sit without excruciating pain. The eyes should be closed.47

**Breathing.** Air is inhaled and exhaled freely through the nose. There is a natural, brief pause after inhaling and again after exhaling.47

**Attention and its object.** The focus of attention or awareness in Vipassana can be categorized into 4 groups: body, emotions and feelings, thoughts, and mental processes.101

In focusing attention on the breath, novice Vipassana meditators attain a degree of "shallow concentration."47 This is not the deep absorption or pure concentration of the meditator may silently count breaths or count between breaths.47 The meditator notices the feeling of inhaling and exhaling and ignores the details of the experience. The movement of the abdominal wall while inhaling and exhaling may also be used as a focus of attention.47

The primary technique for focusing on bodily sensations is the body scan.102 Beginning with the top of the head, the practitioner observes the sensations as if for the first time, and then scans the scalp, the back of the head, and the face. When visualizations of the body distract the meditator, the thoughts are simply directed back to the sensations. The focus of attention is then shifted to the rims of the nostrils, to the feeling of the breath going in and out. When attention wanders from the breath, the meditator brings it back and anchors it there.47,100

To help concentrate on the breath, a novice meditator may silently count breaths or count between breaths.47 The meditator notices the feeling of inhaling and exhaling and ignores the details of the experience. The movement of the abdominal wall while inhaling and exhaling may also be used as a focus of attention.47

Mindfulness can be practiced during any activity and practitioners are encouraged to practice being mindful and fully aware during other activities such as walking, stretching, and eating.100

**Spirituality and belief.** Though often described as a profound religious practice, no particular spiritual or philosophical system is required to practice Vipassana meditation.37

**Training.** Vipassana should be practiced twice daily, morning and evening, for about 5 to 10 minutes.100 Western interpreters of Vipassana have recommended that novice meditators should be instructed to sit motionless for no longer than 20 minutes.1

Ideally, a meditator works up to at least two 1-hour sessions per day, and does at least one 10-day retreat per year.102 Longer meditation sessions allow for deeper periods of meditation.102 The length of time required to become proficient in Vipassana meditation varies by individual, some students progress rapidly, others slowly.

**Criteria of successful meditation practice.** As instructions for this technique are available in books and articles and there is no explicit instruction in the literature that an experienced practitioner teach the technique or that individualized instruction is necessary, it is presumed that the criteria for successful meditation practice rests with the subjective evaluation of the meditator. However, instruction may be given and, if this is the case, presumably successful practice is judged by an experienced meditator.

**Zen Buddhist Meditation**

Zen Buddhist meditation, or Zazen, perhaps one of the most well-known forms of meditation, is a school of Mahayana Buddhism103 that employs meditation techniques that originated in India several thousand years ago and were introduced to Japan from China in 1191 A.D.104 Zen Buddhist meditation is typically divided into the Rinzai and Soto schools.104

**Main components.** The harmony of the body, the breath, and the mind is considered essential to the practice of Zen. In the traditional forms of Zen meditation, physical preparation involves eating nutritious food in modest amounts.104

Posture is of great importance in Zen meditation. In traditional forms, Zen meditation is performed while seated on a cushion in either the full-lotus or half-lotus position; however, many Western practitioners practice in a variety of ways from chair sitting to full lotus.104

The half-lotus position, the legs are crossed and the feet rest on top of the thighs. In the half-lotus position, only one foot is brought to rest on top of the thigh, the other remaining on the ground as in the regular cross-legged position.104,106

The hands are held in one of two prescribed ways, either with the left hand placed palm up on the palm of the right hand with the tips of the thumbs touching, or with the right hand closed in a loose fist and enclosed in the left hand, the left thumb between the web of the thumb and the index finger of the right hand.104

The spine is held straight and with the top of the head thrust upward, with the chin drawn in and the shoulders and abdomen remain relaxed. The body should be perpendicular and the ears, shoulders, nose, and navel should be in line. The tongue should touch the upper jaw and the molars should be in gentle contact with one another. The eyes should be half closed and the gaze focused on a point on the floor approximately 3 feet in front.104

Breathing.** Breathing in Zen meditation is active and many breathing patterns are used. One deep breathing pattern begins with exhaling completely through an open mouth and letting the lower abdomen relax. Air is then inhaled through the nose and allowed to fill the chest and then the abdomen. This breathing pattern is repeated 4 to 10 times. The mouth is then closed, and air is inhaled and exhaled through the nose only. By the use of abdominal and diaphragmatic pressures, air is drawn in and pushed out. Both inhalation and exhalation should be smooth, with long breaths. After practitioners have learned to focus on their breath by counting, counting is omitted and meditators practice "shikantaza," which means "nothing but precisely sitting."106 Shikantaza is the most advanced form of Zen meditation.106 With practice, the frequency of breathing becomes about three to six breaths per minute.104

Attention and its object.** Attention is focused on counting breaths or on a koan, a specific riddle that is unsolvable by logical analysis.106 The frequency of breathing is silently counted in one of three ways: counting the cycles of inhalation and exhalation, counting inhalations only, or counting exhalations only.106

Though some koans have become famous in the West (e.g., what is the sound of one hand clapping?), practice, beginners often silently repeat the
sound “mu” while counting. As a student advances, there are many koans that may be worked on over a period of years. This silent repetition allows the meditator to become fully absorbed in the koan. In both counting of breaths and focusing on a koan, it is essential that the concentration of the mind is on the counting or on the koan and not on respiration as such. No attempt is made to focus the mind on a single idea or experience; the meditator sits, aware only of the present moment.

Spirituality and belief. It is generally accepted that Buddhist metaphysical beliefs are not essential to the practice of Zen. At a spiritual level, Zen is considered a recognition of or, more accurately, the constant participation of all beings in the reality of each being. Sitting should be based on the compassionate desire to save all sentient beings by means of calming the mind; however, this belief is not essential to practice. Only the wish to save all sentient beings and the strength to be disciplined in practice is necessary.

Training. Depending on the purpose, Zen meditation may be practiced for a few minutes or for many hours.

Criteria of successful meditation practice. Successful meditation practice is judged in terms of the internal changes that are brought about by cultivating awareness. The practice of Zen meditation should not be done with the aim of accomplishing some purpose or acquiring something. Examples of incorrect aims or approaches include (1) sitting in order to tranquilize the mind, (2) sitting to be empty in one's mind, (3) attempting to solve a koan as if playing a guessing game, and (4) being motivated by a wish to escape from everyday conflicts. Some Zen masters believe that it is acceptable for prospective students to be motivated by desires for good health, composure, iron nerves, etc., because in time their attachment to these less important purposes will be recognized. The successful practice of Zen meditation is often described in terms of an awareness of the “true nature” of reality, of discovering the extent to which ordinary experience is constructed and manipulated by our interests, fears, and purposes. Thus, successful practice results in the realization that a dreamlike absorption in personal intentions is actually the principal content of daily mental life, freeing the practitioner from circumstance and emotion.

Mindfulness-Based Stress Reduction

The MBSR program emerged in 1979 as a way to integrate Buddhist mindfulness meditation into mainstream clinical medicine and psychology. Originally designed by Dr. Jon Kabat-Zinn at the University of Massachusetts Medical Center, the MBSR program was a group-based program designed to treat patients with chronic pain. Since then, MBSR has also been used to reduce morbidities associated with chronic illnesses such as cancer and acquired immunodeficiency syndrome and to treat emotional and behavioral disorders.

Main components. The mindfulness component of the program incorporates three different practices: a sitting meditation, a body scan, and Hatha yoga. In addition to the mindfulness meditation practice that forms the basis of the intervention, patients are taught diaphragmatic breathing, coping strategies, assertiveness, and receive educational material about stress. The foundation for the practice of MBSR is the cultivation of seven attitudes:

1. nonjudgment, becoming an impartial witness to your own experience;
2. patience, allowing your experiences to unfold in their own time;
3. beginner's mind, a willingness to see everything as if for the first time;
4. trust, in your own intuition and authority and being yourself;
5. nonstriving, having no goal other than meditation itself;
6. acceptance, of things as they actually are in the present moment; and
7. not censoring one’s thoughts and allowing them to come and go.

In addition to these attitudes, a strong motivation and perseverance are considered essential to developing a strong meditation practice and a high degree of mindfulness. These attitudes are cultivated consciously during each meditation session. As with other mindfulness practices, posture and breathing are essential. The practitioner sits upright, either on a chair or cross-legged on the floor, and attempts to focus attention on a particular object, most commonly on the sensations of his or her own breath as it passes the opening of the nostrils or on the rising and falling of the abdomen or chest. Whenever attention wanders from the breath, the practitioner will simply notice the distracting thought and then let it go as attention is returned to the breath. This process is repeated each time that attention wanders from the breath. The MBSR program incorporates formal meditation (i.e., seated, walking, Yoga) and informal meditation (i.e., the application of mindfulness to the activities of daily life). In informal practice, practitioners are reminded to become mindful of their breath to help induce a state of physical relaxation, emotional calm, and insight.

The seated meditation is done either on the floor or on a straight-backed chair. When sitting on the floor, a cushion approximately 6 inches thick should be placed beneath the buttocks. The practitioner may use the “Burmese” posture in which one heel is drawn in close to the body and the other leg is draped in front, or a kneeling posture, placing the cushion under the buttocks and the hands are usually rested on the knees or on the lap with the fingers of the left hand above the fingers of the right and the tips of the thumbs just touching each other.

The body scan is the first formal mindfulness technique that meditators do for a prolonged period and is practiced intensively for the first 4 weeks of the program. Body scanning involves lying on your back and moving the mind through the different regions of the body, starting with the toes of the left foot and moving slowly upwards to the top of the head. Scanning is done in silence and stillness.

The third formal meditation technique used in the MBSR program is mindful Hatha yoga. It consists of slow and gentle stretching and strengthening exercises along with mindfulness of breathing and of the sensations that arise as the practitioner assumes various postures.

Breathing. Breathing is passive and without any specific pattern.

Attention and its object. During sitting meditation, the attention is focused on the inhalation and exhalation of the breath or on the rising and falling of the abdomen. When the mind becomes distracted with other thoughts, the attention is gently, but firmly returned to the breath or abdomen. During the body scan, attention is focused on the bodily sensations. When the mind wanders, attention is brought back to the part of the body that was the focus of awareness. In contrast to other Yoga practices, mindful Hatha yoga is focused less on what the body is doing and more on maintaining moment-to-moment awareness. As in the seated meditation and body scan, the attention is focused on the breath and on the sensations that arise as the various postures are assumed.
**Spirituality and belief.** MBSR was designed as a secular, clinical practice and its practice does not require adopting any specific spiritual orientation or belief.

**Training.** The program consists of an 8-week intervention with weekly classes that last 2 to 3 hours. There is a day-long intensive meditation session between the sixth and seventh sessions.38,39,48 Participants also complete 45-minute sessions at home, at least 6 days a week for 8 weeks.38 During the 2-hour weekly sessions, participants are instructed in the informal and formal practice of mindfulness meditation. Participants must commit to a daily, 45-minute home practice of the skills taught during the weekly meetings.48 The components of practice change as participants become more adept in sitting meditation, body scan, and Yoga. Body scan is initially practiced at least once per day for 45 minutes for about 4 weeks. It is then practiced every other day, alternating with Yoga.48

**Criteria of successful meditation practice.** The proper practice is determined by an experienced teacher. In the absence of any religious or spiritual component, the measure of success is the achievement of successful outcomes, whether subjective (reduced perceived stress, reduced anxiety, etc.) or objective (reduced blood pressure, reduction in medication usage, etc.).

**Mindfulness-Based Cognitive Therapy**

Developed by Zindel Segal, Mark Williams, and John Teasdale in the 1990s as a method for preventing relapse in patients with clinical depression, MBCT combines the principles of cognitive therapy with a framework of mindfulness to improve emotional well-being and mental health.48,108 Based on the MBSR program developed by Jon Kabat-Zinn, the original aim of the MBCT program was to help individuals alter their relationship with the thoughts, feelings, and bodily sensations that contribute to depressive relapse, and to do so through changes in understanding at a deep level.108

**Main components.** Like MBSR, the MBCT program incorporates seated meditation and body scan. The practice teaches patients decentering (the ability to distance oneself from one's mental contents), how to recognize when their mood is deteriorating, and techniques to help reduce the information channels available for sustained ruminative thought-affect cycles and negative reactions to emotions and bodily sensations.108 The core skill that the MBCT program aims to teach is the ability, at times of potential relapse, to recognize and disengage from mind states characterized by self-perpetuating patterns of ruminative, negative thought.

**Breathing.** Breathing is passive and without any specific pattern.108

**Attention and its object.** During seated meditation, the attention is focused on the inhalation and exhalation of the breath or on the rising and falling of the abdomen. When the mind becomes distracted, the attention is gently, but firmly, returned to the breath or abdomen. During the body scan, attention is focused on the body. When the mind wanders, attention is brought back to the part of the body that was the focus of attention.

**Spirituality and belief.** Like MBSR, MBCT was developed as a secular, clinical intervention and does not require adopting any specific spiritual orientation or belief system.

**Training.** The program consists of an 8-week program, with one 2-hour session per week. Classes contain approximately 12 students. The program is divided into two main components: in sessions one to four, participants are taught to become aware of the constant shifting of the mind and how to bring the mind to a single focus using a body scan technique and breathing. Participants also learn how the wandering mind can give rise to negative thoughts and feelings. In sessions five to eight, participants learn how to handle mood shifts, either immediately or at a future time.

Like the MBSR program, participants must continue the sessions at home for 6 or 7 days and complete various homework exercises that teach and reinforce mindfulness skills and help participants to reflect on their mindfulness practice.108

**Criteria of successful meditation practice.** The presence of an instructor who is adept in the practice of mindfulness is crucial to the success of the program. It is generally believed that if instructors are not mindful as they teach, the extent to which class members can learn mindfulness will be limited.108 The proper technique is determined by an experienced practitioner. The measure of success is the achievement of successful prevention of relapse based on clinical criteria.

**Yoga**

The philosophy and practice of Yoga date back to ancient times, originating perhaps as early as 5,000 to 8,000 years ago.1,109,110 It has been argued that the rules or precepts set down in the first systematic work on Yoga, Patanjali’s Yoga Sutras, do not set forth a philosophy, but are practical instructions for attaining certain psychological states.111,112 It is important to acknowledge the diversity of techniques subsumed under the term “Yoga.” Over many millenia, different yogic meditative techniques had been developed and used to restore and maintain health, and to elevate self-awareness and to also transcend ordinary states of consciousness, and ultimately to attain states of enlightenment.10

Yogic meditative techniques have been transmitted through Kundalini yoga, Sahaja yoga, Hatha yoga and other yogic lineages.113 Though there are numerous styles of Yoga,113 the styles vary according to the emphasis and combination of four primary components: asanas, pranayamas, mantras, and the various meditation techniques.113 In Kundalini yoga, there are thousands of different postures, some dynamic and some static, and also thousands of different meditation techniques, many of which are disorder specific.110,117 Kundalini yoga meditation techniques are usually practiced while maintaining a straight spine, and employ a large number of specific, and highly structured breathing patterns, various eye and hand postures, and a wide variety of mantras. All of these techniques supposedly have different effects and benefits in their respective combinations.

Within Hatha yoga, many “schools” have developed, each differing slightly in its emphasis on the use of breathing and postures: in Bikram Yoga, practitioners perform the same sequence of 26 asanas in each session; in Vini Yoga, emphasis on the breath makes for a slower-paced practice. Iyengar Yoga is distinguished from other styles by its emphasis on precise structural alignment, the use of props, and sequencing of poses.113 There are also two Tibetan yogic practices, Tsa Lung and Trul Khor, that incorporate controlled breathing, visualization, mindfulness techniques, and postures.125 In Yoga, it is also believed that the practice of meditation techniques can be enhanced by the proper cleansing and conditioning of the body through the asanas and breathing exercises, or pranayama techniques123 (though pranayama places particular emphasis on techniques of breathing, some pranayama also employ physical movements).

In addition to the schools of Yoga described above, TM10 and the secular meditation techniques RR and CSM are derived from classical yogic techniques.123 It is important to note

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In addition to the schools of Yoga described above, TM10 and the secular meditation techniques RR and CSM are derived from classical yogic techniques.123 It is important to note
that the techniques in any given school or type of Yoga represent distinct interventions, in much the same way that psychodynamic, cognitive-behavioral, and interpersonal therapies each involve different approaches to psychotherapy. 124 The purpose of asanas, pranayams, and pratyahar (emancipation of the mind from the domination of the senses) is to help rid the practitioner of the distractions of body, breath, and sensory activity and to prepare the body and mind for meditation and spiritual development.125 Gradually the use of mantras is said to help gradually to picture the subconscious mind, and to help prepare the conscious mind to experience the various states of superconsciousness. The more advanced Yoga practices lie in dharaana (concentration), dyana (yogic meditation) and samadhi (absorption). Concentration involves attention to a single object or place, external or internal (e.g., the space between the eyebrows, the tip of the nose, the breast, a mantra [chanted loudly, softly, or silently] or attention to all of these elements simultaneously). When the mind flows toward the object of concentration uninterruptedly and effortlessly, it is meditation. When it happens for a prolonged period of time it leads to samadhi, the comprehension of the true nature of reality that ultimately leads to enlightenment and emancipates the practitioner from the bonds of time and space.125,126

Main components. Classical Yoga is an all-encompassing lifestyle incorporating moral and ethical observances (yamas and niyamas), physical postures (asanas), breathing techniques (pranayams), and four increasingly more demanding levels of meditation (pratyahar, dharaana, dyana, and samadhi).126,127 Due to the incredible diversity of techniques in yogic meditation practices, it is impossible to describe them in adequate detail here. Instead, we have attempted to provide the reader with a very general description of the main components of many yogic meditation techniques. The reader is directed to the reference list for more detailed information on specific Yoga styles or techniques. 110,116,117,119,128,129

The most common translation of “asana” is “posture” or “pose” and it refers to both specific postures for gaining greater strength and flexibility and those used specifically to help achieve proper concentration for meditation. Asanas are practiced either standing, sitting, supine, or prone.130 The postures for strength and flexibility take each joint in the body through its full range of motion, stretching, strengthening, and balancing each body part.114 Depending on the particular yogic technique one follows and the individual level of practice, each asana is held anywhere from a few breath cycles (as long as 2 minutes) to as long as 10 minutes or, in the case of some advanced practices, even 2.5 hours.

In most schools, during each posture attention is directed to the breath—to the deep, in-out, rhythmic sensation—and awareness is brought to the area of the body that is being stretched or strengthened.129 Though poses may be held for a few seconds to a few minutes, the body can also be in constant dynamic motion. Muscles relax and loosen, changing the shape of the pose, and the in and out breath moves in rhythm with the body. The practitioner simply observes the physical or psychical sensations and emotions arising while suspending judgment. The asanas are interspersed with brief moments of relaxation during which the practitioner attempts to redirect or maintain an inward focus.130

In postures used specifically for meditation, for example in Kundalini yoga, the spine is kept straight and the practitioner can be seated in a chair with the feet flat on the floor or seated in a cross-legged posture, and specific directions are given regarding the positioning of the arms, hands, and eyes, (e.g., the palms of the hands can be pressed together with the fingers together pointing up at a 60-degree angle, and the sides of the thumbs rest on the sternum in what is called “prayer pose,”129 and the eyes are closed as if looking at a central point on the horizon, the “third eye,” or the notch region between the eyes). A mantra (again technique specific) may also be chanted, and/or a simple or complex breathing pattern may be employed.125 Alternately, the eyes might be kept open and focused on the tip of the nose or closed and focused on the tip of the chin or top of the head, again in conjunction with any number of a wide variety of breathing patterns, and or mantras.125 In Sahaja yoga, practitioners sit in a relaxed posture with hands in front, palms upward. Attention is directed to a picture placed in front with a candle and retrash when the candles goes out, or to the meditators close their eyes and direct their attention to the “sahasrasara chakra” or top of the head. The individual sits in meditation for about 10 to 15 minutes.115 The amount to which the eyes are open or closed also varies; eyes may be fully open, fully closed, or half-closed.

Breathing. A central focus for most yogic meditation techniques is the breathing pattern.116 Pranayams, or breathing exercises, involve the conscious regulation of rhythmic breathing patterns, where some or all of the inspiration, breath retention, expiration, and breath out phases are regulated according to specific ratios or times. The inspiration and expiration phases can also be regulated by breaking each breath of the inspiration and expiration into 4 parts, 8 parts, or 16 parts or only the inspiration may be broken while the expiration remains broken.125 In addition, a breath pattern may be employed selectively through either the left or right nostril (or a sequential combination of both), or specific combinations of the nose and mouth. A wide variety of broken breath patterns have been discovered that have varying effects. Some techniques may also require holding attention on the imagined flow of energy along the spinal column collaterally with the breathing rhythm, on the sensation of inhaled air touching and passing through the nasal passage, on other parts of the body, or on a mantra.129,130

In Hatha yoga, various patterns of respiration are closely coordinated with the body in either a static posture or with movement.134 There are many pranayama techniques described in Hatha yoga texts; however, the practice of pranayama in this tradition has four primary objectives: (1) a stepwise reduction in breathing frequency, (2) attainment of a 1:2 ratio for the end of inspiration and expiration respectively, (3) holding the breath for a period at the end of inspiration that lasts twice the length of expiration, i.e., a 1:4 ratio between inhalation and retention, and (4) mental concentration on breathing.121,123,135 The four objectives are unified in the achievement of a single purpose, namely, the slowing down of respiration to achieve an immediate intensification of consciousness through the elimination of external stimuli.135

Practices such as Sudarshana Kriya Yoga involve rhythmic breathing at different rates following ujjayi pranayama (long and deep breaths with constriction at the base of throat) and bhastrika (fast and forceful breaths through the nose along with arm movements). Other practices, such as Iyengar Yoga, instruct the practitioner to breathe through the nostrils only while performing the asanas.126 Some varieties of pranayama require the practitioner to inhale and exhale through one nostril selectively, a practice called unilateral forced nostril breathing.119,120 These breathing exercises are often practiced in combination with different postural locks (bandhas). Bandhas are restrictive positions or muscle manoeuvres that exercise certain parts of the body. The most common of these are the abdominal lift (uddiyana bandha), the root lock (mula bandha), and the chin lock (glandhanda bandha).125

In Kundalini yoga, there are hundreds of different breathing patterns, each having unique and specific benefits and effects. In “Sudarshan Chakra Kriya,” considered one of the most powerful pranayama meditation techniques in Kundalini yoga, a unilateral forced nostril
breathing pattern is employed selectively with inspiration through the left nostril, with breath retention, and with selective expiration through the right nostril. During the breath retention phase the abdomen is pumped in and out 48 times and a three-part mantra is mentally repeated 16 times in phase with the abdominal pumping (one repetition of the three-part mantra with three pumps), and the eyes are open and focused on the tip of the nose. As the technique is mastered, the rate of respiration is eventually reduced to less than one breath per minute and is practiced for a maximum of 2 hours and 31 minutes.129

**Attention and its object.** Inherent in the practice of Yoga is an effortless progression toward increased concentration, or, more precisely, toward entering a state in which the mind is highly stable and still, consciously and purposely focused, and ordinary thoughts are suspended, and the meditator is more aware of the present moment (samadhi).130,131 This state has been described as the complete merging of the subjective consciousness and the object of focus.130

Hatha yoga has been defined as gentle stretching and strengthening exercises with constant awareness of breathing and of the sensations that arise as the meditator assumes various postures.76,124 By manipulating the body and making minute, detailed adjustments to perfect each posture, a person develops “one-pointed” concentration and ceases to become distracted by extraneous thoughts.130

One Hatha yoga technique, Savasana, or corpse pose, involves lying on the back, with legs resting on the floor slightly apart, arms at the sides, palms facing up, and eyes closed. This seemingly simple pose is actually one of the most demanding to perfect because of the practitioner’s need to achieve absolute stillness and total concentration as well as control over the breath.132 If drowsiness occurs, practitioners are told to increase the depth of their breathing. If the mind is restless, attention to the breathing cycle or other bodily sensations is encouraged. The goal is to rest in a state of relaxation, yet be aware of raw, sensory information and to let go of any reactions or judgments.132

In Kundalini yoga, one complex meditation technique called “Gan Puttee Kriya”, with multiple aspects of focus, is said to help eliminate negative thoughts, “psychic scarring,” and acute stress.116 The practitioner sits with a straight spine, either on the floor or in a chair. The legs resting on the floor slightly apart, arms at the sides, palms facing up, and eyes closed. In the beginning posture, the practitioner’s hands are placed on the upper abdomen and knees together. The practitioner begins by chanting “SA” (the A sounding like “ah”), and touching the thumbtips and index fingertips together quickly and simultaneously then chanting “TA” and touching the thumbtips to the middle fingertips, then chanting “NA” and touching the thumbtips to the ring fingertips, then chanting “MA” and touching the thumbtips to the little fingertips, then chanting “RA” and touching the thumbtips and index fingertips, then chanting “MA” and touching the thumbtips to the middle fingertips, then chanting “DA” and touching the thumbtips to the ring fingertips, then chanting “SA” and touching the thumbtips to the little fingertips, then chanting “SA” and touching the thumbtips and index fingertips, then chanting “SAY” (like the word “say”) and touching the thumbtips to the middle fingertips, then chanting “SO” and touching the thumbtips to the ring fingertips, then chanting “HUNG” and touching the thumbtips to the little fingertips. The thumbtips and fingers touch with about 2 to 3 pounds of pressure with each connection which supposedly helps to consolidate a circuit created by each thumb-finger link. The techniques can be practiced for 11 minutes (or less) to a maximum of 31 minutes. When finished, the practitioner remains in the sitting posture and inhales and holds the breath for 20 to 30 seconds while shaking and moving every part of the body vigorously, with the hands and fingers moving very loosely, then exhaling and repeating this two additional times, immediately followed by opening the eyes and focusing them on the tip of the nose and breathing slowly through the nose for one minute.

**Spirituality and belief.** Yoga is a science and philosophy of the human mind and body; it is a way of life, moral as well as practical.133 Yoga predates all formal religions,139 and, perhaps for this reason, the practice of Yoga does not presuppose an individual’s commitment to a particular philosophical or religious system.144,145

**Training.** The ethical principles of Yoga describe the essential attitudes and values that are needed to undertake the safe practice of Yoga. The physical practice of Yoga focuses on the development of the strength, flexibility, and endurance of the body, strengthening of the respiratory and nervous systems, development of the glandular system, and increasing the ability to concentrate. In its complete form, Yoga combines rigorous physical training with meditation practices, breathing, and sound/mantra techniques that lead to a mastery of the body, mind, and consciousness. Both ancient commentaries on Yoga and more modern books of instruction stress the importance of learning under the guidance of an experienced teacher, Guru or Master.130,136,143 However, some Yoga techniques, especially asanas, pranayams, and meditation techniques, have been described and illustrated in books and videos produced for the purpose of self-study.133 In terms of specific training requirements, it is recommended that Yoga exercises be practiced daily, preferably in the morning, and on an empty stomach.139 Exercises can last from 15 minutes to several hours and it can take several years of consistent practice before a practitioner is able to practice properly the more demanding asanas and meditation techniques.

**Criteria of successful meditation practice.** The ideal instruction in and assessment of Yoga techniques comes from a Guru or Master. Nevertheless, as books and video instruction are available, it can be assumed that the practitioner is able, to varying degrees, to assess the correctness of at least some asanas, pranayams, and a wide variety of meditation techniques. Yoga is ultimately a tradition of spiritual self-discipline and practice for the pursuit of enlightenment.143 Like Vipassana and Zen Buddhism, the success of meditation practice is judged on the basis of the practitioner achieving this state of enlightenment or other intermediate psychological or spiritual states. For example, the central experience achieved through Sahaja yoga meditation is a state called “thoughtless awareness” or “mental silence” in which the meditator is alert and aware but is free of any unnecessary mental activity.112 The state of thoughtless awareness is usually accompanied by emotionally positive experiences of bliss. In general, the outcome of the meditative process is associated with a sense of relaxation and positive mood and a feeling of benevolence toward oneself and others.146

As Yoga also involves exercises to strengthen the body and voluntarily control different aspects of breathing, success in these techniques can be evaluated against the standards for practice (e.g., achieving a 1:4:2 ratio in inhalation, retention, and exhalation), or developing the ability to reduce the rate of respiration to one breath per minute for 1 or 2 hours. Successful practice can also be determined by a subjective and objective evaluation of the achievement of some of the reported health benefits.
Tai Chi

Tai Chi (also romanized as Tai Chi Ch’uan, T’ai Chi Ch’uan, Taijiquan, Taiji, or Tai Chi) has a history stretching back to the 13th century A.D. to the Sung dynasty.147 There are five main schools, or styles, of Tai Chi, each named for the style’s founding family: Yang, Chen, Sun, Wu (Jian Qian), and Wu (He Qin).148 Each style has a characteristic technique that differs from other styles in the postures or forms included, the order in which the forms appear, the pace at which movements are executed, and the level of difficulty of the technique.148 Though differing in focus on posture and the position of the center of gravity, all styles emphasize relaxation, mental concentration, and movement coordination.142 Tai Chi practice usually involves the need to memorize the names associated with each posture and the sequence of postures.142

Main components. The practice of Tai Chi encompasses exercises that promote posture, flexibility, relaxation, well-being, and mental concentration.146,149 It is characterized by extreme slowness of movement, absolute continuity without break or pause, and a total focusing of awareness on the moment.149 Unlike most exercises that are characterized by muscular force and exertion, the movements of Tai Chi are slow, gentle and light. The active concentration of the mind is instrumental in guiding the flow of the body’s movements.151 Thus, Tai Chi is not only a physical exercise, but also involves training the mind, and this has prompted some to consider the practice “moving meditation.”148-150 Although Tai Chi follows the principles of other types of martial arts that focus on self-defense, its primary objective is to promote health and peace of mind. In contrast to other martial arts, Tai Chi is performed slowly, with deep and consistent breathing.151 The movements should be performed in a quiet place that will help the practitioner to achieve a relaxed state. The muscles and joints are relaxed and the body is able to move easily from one position to another. The spine is in a natural erect position, and the head, torso, arms, and legs should be able to move freely and gently. The upper body is straight, never bending forward or backward, or leaning left or right.152

Breathing. Several different breathing techniques are employed in Tai Chi; however, the principal breathing technique, called “natural breathing,” is the foundation for all other breathing techniques. In natural breathing, the practitioner takes a slow, deep (but not strained) breath, inhaling and exhaling through the nose. The mouth is closed, but the breath are not clenched. The tip of the tongue is held lightly against the roof of the mouth. As the air is taken in, the lower abdomen expands. Once the lungs are adequately filled with air, the person exhales and the lower abdomen contracts. The breath is never held. The eyes should be lightly closed.152

The movements of Tai Chi are coordinated with the breath, and the pattern of breathing follows the succession of opposing movements of the arms: inhalation takes place when the arms are extended outward or upward, exhalation occurs as arms are contracted or brought downward. Breathing eventually becomes an unconscious part of the exercise; however, its importance in the practice never diminishes.150 Attention and its object. Throughout the practice, the mind remains alert but tranquil, directing the smooth series of movements and focusing on one’s internal energy. This active concentration is integral to the practice.149,151 It has been argued that if Tai Chi movements are performed without concentration, Tai Chi is no different from other forms of exercise. The variety and distinctiveness of the movements ensure that one concentrates on the execution of the movements.151

Spirituality and belief. Tai Chi derives its philosophical orientation from the opposing elements of yang (activity) and yin (inactivity) and from qi (breath energy).147 In accordance with the symbols of yin and yang, Tai Chi movements are circular. The movements are designed to balance the qi, or vital energy, in the meridians of the body, and strengthen the qi, thus preventing illness.152 Like Yoga, the practice of Tai Chi does not require adopting a specific spiritual or belief system and has been used clinically as a therapeutic intervention.

Training. The exercise routines of the different forms of Tai Chi vary in the number of postures and in the time required to complete the routine,147 with some Tai Chi programs being modified to suit the abilities of practitioners with declining physical and mental function.146 Classical Yang Tai Chi includes 108 postures with some repeated sequences. Each training session includes a 20-minute warm-up, 24 minutes of Tai Chi practice, and a 10-minute cooldown. The warm-up consists of 10 movements with 10 to 20 repetitions. However, the exercise intensity depends on training style, posture, and duration.154

When practiced solely as an exercise form, sessions should occur twice a day and last about 15 minutes, 4 or more days per week.147 Practitioners are not required to continue training permanently with a Tai Chi teacher, and can continue practice as a form of self-therapy.152 When used as a system of self-defense, Tai Chi must be practiced with a Master and long enough to develop a deep understanding and “body memory” of the movements.155 However, as a healing practice, years of study are not required and the typical practitioner may be able to learn the fundamental movements within a week.155

Criteria of successful meditation practice. The overall aim is not to “master” the movements, but to appreciate a developing sense of inner and outer harmony as the movements become more fluid, yet controlled, and the mind more alert, yet peaceful.149 To learn and practice Tai Chi successfully, practitioners must adopt and practice specific traditional principles of posture and movement such as holding the head in vertical alignment, relaxing the chest and straightening the back, using mental focus instead of physical force, and seeking calmness of mind in movement.149

Qi Gong

Qi Gong is classified as one of the practices known as “energy healing,” a category that includes Reiki, therapeutic touch,156 and the Korean practice of Chondosunbup. Dating back more than 3,000 years to the Shang Dynasty (1600 to 1100 B.C.), Qi Gong is believed to be the basis for traditional Chinese medicine.157 Qi Gong is intimately connected with the practice of Tai Chi in that both exercises utilize proper body positioning, efficient movement, and deep breathing. A quiet focused mind is also essential to both. The main difference between Qi Gong and Tai Chi is that Tai Chi is a martial art. Usually practiced slowly, Tai Chi movements can be sped up to provide a form of self-defense, whereas this is not the case with the forms of Qi Gong. As a result, the visualization that accompanies a particular form is different: for a movement in Tai Chi that might involve visualizing the external consequences of a motion (e.g., disabling one’s adversary), the same movement in Qi Gong would involve the visualization of an internal consequence of qi flow (e.g., qi flowing down your arm, healing your arthritis).152 There are two forms of Qi Gong practice: internal (nei qi), consisting of individual practice, and external (wai qi), whereby a Qi Gong practitioner

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Qi Gong is said to have several thousand forms. There are five main schools or styles of Qi Gong, each emphasizing a different purpose for practice and incorporating different exercises: Taoist, Buddhist, Confucian, Medical, and Martial. It is believed that every Qi Gong style has its own special training methods, objectives, and compatibility with an individual’s constitution and physique. Despite this variation in technique, the main function of Qi Gong is to regulate the mind. 

Main components. Qi Gong, literally “breathless exercise,” consists primarily of meditation, physical movements, and breathing exercises. The main components of Qi Gong vary, but most emphasize correct posture and body alignment, regulation of respiration, posture, and mind, as well as self-massage and movement of the limbs. In general, Qi Gong consists of two aspects: (1) dynamic or active Qi Gong, which involves visible movement of the body, typically through a set of slowly enacted exercises, usually performed in a relaxed stationary position; and (2) meditative or passive Qi Gong, which comprises still positions with inner movement of the diaphragm. In some concentration practices, the eyes are closed and the tip of the tongue touches the front of the upper palate. Essential to both aspects of practice are alert concentration, precise control of abdominal breathing, and a mental concentration on qi flow.

Qi Gong, as a practice of self-regulation, includes regulation of the body (e.g., relaxation and posture), breath (to breathe deeply and slowly), and mind (thinking and emotion). Methods for the regulation of the mind vary. Some forms of Qi Gong stress thinking, e.g., focusing on a specific object or visualization. Other forms emphasize regulation of the emotions (e.g., a peaceful and calm mood), but let thinking go or remain “no-thought.” Accordingly, Qi Gong techniques may be classified as one of two forms: concentrative Qi Gong and nonconcentrative Qi Gong. Self-practice of Qi Gong consists of three major forms: guided movement (dynamic form), pile standing, and static meditation. Whether with motion or without, the aim of Qi Gong is to remove all thoughts and focus on a region of the body known as “dantian” (the elixir field). As the body relaxes, the mind concentrates on the elixir field and all other thoughts are erased, while respiration becomes deeper and gradually decreases in frequency. When the respiration rate is decreased to four or five times per minute, the subject falls into the so-called Qi Gong state. It is recommended that a student practice only one type of Qi Gong before learning another as not all techniques are congruent.

Breathing. Qi Gong breathing is characterized by a concentration of attention on dantian in concert with inhalation, exhalation, and holding of breath in order to stimulate qi and blood, and to strengthen the body. There are many ways to regulate the breath in Qi Gong including natural breathing, chest breathing, abdominal and reverse-abdominal breathing, holding the breath, and one-sided nostril and alternating nostril techniques.

Attention and its object. A main tenet of Qi Gong is that intention can direct the qi within the body; the mind leads the qi, and qi leads the blood. To exert this control over qi, the practitioner must calm the mind and clear it of thoughts. A person’s success in Qi Gong is directly related to the ability to concentrate in this way. This is done by focusing the mind and body on correct breathing, and the visualization of qi as a substance moving through the body.

Spirituality and belief. Qi Gong posits the existence of a subtle energy (qi) that circulates throughout the entire human body. Pain and disease are considered to be the result of qi blockage or imbalance; strengthening and balancing qi flow can improve health and ward off disease. Taoism, an ancient spiritual tradition in East Asia, is a philosophical perspective underlying the practice of Qi Gong. The Tao is the indefinable ultimate reality—the process involving every aspect in nature and in the entire universe. Similar to the worldviews of Buddhism and Hinduism, Taoism emphasizes harmony with nature. The universe is viewed in a dynamically continuous flow and constant change.

Basic concepts considered essential to the understanding of Qi Gong include qi, vital energy, and gong, the skill, control, training, cultivation and practice of adjusting physical, mental and spiritual phenomena. Yin and yang, two other crucial concepts, are complementary opposites: yin signifies decrease, stillness, darkness, the six solid organs (lungs, spleen, heart, kidneys, pericardium, and liver), and bodily substances; yang signifies increase, activity, lightness, the upper and exterior parts of the body, the six hollow organs (large intestine, stomach, small intestine, urinary bladder, gallbladder, san jiao [not an organ, but the sum of the functions of transformation and interpenetration of various densities and qualities of substance within the organism]), and bodily functions.

Training. Because of the possibility of Qi Gong-induced disorders from improper practice, or from the combination of incongruent forms, proper coaching is considered mandatory for safe Qi Gong practice. Qi Gong should be practiced twice daily for 20 to 30 minutes with no single session exceeding 3 hours.

Criteria of successful meditation practice. Correctness of technique is judged by a Qi Gong Master. No statement of the criteria for evaluating successful outcomes was available in the literature.

Characteristics of Meditation Practices

Main Components

What are the main components of the various meditation practices? Which components are universal and which ones are supplemental?

The variety of meditation practices is an indication of the diversity of the combination of main components and the way in which a given component may be emphasized in a practice. Given the multitude of practices and the many variations or techniques within these practices, it is impossible to select components that might be considered universal or supplemental across practices. Some practices prescribe specific postures (e.g., Zen Buddhist meditation, Tai Chi, Yoga) while others are less concerned with the exact position of the body (e.g., TM, RR, CSM). Some practices (e.g., Vipassana, Zen Buddhist meditation, Yoga, Tai Chi, and Qi Gong) incorporate moving meditation, while others are strictly seated meditations (e.g., TM, RR, and CSM). Some clinically-based practices (e.g., MBSR, MBCT), though guided by the underlying practice of mindfulness, combine several techniques. In this, however, they are not substantially different from older multifaceted meditation practices such as Yoga.
More detailed summaries addressing the main components used to describe individual practices are described below and summarized in Table 4. However, it is worth noting here some general conclusions that can be drawn from them. Though some statement about the use of breathing is universal across the practices, this seems more indicative of the ubiquitousness of breathing in humans rather than a universal feature of meditation practices per se. The control of attention is putatively universal; however, as noted below, there are at least two aspects of attention that might be employed and a wide variety of techniques for anchoring the attention, no one of which is universal. In terms of the spiritual or belief component of meditation, no meditation practice required the adoption of a specific religious framework. However, if Taoist metaphysical assumptions of Qi Gong are crucial to correctly understanding, visualizing, and guiding qi flow, then at least this practice would seem to require the adoption of a particular belief system. Nevertheless, this aspect of all meditation practices is poorly described, and it is unclear in what way and to what extent spirituality and belief play a role in the successful practice of meditation at all levels. The amount of variation in the described frequency and duration of practice make it difficult to draw generalizations about the training requirements for meditation techniques. Lastly, the criteria for successful meditation, for both the correct practice of the technique and the achievement of successful outcomes, have not been described well in the literature.

Breathing

How is breathing incorporated in these practices? Are there specific breathing patterns that are integral elements of meditation? Is breathing passive or directed?

The use of the breath is ubiquitous in all practices; however, the importance and attention given to it vary from practice to practice. Each meditation practice and technique has a breathing pattern or element that can be considered integral to that technique, whether the breath is actively controlled in terms of its timing and depth (e.g., Zen Buddhist meditation, Yoga, Tai Chi), or passive and “natural” (e.g., TM®, RR, CSM, Vipassana, MBCT). The practice of Yoga, which covers thousands of techniques, uses both active and passive breathing. Though the direction for active breathing may be relatively uniform across the techniques in a given practice (e.g., Zen Buddhist meditation), other practices use a wide array of breathing techniques that change according to the outcome desired (e.g., Kundalini yoga). For those practices that utilize passive breathing, there is no consistent pattern or rhythm as “breathing naturally” will vary from practitioner to practitioner.

Attention and Its Object

For each type of meditation practice, where is the attention directed during meditation (e.g., mantra, breath, image, nothing)?

The purposeful focusing of attention is considered crucial in all meditation practices. However, like breathing, the techniques for anchoring attention vary and there is no single method shared by all practices. For those practices that use a mantra (e.g., TM®, RR, CSM), in some the mantra may be repeated silently, and in some aloud. The factors surrounding the choice of the mantra vary and the nature of the mantra chosen will influence the number of associations brought forth by the word and the vibrations caused by the vocalization of the mantra. Some mantras will have no meaning to Western practitioners unfamiliar with Sanskrit (e.g., TM®, CSM, Yoga), while others will (e.g., RR).

Other forms of meditation practice focus attention on bodily sensations (e.g., Vipassana, MBSR, MBCT) or a body part (e.g., Tai Chi) to the exclusion of other thoughts. The so-called mindfulness techniques focus on the breath and cultivate an objective openness to whatever comes into awareness. Though this may be interpreted as not focusing attention, or, as it is sometimes paradoxically phrased, as focusing on nothing, the attention is controlled and directed with the aim of achieving a distance from one’s emotional and cognitive responses to the objects in the field of attention. The difference between mindfulness meditation and other practices lies in the acceptance of these other thoughts into the field of awareness. Though the distinction between concentrative and mindfulness meditation has prima facie validity, the reality is somewhat more complicated because some practices, such as Zen and Vipassana, have phases where concentration is used, and for which certain techniques such as counting or concentrating on a mantra are employed, while at other stages broad spaced mindful attention is encouraged.

Spirituality and Belief

To what extent is spirituality a part of meditation? To what extent is belief a part of meditation?

The one common feature of all meditation practices examined in this review is the apparent ability to practice meditation without adopting a specific system of spiritual or religious belief. However, the extent to which spirituality and belief are part of any given meditation practice is poorly described. Furthermore, if the Taoist metaphysical assumptions of Qi Gong are crucial to successfully understand, visualize, and guide qi, then at least this practice requires adopting a specific belief system.

The extent to which spirituality or belief play a role in any meditation practice appears to depend in large part on the individual practitioner. Though the traditional practices were developed within specific spiritual or religious contexts (Vipassana, Zen Buddhist meditation, Yoga, Tai Chi, Qi Gong), and therefore have spiritual or religious aspects, this does not mean that a practitioner must adopt the belief systems upon which they were based. In addition, some practices developed for purposes other than spiritual enlightenment; for example, Tai Chi and Qi Gong were developed within a system of traditional Chinese Medicine, respectively. Though Yoga, too, has spiritual and religious components, it is often considered more properly a system of metaphysics and psychology, especially when the ethical instructions are ignored. In summary, it appears that all meditation practices can be performed, to some degree, without adopting a specific system of spirituality or belief.
Training

What are the training requirements for the various meditation practices (e.g., the range of training periods, frequency of training, individual and group approaches)?

Training refers to the specific periods of practice, the frequency and duration of practice, and how long a practitioner is expected to train before becoming proficient in a given technique. The training for meditation varies with periods of practice, ranging from 5 minutes (RR, Vipassana) to several hours (Yoga). The frequency of practice ranges from daily (MBSR, MBCT, Tai Chi, Vipassana, Yoga) to twice daily (TM®, RR, CSM, Qi Gong). Zen meditation does not specify a frequency of practice. Few practices give a required duration of practice; however, some (Yoga, Zen Buddhist meditation) give an indication of the time required to master a given technique.

Criteria of Successful Meditation Practice

How is the success of the meditation practice determined (i.e., was it practiced properly)? What criteria are used to determine successful meditation practice?

The criteria of successful meditation practice is understood both in terms of the successful practice of a specific technique (i.e., the technique is practiced properly) and in terms of achieving the aim of the meditation practice (e.g., leading to reduced stress, calmness of mind, or spiritual enlightenment).

The successful practice of a specific technique is sometimes judged by an experienced or master practitioner (TM®, MBSR, Yoga, Tai Chi, Qi Gong), and in some cases it can be judged by the individual (RR, CSM). However, the proliferation of self-instruction books and videos for some of the practices that also recommend an experienced teacher implies that individuals may judge, to some degree, the success of a practice.

<table>
<thead>
<tr>
<th>Meditation practice</th>
<th>Main components</th>
<th>Breathing</th>
<th>Attention</th>
<th>Spirituality/belief</th>
<th>Training</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mantra meditation</td>
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<tr>
<td>TM®</td>
<td>Sitting (no prescribed posture) Personalized Sanskrit mantra Eyes closed</td>
<td>Passive, unconnected to repetition of mantra No description of breathing</td>
<td>Attention directed to prescribed mantra Mantra repeated silently</td>
<td>No specific spiritual or religious beliefs required</td>
<td>Taught in 4 consecutive days (preceded by two 1-hour lectures and a 5-10 minute interview) in a 1-hour training session and three 1.5-hour group sessions. Individual instruction: Practiced twice daily 15-20 min/session Instruction by qualified TM® teacher</td>
</tr>
<tr>
<td>Relaxation Response</td>
<td>Comfortable posture (sitting, kneeling, squatting) Eyes open or closed Can also include body scan and information sessions</td>
<td>Passive, but mantra is &quot;linked&quot; to exhalation Nasal</td>
<td>Attention focused on the breath Mantra repeated silently Thoughts are ignored</td>
<td>No specific spiritual or religious beliefs required</td>
<td>Taught in 5-min training session Individual instruction: Practiced twice daily 15-20 min/session and not before 2hrs after a meal</td>
</tr>
<tr>
<td>Clinically Standardized Meditation</td>
<td>Comfortable seated posture Sanskrit mantra or individually chosen mantra Eyes open initially and focused on pleasant object, then closed for repetition of mantra</td>
<td>Passive, unconnected to repetition of mantra</td>
<td>Attention directed to individually chosen mantra (1 of 16) Mantra repeated aloud and then at decreasing volume until it is repeated silently Thoughts recognized, but not focused on</td>
<td>No specific spiritual or religious beliefs required</td>
<td>Taught in 2 1-hr lessons Individual instruction or training manual and audio tapes Practiced twice daily for 20 min/session</td>
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</table>
Table 4. Characteristics of included meditation practices (continued)

<table>
<thead>
<tr>
<th>Meditation practice</th>
<th>Main components</th>
<th>Breathing</th>
<th>Attention</th>
<th>Spirituality/belief</th>
<th>Training</th>
<th>Criteria for success</th>
<th>Main components</th>
<th>Breathing</th>
<th>Attention</th>
<th>Spirituality/belief</th>
<th>Training</th>
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<tbody>
<tr>
<td>Vipassana</td>
<td>Cultivation of a &quot;mindful&quot; attitude</td>
<td>Passive Nasal</td>
<td>Attention is focused on the breath (first nostril or on rising and falling of abdomen)</td>
<td>No specific spiritual or religious beliefs required</td>
<td>No specific training period given</td>
<td>Proper technique determined by experienced meditator or by self-evaluation</td>
<td>Based on MBSR program</td>
<td>Passive</td>
<td>Seated meditation: attention focused on breath as it passes edge of nostrils or on rising and falling of abdomen</td>
<td>No specific spiritual or religious beliefs required</td>
<td>Taught in an 8-week course involving weekly 2-hr classes and 45-min sessions at home 6 days a week with homework exercises</td>
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<tr>
<td></td>
<td>Seated posture</td>
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<tr>
<td>Zen</td>
<td>Specific seated postures (lotus or half-lotus), positioning of hands, mouth and tongue</td>
<td>Active Inhale through nose, exhale through mouth and nasal only</td>
<td>Attention focused on counting of breath, on a loam or &quot;just sitting.&quot;</td>
<td>No specific spiritual or religious beliefs required; however, attitude of nonreactiveness is essential</td>
<td>No specific training period given</td>
<td>Successful practice determined by experienced teacher; specific personal experience of the true nature of reality</td>
<td>MBCT</td>
<td>Based on MBSR program</td>
<td>Cultivation of &quot;decentered&quot; or &quot;mindful&quot; perspective</td>
<td>Seated meditation Body scan</td>
<td>No specific spiritual or religious beliefs required</td>
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<tr>
<td></td>
<td>Eyes half closed and focused on point on floor</td>
<td>Many breathing patterns</td>
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<tr>
<td>MBSR</td>
<td>Cultivation of a &quot;mindful&quot; attitude</td>
<td>Active (diaphragmatic breathing) and passive</td>
<td>Seated meditation: attention focused on breath as it passes edge of nostrils or on rising and falling of abdomen</td>
<td>No specific spiritual or religious beliefs required, however, strong commitment and self-discipline are essential</td>
<td>Taught in an 8-week course involving weekly 2-3 hr classes and 45-min sessions at home 6 days a week with homework exercises</td>
<td>Successful meditation requires the technique be taught by an MBSR practitioner</td>
<td>Sīkṣā Yoga: Emphasis of components vary among &quot;schools&quot; but can include ethical observances, physical postures, breathing techniques, concentrative and mindfulness meditation</td>
<td>Active and passive</td>
<td>Physical postures</td>
<td>No specific spiritual or religious beliefs required unless the ethical component is included</td>
<td>Regular daily practice from 15 min to several hours instruction by an experienced Yogi or Guru; may take several years or longer to properly execute asanas and pranayama</td>
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<td>Prescribed postures</td>
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<tr>
<td></td>
<td>Seated meditation</td>
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<td></td>
<td>Body scan (supine posture)</td>
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<td></td>
<td>Hatha yoga postures</td>
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The combined search strategies identified 11,030 citations. After screening titles and abstracts, 2,366 references were selected for further examination. The manuscripts of 81 articles were not retrieved (Appendix E). The majority of the unretrieved studies were abstracts from conference proceedings and articles from nonindexed journals and were requested through our interlibrary loan service, but did not arrive within the 9-month cutoff that we established for article retrieval. Therefore, the full text of 2,285 potentially relevant articles was retrieved and evaluated for inclusion in the review. The application of the selection criteria to the 2,285 articles resulted in 911 articles being included and 1,374 excluded. Figure 2 outlines study retrieval and selection for the review.

The primary reasons for excluding studies were as follows: (1) the study was not primary research on meditation practices (n= 909), (2) the study did not have a control group (n= 280), (3) the study did not report adequately on measurable data for health-related outcomes relevant to the review (n= 170), (4) the study did not examine an adult population (n= 9), and (5) the study sample included less than 10 participants (n= 6) (Appendix E). The level of agreement between reviewers for inclusion and exclusion of studies was substantial (kappa = 0.84, 95% CI, 0.80 to 0.87).

From 911 included articles, 108 were identified as multiple publications;165 that is, cases in which the same study was published more than once, or part of data from an original report was published.166 The multiple publications were not considered to be unique studies and any information that they provided was included with the data reported in the main study (Appendix F). The report that was published first was regarded as the main study. In total, 803 articles were included in this report 10 of which each reported on two studies. Therefore, this report included 813 unique studies reported in 803 articles.

Table 4. Characteristics of included meditation practices (continued)

<table>
<thead>
<tr>
<th>Meditation practice</th>
<th>Main components</th>
<th>Breathing</th>
<th>Attention</th>
<th>Spirituality/belief</th>
<th>Training</th>
<th>Criteria for success</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yang, Chen, Sun, Wu (Jian Qian), and Wu (He Qin) styles</td>
<td>A routine of slow, deliberate movements (movements and postures vary among schools) Body relaxed, upper body erect, not bending Mouth closed, teeth not clenched</td>
<td>Active</td>
<td>Attention is focused on movement and one's internal energy (qi)</td>
<td>No specific spiritual or religious beliefs required</td>
<td>Routines vary in number of postures and duration Classical Yang-style Tai Chi includes 108 postures and takes approximately 20-25 min to complete; practice also includes a 20-min warm-up and 10-min cooldown</td>
<td>Proper movement and posture are judged by experienced Tai Chi teacher</td>
</tr>
<tr>
<td>Qi Gong</td>
<td>Many techniques</td>
<td>Active</td>
<td>Techniques vary</td>
<td>Attention is focused on the &quot;elixir field&quot; and on the inhalation and exhalation of the breath</td>
<td>No specific spiritual or religious beliefs required</td>
<td>Practiced 60-90 min daily for 20-30 min with no single session exceeding 3 hr</td>
</tr>
</tbody>
</table>

*Appendices and evidence tables cited in this report are provided electronically at http://www.ahrq.gov/clinic/tp/medittp.htm
**Topic II. State of Research on the Therapeutic Use of Meditation Practices in Healthcare**

**General Characteristics**

Eight hundred and thirteen studies provided evidence regarding the state of research on the therapeutic use of meditation. Tables G1 to G3 of Appendix G summarize the key characteristics of studies included in topic II.

The studies were published between 1956 and 2005, with 51 percent of the studies (n = 417) published after 1994. Most of the studies (86 percent, n = 701) were published as journal articles. Seventy-nine (10 percent) were theses or dissertations, 25 (3 percent) were abstracts from scientific conferences, and 5 (0.5 percent) were book chapters or letters. Three unpublished studies (0.5 percent) were identified by contacting investigators. Studies were conducted in North America (61 percent), Asia (24 percent), Europe (11 percent), Australasia (3 percent) and other regions (1 percent).

Of the 813 studies included, 67 percent (n = 547) were intervention studies (286 RCTs, 114 NRCTs and 147 before-and-after studies), and 33 percent (n = 266) were observational analytical studies (149 cohort and 117 cross-sectional studies).

**Methodological Quality**

**Intervention studies.** Overall, the methodological quality of the 286 RCTs was poor (median Jadad score = 2/5; IQR, 1 to 2). Only 14 percent (n = 40) of the RCTs were considered of high quality (i.e., Jadad scores greater than or equal to 3 points). Three studies obtained 4 points on the Jadad scale, and none obtained a perfect score (5 points). The remaining 246 RCTs had a high risk of bias.

The methodological quality of the RCTs was analyzed by the individual components of the Jadad scale. We found that 21 percent (n = 60) described how the randomization was carried out. Among these 60 trials, 75 percent (n = 45) reported adequate methods to randomize study participants to treatment groups, whereas 25 percent (n = 15) used inappropriate and unreliable methods (i.e., alternation or methods based on patient characteristics) that might have introduced imbalances and jeopardized the estimates of the overall treatment effect.

The vast majority of RCTs (97 percent, n = 278) did not use double blinding to hide the identity of the assigned interventions from the participant and assessor, or hide the hypothesis from the instructor and participant and assessor. One of them described an inadequate method of double blinding while the others did not provide any description about the double-blinding procedures. Finally, 51 percent (n = 145) of the RCTs provided a description of withdrawals and dropouts from the study.

Concealment of treatment allocation (separating the process of randomization from the recruitment of participants) was adequately reported in 12 (4 percent) RCTs and was inadequate in 2 (1 percent) RCTs. The majority of RCTs (272, 95 percent) failed to describe how they concealed...
concealed the allocation to the interventions under study. Finally, funding source was disclosed in 41 percent (n = 118) of the RCTs. A summary of the methodological quality of RCTs is presented in Table 5.

Table 5. Methodological quality of RCTs  

<table>
<thead>
<tr>
<th>Quality components</th>
<th>N studies (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Randomization</td>
<td>286 (100)</td>
</tr>
<tr>
<td>Double blinding</td>
<td>8 (2.8)</td>
</tr>
<tr>
<td>Appropriate randomization</td>
<td>45 (15.6)</td>
</tr>
<tr>
<td>Inappropriate randomization</td>
<td>13 (5.2)</td>
</tr>
<tr>
<td>Inappropriate double blinding</td>
<td>1 (0.3)</td>
</tr>
<tr>
<td>Description withdrawals</td>
<td>145 (50.7)</td>
</tr>
<tr>
<td>Total Jadad score (max 5): median (IQR)</td>
<td>2 (1, 2)</td>
</tr>
<tr>
<td>Number of high quality RCTs (Jadad score 3)</td>
<td>40 (13.9)</td>
</tr>
<tr>
<td>Appropriate concealment of allocation</td>
<td>12 (4.1)</td>
</tr>
<tr>
<td>Funding reported</td>
<td>118 (41.3)</td>
</tr>
</tbody>
</table>

IQR = interquartile range; RCT = randomized controlled trial

Overall, the quality of the 114 NRCTs was low (median modified Jadad score: 0/3; IQR, 0 to 1). Forty-six percent (n = 52) of the NRCTs obtained only 1 point out of 3 for the individual components of the Jadad scale, most frequently for the description of withdrawals and dropouts. The remaining 54 percent (n = 62) of the NRCTs did not score any points. Finally, the source of funding was cited in 26 percent (n = 30) of the NRCTs. A summary of the methodological quality of NRCTs is presented in Table 6.

Table 6. Methodological quality of NRCTs  

<table>
<thead>
<tr>
<th>Quality components</th>
<th>N studies (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Double blinding</td>
<td>...</td>
</tr>
<tr>
<td>Appropriate double blinding</td>
<td>...</td>
</tr>
<tr>
<td>Inappropriate double blinding</td>
<td>...</td>
</tr>
<tr>
<td>Description withdrawals</td>
<td>52 (45.6)</td>
</tr>
<tr>
<td>Total modified Jadad score (max 3), median (IQR)</td>
<td>0 (0, 1)</td>
</tr>
<tr>
<td>Funding reported</td>
<td>30 (26.3)</td>
</tr>
</tbody>
</table>

NRCT = nonrandomized controlled trials

The quality of the 147 before-and-after studies was poor. Only 16 percent (n = 23) of the before-and-after studies included representative samples of the target population. Descriptions of the number of study withdrawals (31 percent, n = 45), reasons for study withdrawals (14 percent, n = 20), and blinding of outcome assessors to intervention and assessment periods (2 percent, n = 3) were also infrequent. Better quality results were obtained for the homogeneity in the methods for outcome assessment for the pre- and postintervention periods for all participants. Finally, funding source was disclosed in 28 percent (n = 41) of the before-and-after studies. A summary of the methodological quality of the before-and-after studies is presented in Table 7. Studies that were included in the analysis of the methodological quality of RCTs, NRCTs, and before-and-after studies are summarized in Table G4 in Appendix G.

Table 7. Methodological quality of before-and-after studies  

<table>
<thead>
<tr>
<th>Quality components</th>
<th>N studies (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Study population representative of the target population</td>
<td>23 (15.6)</td>
</tr>
<tr>
<td>The method of outcome assessment was the same for the pre and post intervention periods for all participants</td>
<td>140 (90.2)</td>
</tr>
<tr>
<td>Outcome assessors were blind to intervention and assessment period</td>
<td>3 (2)</td>
</tr>
<tr>
<td>Description of the number of study withdrawals</td>
<td>45 (30.6)</td>
</tr>
<tr>
<td>Description of the reasons for study withdrawal</td>
<td>20 (13.9)</td>
</tr>
<tr>
<td>Funding reported</td>
<td>41 (27.9)</td>
</tr>
</tbody>
</table>

Observational analytical studies. The quality of reporting of cohort studies was evaluated with the individual components of the NOS scale regarding the selection and comparability of the cohorts, and outcome assessment. Overall, the methodological quality of the 149 cohort studies was poor (median NOS score = 3/9 stars; IQR; 2 to 4), suggesting a high risk of bias in these studies. Table 8 displays the methodological quality of the cohort studies assessed with the NOS scale.

Appendixes and evidence tables cited in this report are provided electronically at http://www.ahrq.gov/clinic/tp/medittp.htm
Table 8. Methodological quality of cohort studies (NOS scale)

<table>
<thead>
<tr>
<th>Quality components</th>
<th>N studies (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Representativeness of the exposed cohort</td>
<td></td>
</tr>
<tr>
<td>Truly representative of the average group in the community*</td>
<td>12 (8.1)</td>
</tr>
<tr>
<td>Somewhat representative of the average group in the community*</td>
<td>43 (28.9)</td>
</tr>
<tr>
<td>Selected group of participants</td>
<td>88 (58.1)</td>
</tr>
<tr>
<td>No description of the derivation of the cohort</td>
<td>6 (4.0)</td>
</tr>
<tr>
<td>Selection of the nonexposed cohort</td>
<td></td>
</tr>
<tr>
<td>Drawn from the same community as the exposed cohort*</td>
<td>56 (37.6)</td>
</tr>
<tr>
<td>Drawn from a different source</td>
<td>79 (53.0)</td>
</tr>
<tr>
<td>No description of the derivation of the nonexposed cohort</td>
<td>14 (9.4)</td>
</tr>
<tr>
<td>Ascertainment of exposure</td>
<td></td>
</tr>
<tr>
<td>Secure record*</td>
<td>10 (6.7)</td>
</tr>
<tr>
<td>Structured interview</td>
<td>4 (2.7)</td>
</tr>
<tr>
<td>Written self-report</td>
<td>21 (14.1)</td>
</tr>
<tr>
<td>No description of exposure ascertainment</td>
<td>114 (76.6)</td>
</tr>
<tr>
<td>Ascertainment of outcome</td>
<td></td>
</tr>
<tr>
<td>Demonstration that the outcome(s) of interest was not present at the start of the study*</td>
<td>10 (6.7)</td>
</tr>
<tr>
<td>Study controls for two or more important confounding factors*</td>
<td>48 (32.2)</td>
</tr>
<tr>
<td>Study controls for at least one important confounding factor*</td>
<td>51 (34.2)</td>
</tr>
<tr>
<td>No adjustment for important confounding factors in the design or analysis of the study</td>
<td>50 (33.6)</td>
</tr>
</tbody>
</table>

* Positive responses earn stars for the final score.

Table 8. Methodological quality of cohort studies (NOS scale) (continued)

<table>
<thead>
<tr>
<th>Quality components</th>
<th>N studies (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assessment of outcome</td>
<td></td>
</tr>
<tr>
<td>Independent blind assessment*</td>
<td>24 (16.1)</td>
</tr>
<tr>
<td>Record linkage*</td>
<td>85 (57.0)</td>
</tr>
<tr>
<td>Self-report</td>
<td>38 (25.5)</td>
</tr>
<tr>
<td>No description of outcomes assessment</td>
<td>2 (1.3)</td>
</tr>
<tr>
<td>Length of followup</td>
<td></td>
</tr>
<tr>
<td>Followup long enough for outcomes to occur*</td>
<td>44 (29.5)</td>
</tr>
<tr>
<td>Adequacy of followup of cohorts</td>
<td></td>
</tr>
<tr>
<td>Complete followup (all subjects accounted for)*</td>
<td>17 (11.4)</td>
</tr>
<tr>
<td>Subjects lost to followup unlikely to introduce bias*</td>
<td>12 (8.1)</td>
</tr>
<tr>
<td>Lost to followup likely to introduce bias</td>
<td>8 (5.4)</td>
</tr>
<tr>
<td>No description of losses to followup</td>
<td>112 (75.2)</td>
</tr>
<tr>
<td>NOS total score (max 9); median (IQR)</td>
<td>3 (2, 4)</td>
</tr>
</tbody>
</table>

In general, the cohort studies failed to protect against selection bias when assembling the exposed and nonexposed cohorts. Participants in 60 percent (n = 94) of the studies were not representative of the target population about which conclusions were to be drawn. The selection of the nonexposed cohort was equally compromised (62 percent, n = 93).

Detection bias affecting the ascertainment of both exposure and outcome was introduced in 139 (93 percent) studies. These studies did not use reliable methods to ensure that no differences in accuracy of exposure data between the cohorts existed. A similar proportion was found for studies that failed to demonstrate that the outcomes of interest were not present at the start of the study. Similarly, 105 (71 percent) cohort studies did not provide enough information to assess whether the length of the followup period was sufficient for outcomes to occur.

Attrition bias was substantial; only 20 percent (n = 29) of the studies reported followup rates unlikely to introduce differences between the comparison groups. The only methodological component that did not appear to be severely jeopardized was the control of confounders in the design or analysis. Sixty-six percent (n = 99) of the cohort studies adjusted for potential confounders either in the design or analysis. Finally, 28 percent (n = 41) of the cohort studies reported the source of funding.

The methodological quality of the cross-sectional studies was poor (median NOS total score = 2/6 stars; IQR, 1 to 3). The methodological characteristics of cross-sectional studies are summarized in Table 9. The cross-sectional studies had less prominent methodological weaknesses than the cohort studies.

Over half of the cross-sectional studies (53 percent, n = 62) chose study groups that were at least somewhat representative of the target population. However, only 21 percent of the studies (n = 24) drew the comparison groups from the same population as the study group. None of the studies used secure methods for ascertainment of exposure. Half of the cross-sectional studies (54 percent, n = 63) adjusted for potential confounders either in the design or analysis and used relatively reliable methods for assessing the outcomes (53 percent, n = 62). Finally, only 27 (23 percent) cross-sectional studies disclosed their source of funding.

Studies that were included in the analysis of the methodological quality of cohort and cross-sectional studies are summarized in Table G5 in Appendix G.*

*Appendices and evidence tables cited in this report are provided electronically at http://www.ahrq.gov/clinic/tp/medittp.htm
Table 9. Methodological quality of cross-sectional studies (NOS scale)

<table>
<thead>
<tr>
<th>Quality components</th>
<th>N studies (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Representativeness of the study group</td>
<td></td>
</tr>
<tr>
<td>Truly representative of the average group in the community*</td>
<td>1 (0.9)</td>
</tr>
<tr>
<td>Somewhat representative of the average group in the community*</td>
<td>61 (52.1)</td>
</tr>
<tr>
<td>Selected group of participants</td>
<td>12 (10.3)</td>
</tr>
<tr>
<td>No description of the derivation of the study group</td>
<td>43 (36.8)</td>
</tr>
<tr>
<td>Selection of the comparison group</td>
<td></td>
</tr>
<tr>
<td>Drawn from the same community as the study group*</td>
<td>24 (20.5)</td>
</tr>
<tr>
<td>Drawn from a different source</td>
<td>56 (47.9)</td>
</tr>
<tr>
<td>No description of the derivation of the comparison group</td>
<td>37 (31.6)</td>
</tr>
<tr>
<td>Ascertainment of exposure</td>
<td></td>
</tr>
<tr>
<td>Secure record*</td>
<td></td>
</tr>
<tr>
<td>Structured interview</td>
<td></td>
</tr>
<tr>
<td>Written self-report</td>
<td>2 (1.7)</td>
</tr>
<tr>
<td>No description of exposure ascertainment</td>
<td>115 (98.3)</td>
</tr>
<tr>
<td>Comparability of the comparison groups</td>
<td></td>
</tr>
<tr>
<td>Study controls for two or more important confounding factors*</td>
<td>49 (41.8)</td>
</tr>
<tr>
<td>Study controls for at least one important confounding factor*</td>
<td>14 (12)</td>
</tr>
<tr>
<td>No adjustment for important confounding factors in the design or analysis of the study</td>
<td>54 (46.2)</td>
</tr>
<tr>
<td>Assessment of outcome</td>
<td></td>
</tr>
<tr>
<td>Independent blind assessment*</td>
<td></td>
</tr>
<tr>
<td>Record linkage*</td>
<td>62 (53.0)</td>
</tr>
<tr>
<td>Self-report</td>
<td>52 (44.4)</td>
</tr>
<tr>
<td>No description of outcomes assessment</td>
<td>3 (2.6)</td>
</tr>
</tbody>
</table>

NOS total score (max: 9); median (IQR) 2 (1, 3)

Table 10. Meditation practices examined in intervention and observational analytical studies

<table>
<thead>
<tr>
<th>Meditation practice</th>
<th>Intervention studies (n)</th>
<th>Observational analytical studies (n)</th>
<th>Total (n)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>RCT</td>
<td>NRCT</td>
<td>Before-and-after</td>
</tr>
<tr>
<td>Mantra meditation</td>
<td>111</td>
<td>30</td>
<td>31</td>
</tr>
<tr>
<td>Mindfulness meditation</td>
<td>50</td>
<td>25</td>
<td>28</td>
</tr>
<tr>
<td>Meditation (ND)</td>
<td>11</td>
<td>6</td>
<td>2</td>
</tr>
<tr>
<td>Miscellaneous meditation practices</td>
<td>3</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Qi Gong</td>
<td>13</td>
<td></td>
<td>9</td>
</tr>
<tr>
<td>Tai Chi</td>
<td>29</td>
<td>17</td>
<td>20</td>
</tr>
<tr>
<td>Yoga</td>
<td>69</td>
<td>36</td>
<td>54</td>
</tr>
<tr>
<td>Total</td>
<td>286</td>
<td>114</td>
<td>147</td>
</tr>
</tbody>
</table>

ND = not described; NRCT = nonrandomized controlled trials; RCT = randomized controlled trials

Mantra meditation. Forty-one percent (n = 337) of the included studies reported on interventions involving the use of a mantra as a pivotal component for the practice of meditation. The studies were published from 1972 to 2005, with 1986 the median year of publication (IQR, 1978 to 1991). Study sample sizes ranged from 10 to 602,000 participants with a median of 40 participants per study (IQR, 24 to 68).

A variety of mantra meditation techniques were assessed in the studies. The majority of the studies (68 percent, n = 230) focused on TM® or the TM® Sidhi program. Fifteen percent (n = 51) reported on Benson’s RR, and nine percent (n = 31) assessed practices in which words or phrases (mantra) were chanted aloud or silently and used as objects of attention. Mantra meditation techniques such as CSM, and SRELAX that are similar to TM®, but developed specifically for clinical purposes, were assessed in four percent (n = 12) of the studies, Acem meditation, an amalgam of traditional meditation techniques and Western psychological theory and practices, was evaluated in two percent (n = 7) of the studies. Finally, three percent of the studies focused on other mantra techniques such as Ananda Marga (n = 3), concentrative prayer (n = 2), and Cayce’s meditation (n = 1).

Design and methodology. Thirty-three percent (n = 111) of the studies on mantra meditation were RCTs, 31 percent (n = 105) were cohort studies, 18 percent (n = 60) cross-sectional studies, and 9 percent for each of before-and-after studies (n = 31) and NRCTs (n = 30). The methodological quality of intervention studies on mantra meditation was poor: The median Jadad score for RCTs was 1/5 (IQR, 1 to 2). Only 13 out of 111 RCTs (12 percent) scored 3 points or more on the Jadad scale and thus could be considered high quality. The median modified Jadad score for NRCTs was 0.5/3 (IQR, 0 to 1). The quality of before-and-after studies was poor. The methodological quality of observational studies was also low, with a median NOS total score for cohort studies of 3/9 stars (IQR, 2 to 4) and a median NOS total score for cross-sectional studies of 2/6 stars (IQR, 1 to 3). There were major deficiencies in the selection and comparability of the study groups.

Mindfulness meditation. Sixteen percent of the studies (n = 127) described the use of mindfulness meditation techniques, such as MBSR (n = 49), mindfulness meditation techniques not further described (n = 37), Zen Buddhist meditation (n = 28), MBCT (n = 7), and Vipassana
mediation (n = 6). The studies were published from 1964 to 2005, with a median year of publication of 2001 (IQR, 1992 to 2003). Study sample sizes ranged from 10 to 719 with a median number of 39 participants per study (IQR, 23 to 73).

**Design and methodology.** Thirty-nine percent (n = 50) of the studies on mindfulness meditation were RCTs, 22 percent (n = 28) were before-and-after studies, 20 percent (n = 25) NRCTs, and 9 percent for each of cohort (n = 12) and cross-sectional studies (n = 12). The methodological quality of intervention studies on mindfulness meditation was low (RCTs median Jadad score = 2/5; IQR, 1 to 2; NRCTs median modified Jadad score: 0.5/3; IQR, 0 to 1). The quality of before-and-after studies was poor. Only 7 of 50 RCTs (14 percent) scored 3 or more points in the Jadad scale and were thus considered high quality. The observational studies also exhibited major methodological shortcomings (cohort studies median NOS total score = 3/9 stars; IQR, 2 to 4; cross-sectional studies median NOS total score: 3/6; IQR, 1 to 3), particularly in the areas of selection and comparability of the study groups.

**Meditation practices not described.** Three percent of the included studies (n = 21) reported on meditation practices that were not described. The studies were published from 1974 to 2004, with a median year of publication of 1998 (IQR, 1990 to 2002). Study sample sizes ranged from 10 to 230 with a median number of 46 participants per study (IQR, 27 to 97).

**Design and methodology.** Almost half (n = 11) of the studies were RCTs, six were NRCTs, two before-and-after studies, one cohort and one cross-sectional study. The methodological quality of the intervention studies was low (RCTs median Jadad score = 1.5/5; IQR, 1 to 2; NRCTs median modified Jadad score = 0/3; IQR, 0 to 0). Only 1 out of 11 RCTs scored 3 or more points on the Jadad scale and thus was considered high quality. The quality of before-and-after studies was poor. The cohort and cross-sectional studies obtained three and two stars on the Jadad scale and were thus considered low quality. The observational studies also exhibited major methodological shortcomings (cohort studies median NOS total score = 3/9 stars; IQR, 2 to 4; cross-sectional studies median NOS total score: 3/6; IQR, 1 to 3), particularly in the areas of selection and comparability of the study groups.

**Miscellaneous meditation practices.** One percent of the included studies (n = 11) reported on interventions that combined different meditation techniques in a single intervention. The studies were published from 1980 to 2005, with a median year of publication of 1985 (IQR, 1981 to 1993). Sample sizes ranged from 11 to 340 with a median number of participants per study of 84 (IQR, 20 to 181).

**Design and methodology.** Three out of 11 studies were RCTs, 3 were before-and-after studies, 2 were cohort studies, and 3 were cross-sectional studies. The methodological quality of studies on miscellaneous meditation practices showed important flaws. All RCTs scored 2 points on the Jadad scale and were considered low quality. The quality of before-and-after studies was also poor. The observational studies exhibited the same methodological flaws as the studies of other interventions described above (cohort studies median NOS total score = 3/9 stars; IQR, 1 to 3; cross-sectional studies median NOS total score = 2/6; IQR, 2 to 3).

**Qi Gong.** Five percent of the included studies (n = 37) reported on Qi Gong interventions. The studies were published between 1956 and 2005, with a median year of publication of 1998 (IQR, 1991 to 2002). Study sample sizes ranged from 10 to 355 with a median of 40 participants (IQR, 23 to 70).

**Design and methodology.** Thirty-six percent (n = 69) of the studies on Yoga interventions were RCTs, 28 percent (n = 54) were before-and-after studies, 19 percent (n = 36) NRCTs, 9 percent (n = 18) cohort studies, and 8 percent (n = 15) were cross-sectional studies. The methodological quality of yoga studies was low (RCTs median Jadad score = 1/5; IQR, 1 to 2; NRCTs median modified Jadad score = 0/3; IQR, 0 to 1). Fourteen percent (n = 10) of the RCTs on Yoga scored 3 points or more on the Jadad scale and were thus considered high quality. The quality of before-and-after studies was also low. The observational studies exhibited major flaws and were likely to be affected by bias (cohort studies median NOS total score = 2/9 stars; IQR, 2 to 4; cross-sectional studies median NOS total score = 2/6; IQR, 2 to 4).

**Yoga.** Twenty-four percent of the included studies (n = 192) reported on interventions involving Yoga practices. The studies were published between 1968 and 2005, with a median year of publication of 1998 (IQR, 1991 to 2002). Study sample sizes ranged from 10 to 355 with a median of 40 participants (IQR, 23 to 70).

**Design and methodology.** Thirty-six percent (n = 69) of the studies on Yoga interventions were RCTs, 28 percent (n = 54) were before-and-after studies, 19 percent (n = 36) NRCTs, 9 percent (n = 18) cohort studies, and 8 percent (n = 15) were cross-sectional studies. The methodological quality of yoga studies was low (RCTs median Jadad score = 1/5; IQR, 1 to 2; NRCTs median modified Jadad score = 0/3; IQR, 0 to 1). Nine out of 29 RCTs scored 3 or more points on the Jadad scale and thus were considered high quality. The quality of before-and-after studies was also low. The observational studies exhibited major flaws and were likely to be affected by bias (cohort studies median NOS total score = 2/9 stars; IQR, 2 to 4; cross-sectional studies median NOS total score = 2/6; IQR, 2 to 4).

**Tai Chi.** Eleven percent of the included studies (n = 88) reported on Tai Chi interventions. The studies were published from 1977 to 2005, with a median year of publication of 2002 (IQR, 1998 to 2004). Study sample sizes ranged from 10 to 311 with a median number of participants per study of 39 (IQR, 25 to 65).

**Design and methodology.** Thirty-three percent (n = 29) of the studies on Tai Chi were RCTs, 23 percent (n = 20) were before-and-after studies, 19 percent (n = 17) NRCTs, 20 percent (n = 18) cross-sectional studies, and 4.5 percent (n = 4) were cohort studies. The methodological quality of studies on Tai Chi was poor (RCTs median Jadad score = 2/5; IQR, 1 to 3; NRCTs median modified Jadad score = 1/3; IQR, 0 to 1). Nine out of 29 RCTs scored 3 or more points on the Jadad scale and were thus considered high quality. The quality of before-and-after studies was also low. The observational studies exhibited major flaws and were likely to be affected by bias (cohort studies median NOS total score = 2/9 stars; IQR, 2 to 4; cross-sectional studies median NOS total score = 2/6; IQR, 2 to 4).

**Miscellaneous stress.** Thirty-three percent (n = 29) of the studies on Tai Chi were RCTs, 23 percent (n = 20) were before-and-after studies, 19 percent (n = 17) NRCTs, 20 percent (n = 18) cross-sectional studies, and 4.5 percent (n = 4) were cohort studies. The methodological quality of studies on Tai Chi was poor (RCTs median Jadad score = 2/5; IQR, 1 to 3; NRCTs median modified Jadad score = 1/3; IQR, 0 to 1). Nine out of 29 RCTs scored 3 or more points on the Jadad scale and were thus considered high quality. The quality of before-and-after studies was also low. The observational studies exhibited major flaws and were likely to be affected by bias (cohort studies median NOS total score = 2/9 stars; IQR, 2 to 4; cross-sectional studies median NOS total score = 2/6; IQR, 2 to 4).
Table 11. Methodological quality of RCTs by meditation practice*

<table>
<thead>
<tr>
<th>Quality criteria</th>
<th>Mantra meditation (n = 111)</th>
<th>Mindfulness meditation (n = 50)</th>
<th>Meditation practices (ND) (n = 11)</th>
<th>Qi Gong (n = 14)</th>
<th>Tai Chi (n = 20)</th>
<th>Yoga (n = 26)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Randomization; n (%)</td>
<td>All</td>
<td>All</td>
<td>All</td>
<td>All</td>
<td>All</td>
<td>All</td>
</tr>
<tr>
<td>Double blinding; n (%)</td>
<td>2 (1.2)</td>
<td>1 (2.0)</td>
<td>2</td>
<td>1 (3.4)</td>
<td>4 (5.8)</td>
<td></td>
</tr>
<tr>
<td>Appropriate randomization; n (%)</td>
<td>15 (13.3)</td>
<td>8 (16.0)</td>
<td>2</td>
<td>9 (31.0)</td>
<td>11 (15.9)</td>
<td></td>
</tr>
<tr>
<td>Inappropriate double blinding; n (%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inappropriate randomization; n (%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Description withdrawals; n (%)</td>
<td>50 (45.0)</td>
<td>27 (54.0)</td>
<td>5</td>
<td>19 (65.5)</td>
<td>33 (47.8)</td>
<td></td>
</tr>
<tr>
<td>Total Jadad score (max 5); Median (IQR)</td>
<td>1 (1, 2)</td>
<td>2 (1, 2)</td>
<td>1</td>
<td>9 (31)</td>
<td>10 (14.4)</td>
<td></td>
</tr>
<tr>
<td>Number of high quality RCTs (Jadad scores ≥3); n (%)</td>
<td>13 (11.6)</td>
<td>7 (14.0)</td>
<td>1</td>
<td>3 (10.3)</td>
<td>5 (7.2)</td>
<td></td>
</tr>
<tr>
<td>Appropriate concealment of allocation; n (%)</td>
<td>3 (2.7)</td>
<td>1 (2.0)</td>
<td>...</td>
<td>7</td>
<td>10 (34.4)</td>
<td>28 (40.6)</td>
</tr>
</tbody>
</table>

Table 12. Methodological quality of NRCTs by meditation practice*

<table>
<thead>
<tr>
<th>Quality criteria</th>
<th>Mantra meditation (n = 30)</th>
<th>Mindfulness meditation (n = 25)</th>
<th>Meditation practices (ND) (n = 6)</th>
<th>Tai Chi (n = 17)</th>
<th>Yoga (n = 36)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Double blinding; n (%)</td>
<td>...</td>
<td>...</td>
<td>...</td>
<td>...</td>
<td>...</td>
</tr>
<tr>
<td>Appropriate double blinding; n (%)</td>
<td>...</td>
<td>...</td>
<td>...</td>
<td>...</td>
<td>...</td>
</tr>
<tr>
<td>Inappropriate double blinding; n (%)</td>
<td>...</td>
<td>...</td>
<td>...</td>
<td>...</td>
<td>...</td>
</tr>
<tr>
<td>Description withdrawals; n (%)</td>
<td>15 (50.0)</td>
<td>14 (56.0)</td>
<td>-</td>
<td>9 (52.9)</td>
<td>14 (38.9)</td>
</tr>
<tr>
<td>Total modified Jadad score, (max 3); Median (IQR)</td>
<td>0.5 (0.1)</td>
<td>1 (0.1)</td>
<td>0 (0.0)</td>
<td>1 (0.1)</td>
<td>0 (0.1)</td>
</tr>
<tr>
<td>Funding reported; n (%)</td>
<td>5 (16.7)</td>
<td>7 (28.0)</td>
<td>2</td>
<td>7 (41.2)</td>
<td>9 (25)</td>
</tr>
</tbody>
</table>

Table 13. Methodological quality of before-and-after studies by meditation practice*

<table>
<thead>
<tr>
<th>Quality criteria</th>
<th>Mantra meditation (n = 27)</th>
<th>Mindfulness meditation (n = 28)</th>
<th>Meditation practices (ND) (n = 2)</th>
<th>Qi Gong (n = 9)</th>
<th>Tai Chi (n = 20)</th>
<th>Yoga (n = 54)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Study population representative of the target population; n (%)</td>
<td>1 (3.2)</td>
<td>11 (39.3)</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>4 (20)</td>
</tr>
<tr>
<td>Outcome assessors were blind to intervention and assessment period; n (%)</td>
<td>2 (6.4)</td>
<td>...</td>
<td>...</td>
<td>...</td>
<td>...</td>
<td>1 (5)</td>
</tr>
<tr>
<td>Description of the number of study withdrawals; n (%)</td>
<td>12 (38.7)</td>
<td>15 (53.6)</td>
<td>...</td>
<td>3</td>
<td>1</td>
<td>6 (30)</td>
</tr>
<tr>
<td>Description of the reasons for study withdrawal; n (%)</td>
<td>4 (12.9)</td>
<td>5 (17.8)</td>
<td>...</td>
<td>2</td>
<td>1</td>
<td>4 (20)</td>
</tr>
<tr>
<td>Funding reported; n (%)</td>
<td>4 (12.9)</td>
<td>7 (25)</td>
<td>...</td>
<td>2</td>
<td>5</td>
<td>3 (15)</td>
</tr>
</tbody>
</table>

*Percentages are reported for N ≥ 20 only
ND = not described
### Table 14. Methodological quality of cohort studies by meditation practice

<table>
<thead>
<tr>
<th>Quality criteria</th>
<th>Mantra meditation (n = 105)</th>
<th>Mindfulness meditation (n = 12)</th>
<th>Meditation practices (ND) (n = 1)</th>
<th>Miscellaneous meditation practices (n = 2)</th>
<th>Qi Gong (n = 7)</th>
<th>Tai Chi (n = 4)</th>
<th>Yoga (n = 18)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Outcome assessment</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Demographic bias (n, %)</td>
<td>22 (20.9)</td>
<td>3 (25.0)</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Outcome ascertainment bias (n, %)</td>
<td>32 (30.5)</td>
<td>3</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>9</td>
<td></td>
</tr>
<tr>
<td>Data collection and analysis bias (n, %)</td>
<td>29 (27.6)</td>
<td>4</td>
<td>1</td>
<td>1</td>
<td>5</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td><strong>Comparability</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Selection of the cohorts</td>
<td>True</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td><strong>Selection of the cohorts</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Selection of the cohorts</td>
<td>True</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td><strong>Selection of the cohorts</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Selection of the cohorts</td>
<td>True</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td><strong>Selection of the cohorts</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Selection of the cohorts</td>
<td>True</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td><strong>Selection of the cohorts</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Selection of the cohorts</td>
<td>True</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td><strong>Selection of the cohorts</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Selection of the cohorts</td>
<td>True</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>6</td>
<td></td>
</tr>
</tbody>
</table>
Control Groups Used in Studies on Meditation Practices

Six hundred and sixty-eight studies contributed data for this question (402 intervention studies [RCTs and NRCTs] and 266 observational analytical studies [cohort studies and cross-sectional studies with control groups]). One hundred and forty-five studies were excluded from this analysis because they were uncontrolled before-and-after studies. Only two before-and-after studies171,172 had controlled comparisons and were considered for the analysis of the type of control groups used in studies on meditation practices.

Overall, the number of control groups per study ranged from one to four. The median number of control groups per study was one (IQR, 1 to 2). Table 16 shows the distribution of the number of control groups by study design. The majority of studies (72 percent, n = 482) included one control group per study, 21 percent (n = 139) used two control groups, 5 percent (n = 33) used three control groups, and 2 percent (n = 14) used four control groups.

### Table 14. Methodological quality of cohort studies by meditation practice (continued)

<table>
<thead>
<tr>
<th>Quality criteria</th>
<th>Mantra meditation (n = 105)</th>
<th>Mindfulness meditation (n = 12)</th>
<th>Meditation practices (ND) (n = 1)</th>
<th>Qi Gong (n = 7)</th>
<th>Tai Chi (n = 4)</th>
<th>Yoga (n = 18)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lost to followup likely to introduce bias; n (%)</td>
<td>6 (5.7)</td>
<td>1</td>
<td>...</td>
<td>...</td>
<td>...</td>
<td>1</td>
</tr>
<tr>
<td>No description of losses to followup; n (%)</td>
<td>83 (79.0)</td>
<td>6</td>
<td>...</td>
<td>2</td>
<td>6</td>
<td>2</td>
</tr>
</tbody>
</table>

### Table 15. Methodological quality of cross-sectional studies by meditation practice

<table>
<thead>
<tr>
<th>Quality criteria</th>
<th>Mantra meditation (n = 60)</th>
<th>Mindfulness meditation (n = 12)</th>
<th>Meditation practices (ND) (n = 1)</th>
<th>Qi Gong (n = 8)</th>
<th>Tai Chi (n = 18)</th>
<th>Yoga (n = 15)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Truly representative of the community; n (%)</td>
<td>1 (1.7)</td>
<td>...</td>
<td>...</td>
<td>...</td>
<td>...</td>
<td>...</td>
</tr>
<tr>
<td>Somewhat representative of the community; n (%)</td>
<td>27 (45.0)</td>
<td>6*</td>
<td>1</td>
<td>3</td>
<td>6</td>
<td>13</td>
</tr>
<tr>
<td>Selected group of participants; n (%)</td>
<td>6 (10.0)</td>
<td>2</td>
<td>...</td>
<td>...</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>No description of the derivation of the study group; n (%)</td>
<td>26 (43.3)</td>
<td>4</td>
<td>...</td>
<td>...</td>
<td>3</td>
<td>8</td>
</tr>
<tr>
<td>Drawn from the same community as the study group; n (%)</td>
<td>14 (23.3)</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Drawn from a different source; n (%)</td>
<td>25 (41.7)</td>
<td>6</td>
<td>...</td>
<td>1</td>
<td>6</td>
<td>13</td>
</tr>
<tr>
<td>No description of the derivation of the comparison group; n (%)</td>
<td>21 (35.0)</td>
<td>4</td>
<td>...</td>
<td>...</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Secure record; n (%)</td>
<td>...</td>
<td>...</td>
<td>...</td>
<td>...</td>
<td>...</td>
<td>...</td>
</tr>
<tr>
<td>Structured interview; n (%)</td>
<td>...</td>
<td>...</td>
<td>...</td>
<td>...</td>
<td>...</td>
<td>...</td>
</tr>
<tr>
<td>Written self-report; n (%)</td>
<td>1 (1.7)</td>
<td>1</td>
<td>...</td>
<td>...</td>
<td>...</td>
<td>...</td>
</tr>
<tr>
<td>No description of exposure ascertainment; n (%)</td>
<td>59 (98.3)</td>
<td>11</td>
<td>1</td>
<td>3</td>
<td>8</td>
<td>18</td>
</tr>
</tbody>
</table>

*Percentages are reported for N ≥ 20 only
ND = not described; NOS = Newcastle-Ottawa Scale
The majority of intervention studies and observational analytical studies considered in this review used single control groups (n = 482, 72 percent) as compared to the number of studies that used multiple control groups (n = 186, 28 percent). Tables 17 and 18 display the distribution of the number of control groups used in the intervention and observational analytical studies for each meditation practice.

### Table 18. Observational analytical studies: number of control groups by meditation practice

<table>
<thead>
<tr>
<th>Meditation practice</th>
<th>Number of controls</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1 N (%)</td>
<td>2 N (%)</td>
<td>3 N (%)</td>
<td>4 N (%)</td>
<td>Total</td>
<td></td>
</tr>
<tr>
<td>Mantra meditation</td>
<td>138 (82.4)</td>
<td>23 (13.9)</td>
<td>5 (3.0)</td>
<td>1 (0.6)</td>
<td>165</td>
<td></td>
</tr>
<tr>
<td>Mindfulness meditation</td>
<td>17*</td>
<td>5</td>
<td>2</td>
<td>...</td>
<td>24</td>
<td></td>
</tr>
<tr>
<td>Meditation practice (ND)</td>
<td>1</td>
<td>...</td>
<td>...</td>
<td>...</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Miscellaneous meditation practices</td>
<td>3</td>
<td>...</td>
<td>1</td>
<td>1</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Qi Gong</td>
<td>8</td>
<td>2</td>
<td>4</td>
<td>1</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td>Tai Chi</td>
<td>18</td>
<td>6</td>
<td>...</td>
<td>...</td>
<td>22</td>
<td></td>
</tr>
<tr>
<td>Yoga</td>
<td>26 (15.8)</td>
<td>7 (4.2)</td>
<td>...</td>
<td>...</td>
<td>33</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>207</td>
<td>43</td>
<td>13</td>
<td>3</td>
<td>266</td>
<td></td>
</tr>
</tbody>
</table>

* Percentages are reported for N ≥ 20 only.
ND = not described.

Control groups from intervention studies (RCTs, NRCTs, and controlled before-and-after studies) were grouped into six categories according to the type of control group. As some studies used more than one control group as a comparator, the number of intervention studies reported below does not match the number of control groups. Tables 19 and 20 describe the types of control groups for intervention and observational studies along with their distribution by meditation practice. Table G7 in Appendix G* lists the references for studies included in the description of the type of control groups for intervention studies along with their distribution by meditation practice.

**Sham meditation or placebo concurrent controls.** Eighteen of 402 intervention studies (four percent) compared meditation practices with elaborately designed and executed sham procedures such as sitting in a comfortable position without being instructed in the use of any sound or in directing the attention in certain way. Half of the studies (n = 9) using sham meditation or placebo control groups were conducted on mantra meditation (three on TM®, three on mantra techniques not specified, two on RR, and one on SRELAX, a technique adapted from TM®). Evaluation of other practices that used sham meditation or placebo groups included three studies on meditation practices not further described, two studies on Qi Gong, two on Yoga, one study on mindfulness meditation (Zen meditation), and one on Tai Chi.

**No-treatment concurrent controls.** Two types of no-treatment conditions were included in the studies: no intervention and waiting lists (WL).

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*Appendices and evidence tables cited in this report are provided electronically at http://www.ahrq.gov/clinic/tp/medittp.htm*
Waiting list controls. Sixty-two (15 percent) of the intervention studies utilized a WL control group. Twenty-four were conducted on mantra meditation (10 studies on TM®, 5 on CSM, 5 on RR, 3 on mantra techniques not specified, and 1 on SRELAX, a technique modeled after TM®); 21 on mindfulness meditation (11 studies on MBRS, 6 on mindfulness meditation practices not further specified, 2 on MBCT, and 2 on Zen Buddhist meditation); 10 on Yoga, 3 on meditation practices not further described, 2 on Qi Gong, and 2 on Tai Chi.

Active (positive) concurrent controls: interventions other than meditation. Active concurrent controls, as opposed to placebo or no treatment concurrent controls (i.e., no intervention, and waiting list conditions) were used as comparisons in 306 intervention studies (90 percent). A wide variety of active comparison groups were employed.

Exercise and other physical activities. The practice of exercise and other physical activities constituted the most frequently used comparator (45 studies). Physical activities included, but were not limited to, aerobics, running, swimming, fencing, and stretching. Eighteen studies using exercise and other physical activities as controls were conducted on Yoga, 14 on Tai Chi, and 10 on mantra meditation (3 on mantra techniques not specified, 3 on RR, 2 on TM®, 1 on Acen meditation, 1 on CSM). One study was conducted on MBSR, one on meditation practices not specified, and one on Qi Gong.

Rest and states of relaxation. Conditions involving states of rest and relaxation were used as controls in 45 studies. There were 28 studies on mantra meditation (14 on RR, 9 on TM®, 3 on mantra techniques not specified, and 2 on CSM), 9 on Yoga, 6 on mindfulness meditation (3 on Zen Buddhist meditation, 2 on mindfulness meditation techniques not further specified, and 1 on MBSR), and 2 on other meditation practices not further described.

Educational activities. Forty-four studies used educational activities such as lectures and courses on stress management, nutrition, health, and wellness as comparators. Seventeen of these studies were conducted on mantra meditation (9 on TM®, 5 on RR, 2 on mantra techniques not specified, and 1 on CSM), 10 studies on mindfulness meditation (5 studies on MBSR, 3 on Zen Buddhist meditation, and 2 on mindfulness meditation techniques not further specified), 8 on Yoga, 6 on Tai Chi, 2 on meditation practices not further described, and 2 on miscellaneous meditation techniques.

Progressive muscle relaxation. The practice of progressive muscle relaxation (PMR) was chosen as a control group in 39 intervention studies. The majority of studies (n = 27) using PMR as a control were conducted on mantra meditation (10 on TM®, 8 on RR, 5 on mantra techniques not specified, 3 on CSM, and 1 on Acen meditation). There were also six studies on Yoga, five on mindfulness meditation (two on MBSR, two on mindfulness meditation techniques not further specified, and one on Zen Buddhist meditation), and one study on meditation practice not further described.

Cognitive behavioral techniques. Twenty studies employed cognitive behavioral interventions as comparison groups. Nine of these studies were conducted on mantra meditation (three on TM®, three on RR, two on CSM, and one on mantra techniques not specified). There were seven intervention studies on mindfulness meditation (four on mindfulness meditation techniques not further specified, and three on MBSR). There were two studies on meditation practices not further described, and two studies on Yoga.

Pharmacological interventions. Eight studies used comparators involving pharmacological interventions such as antihypertensive medication, lipid-lowering medication, antidepressants, and other medications that were not described. There were six studies on Yoga, and two on Qi Gong that used a pharmacological intervention as a control.

Miscellaneous active controls. Nineteen studies reported on the use of control groups that involved a heterogeneous collection of active interventions, such as charting, creativity techniques, herbal therapy, visualization and other imagery, and cognitive tasks. Six of these studies were conducted on mantra meditation (three on RR, two on mantra techniques not specified, and one on TM®). There were also six studies on Yoga, four studies on mindfulness meditation (two on MBSR, one on Zen Buddhist meditation, and one on mindfulness meditation techniques not further specified), two on miscellaneous meditation practices, one on Tai Chi, and one on a meditation practice not further described.

Group therapy and psychotherapy. Sixteen studies used psychotherapeutic interventions such as group therapy (13 studies) and individual psychotherapy (3 studies) as comparison groups. Among the 13 studies that used group therapy as a control, 6 were on mantra meditation (3 on RR, 2 on TM®, and 1 on Acen meditation), 3 on mindfulness meditation (2 on mindfulness meditation techniques not further specified, and one on MBSR). There were also three studies on Tai Chi and two on Yoga that used group therapy as a comparator. Generally, group therapy was delivered as a form of group counseling and psychosocial support. Individual psychotherapeutic approaches were used as control groups in one study on mantra meditation (TM®), one study on MBSR, and one study on Yoga.

Biofeedback techniques. The practice of biofeedback (BF) techniques such as electromyographic (EMG) BF, and blood pressure BF was used as comparators in 12 intervention studies. The majority of the studies (n = 11) were conducted on mantra meditation (six on RR, three on mantra techniques not specified, and two on TM®) and one was conducted on Yoga.

Reading. Activities involving reading were utilized as controls in eight studies. There were six studies on mantra meditation (four on RR, and two on TM®), one on Tai Chi, and one on Yoga.

Hypnosis. Hypnosis was selected as a control group in four intervention studies: two on mantra meditation (TM®) and two on meditation practices not further described.

Therapeutic massage and acupuncture. Three studies used complementary interventions such as massage (two studies; one on RR, and another on MBSR) and acupuncture (one on Tai Chi) as comparison groups.

Usual care. Thirty-seven intervention studies included a group of usual care in their comparisons. Nine of these studies were conducted on mindfulness meditation (3 on MBCT, 2 on mindfulness meditation techniques not further specified, 2 on MBSR, and 1 on Zen Buddhist meditation), 3 on Qi Gong, 3 on mantra meditation (2 on TM® and 1 on RR), 4 on Tai Chi, 16 on Yoga, and one on meditation practices not further described.

Other control groups. Six studies reported on the comparison groups in terms of controls without providing further comprehensive details. Two of these studies were conducted on mantra meditation (one on RR and one on TM®), two on Qi Gong, one on mindfulness meditation not further specified, and one on Tai Chi.

Active (positive) concurrent controls: meditation practices as comparison groups. Forty-three studies used meditation practices as control groups. Fourteen of these studies compared two different meditation practices against each other. Twenty-nine studies compared two versions of the same meditation practice but varied certain components of the practice, e.g., method of delivery, intensity, and length of session, of the comparison group. The former category of studies is described first and the latter is described under the category of “different dose or response concurrent control groups.”
Yoga practices. Four studies (three on TM® and one on mantra techniques not specified) compared mantra meditation techniques versus Yoga techniques such as Savasana. One study compared Hatha yoga versus a meditation practice not further described.

Mantra meditation. Three studies on Yoga (Kundalini, Sahaja, and Hatha yoga) used a mantra meditation technique for their comparison groups; two of them used RR153,174 the third175 used a mantra technique not further described.

Mindfulness meditation. Two studies on mantra meditation (TM® and a mantra technique not further described) used interventions described as “mindfulness training” as comparison groups. Another study on a meditation practice not further described used mindfulness meditation as the comparison group.

Meditation practices not described. Two studies on mantra meditation (one on RR, and the other on TM®) failed to describe the type of meditation practice chosen for the comparison group.

Tai Chi. One study on mantra meditation (RR) used a Tai Chi-based intervention for the comparison group.

Different dose or regimen: concurrent control groups. Twenty-nine studies compared similar meditation practices but modified certain components of the practices to create the comparison groups.

Yoga practices. Fourteen studies compared different types of yoga practices with each other. Nine studies140,176-181 compared different patterns of yogic nostril breathing techniques (e.g., unilateral versus bilateral nostril breathing, left versus right forceful unilateral nostril breathing), whereas five studies compared different modalities of yoga practice such as Hatha versus Astanga,125 different formats for practice (e.g., full Sudarshan Kriya versus partial Sudarshan Kriya),195 or combinations with other therapeutic strategies.111

Mantra meditation. Nine studies on mantra meditation compared different formats for the delivery of practice. Three186-188 on TM® examined either short- versus long-term or regular versus irregular practice. Two other studies on TM® included RR as one of the comparators. There were two studies on RR that used TM®, modifications of the RR technique as comparison groups. One study on CSM used a RR control group. The remaining study on mantra meditation did not describe the practices being compared.

Mindfulness meditation. Four studies on mindfulness meditation used other mindfulness meditation techniques as control groups. There were two studies on MBSR on one on Zen Buddhist meditation, and one that did not describe the mindfulness techniques being compared.

Meditation practice not described. Two studies failed to provide a clear description of the meditation practices being compared.

Multiple control groups. As was shown in Table 16, 275 out of 402 intervention studies used a single control group, whereas 127 used more than one kind of control (e.g., used one active and one inactive control). Sixty-five of the intervention studies with multiple controls were conducted on mantra meditation (25 on TM®, 22 on RR, 12 on mantra techniques not further described, 4 on CSM, 1 on Acem meditation, and 1 on SRELAX). There were 26 studies with multiple controls conducted on Yoga, 20 studies on mindfulness meditation (8 on MBSR, 6 on mindfulness meditation techniques not further specified, and 6 on Zen Buddhist meditation), 7 studies on meditation practices not further described, 6 on Tai Chi, 2 on miscellaneous meditation practices, and 1 on Qi Gong.

Control groups from observational analytical studies (cohort and cross-sectional studies) were also classified according to the type of comparison used.172 As some studies used more than one control group as a comparator, the number of observational analytical studies reported below is less than the number of control groups. Table G8 in Appendix G provides the references for studies included in the description of the type of control groups in observational analytical studies along with their distribution by meditation practice.*

Exercise and other physical activities. Practitioners of exercise and other physical activities constituted the most frequent active comparator (14 studies). Four studies examined Tai Chi practitioners, four studies examined Yoga practitioners, and two studies examined subjects practicing a miscellaneous group of meditation techniques. Two studies examined TM® practitioners, one examined practitioners of meditation techniques not specified, and one examined Qi Gong practitioners. The type of physical activities practiced by the control groups included aerobic and anaerobic exercises, swimming, running, and golfing.

Miscellaneous active controls. Five studies used control groups consisting of practitioners of martial arts, concentration, and creativity techniques. Three of these studies used practitioners of mantra meditation, specifically TM®, as exposed groups. One study examined practitioners of Tai Chi and one practitioners of miscellaneous meditation techniques.

Other comparison groups consisted of individuals exposed to a variety of practices not considered meditation. Four studies on TM® used a group of practitioners of PMR as a control group. Three studies on TM® included participants that underwent hypnosis therapy. Three studies on TM® used groups of participants exposed to conditions of rest and relaxation for their comparisons. One study on Qi Gong and one on Yoga included participants in educational activities. Group therapy participants were included for comparison in one study on TM® and in one on Yoga. Individuals involved in reading activities were used as controls in one study of Zen Buddhist meditation, and in one study of Yoga. Finally, practitioners of BF and cognitive behavioral techniques such as sensitivity training acted as controls in, respectively, one study of RR and one study of TM®.

Active (positive) controls exposed to other meditation practices. Forty-seven studies used active control groups of practitioners of a variety of meditation techniques. Eleven of these studies compared groups of practitioners of different meditation techniques against each other. Thirty-six observational analytical studies compared groups of practitioners of the same meditation technique but with different lengths of practice. The former group of studies is

*Appendices and evidence tables cited in this report are provided electronically at http://www.ahrg.gov/clinic/tp/medtrp.htm
described immediately below and the latter is described under “Concurrent control groups exposed to different dose or regimen of the same meditation practice.”

Practitioners of mantra meditation (TM® and a mantra technique not specified) were used as the comparison group in two observational studies on mindfulness meditation (one on Zen Buddhist meditation and the other on a mantra technique not further described).

There were two studies (one on TM® and the other on a mantra technique not further described) that used mindfulness meditation practitioners as control groups. Two other studies (one on Yoga, and the other on a meditation practice not described) failed to describe the type of meditation technique practiced by the comparison group. One study on Qi Gong used Tai Chi practitioners for comparisons, and Yoga practitioners were used as control groups in two studies on TM®, one on Zen Buddhist meditation, and one on Qi Gong.

Concurrent control groups exposed to different dose or regimen of the same meditation practice. Thirty-six studies made comparisons between groups of practitioners of the same meditation practice but using different lengths of practice (e.g., short-term versus long-term). Twenty of these studies were on mantra meditation (17 on TM®, 2 on Ananda Marga, and 1 on a mantra technique not further described), 6 on mindfulness meditation (4 on Zen Buddhist meditation, 1 on Vipassana meditation, and 1 on a Mindfulness meditation technique not further specified), 6 on Qi Gong, 3 on Yoga, and 1 on Tai Chi.

Historical controls. Fourteen out of 266 observational analytical studies used historical controls consisting of groups of participants external to the study or of the same single group of participants with data collected at an earlier period of time. Eleven of these studies compared mantra meditation (nine on TM® and one on Ananda Marga) to data from nonmeditators collected earlier for other purposes. Three studies on Qi Gong also used nonconcurrent data from nonpractitioners, Yoga practitioners, groups of athletes and participants in educational lectures.

Multiple control groups. As shown earlier in Table 16, 207 out of 266 observational analytical studies used a single control group, whereas 59 used more than one kind of control per study (e.g., use of either active controls or inactive interventions).

Twenty-nine of the observational analytical studies with multiple controls were conducted on mantra meditation (25 on TM®, 2 on Ananda Marga, and 2 on mantra techniques not further described). There were seven studies with multiple controls conducted on mindfulness meditation (five on Zen Buddhist meditation, one on mindfulness meditation techniques not further described, and one on Vipassana meditation), seven on Yoga, seven on Qi Gong, six on Tai Chi, two on miscellaneous interventions, and one on meditation practices not further described.

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**Table 19. Types of control groups for intervention studies on meditation practices**

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<thead>
<tr>
<th>Type of control group</th>
<th>N groups</th>
<th>N studies</th>
<th>Meditation practice (no. studies)</th>
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BF = biofeedback; CSM = Clinically Standardized Meditation; MBCT = mindfulness-based cognitive therapy; MBSR = Mindfulness-based stress reduction; MM = mindfulness meditation; ND = not described; NS = not specified; NT = not treatment; PMR = progressive muscle relaxation; RR = relaxation response; TM® = transcendental meditation; WL = waiting list.
Table 19. Types of control groups for intervention studies on meditation practices (continued)

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Table 19. Types of control groups for intervention studies on meditation practices (continued)

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Table 20. Types of control groups for observational analytical studies on meditation practices

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MM = mindfulness meditation; ND = not described; NS = not specified; RR = Relaxation Response; TM® = Transcendental Meditation®

Table 20. Types of control groups for observational analytical studies on meditation practices (continued)

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<td></td>
<td>RR (1)</td>
</tr>
<tr>
<td>Cognitive behavioral techniques</td>
<td>1</td>
<td>1</td>
<td>Mantra meditation (1 group, 1 study)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>TM® (1)</td>
</tr>
<tr>
<td>Concurrent control groups exposed to different dose or regimen of the same meditation practice</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mantra meditation</td>
<td>21</td>
<td>20</td>
<td>Mantra meditation (21 groups, 20 studies)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>TM® (17), Ananda marga (2), Mantra (NS) (1)</td>
</tr>
<tr>
<td>Mindfulness meditation</td>
<td>8</td>
<td>6</td>
<td>Mindfulness meditation (8 groups, 6 studies)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Zen Buddhism meditation (4), Vipassana (1), MM (NS) (1)</td>
</tr>
<tr>
<td>Qi Gong</td>
<td>11</td>
<td>6</td>
<td>Qi Gong (11 groups, 6 studies)</td>
</tr>
<tr>
<td>Yoga</td>
<td>3</td>
<td>3</td>
<td>Yoga (3 groups, 3 studies)</td>
</tr>
<tr>
<td>Tai Chi</td>
<td>1</td>
<td>1</td>
<td>Tai Chi (1 group, 1 study)</td>
</tr>
<tr>
<td>Historical controls</td>
<td>14</td>
<td>14</td>
<td>Mantra meditation (11 groups, 11 studies)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>TM® (10), Ananda marga (1), Qi Gong (3 groups, 3 studies)</td>
</tr>
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</table>
Table 20. Types of control groups for observational analytical studies on meditation practices (continued)

<table>
<thead>
<tr>
<th>Type of control group</th>
<th>N groups</th>
<th>N studies</th>
<th>Meditation practice (no. studies)</th>
</tr>
</thead>
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<tr>
<td><strong>Single control</strong></td>
<td>207</td>
<td>207</td>
<td>Mantra meditation (136 groups, 136 studies)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>TM® (126), Ananda marga (1), RR (1)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Yoga (26 groups, 26 studies)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Mindfulness meditation (17 groups, 17 studies)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Zen Buddhist meditation (8), MM (NS) (6), Vipassana (3)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Qi Gong (8 groups, 8 studies)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Miscellaneous meditation practices (3 groups, 3 studies)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Meditation practices (ND) (1 group, 1 study)</td>
</tr>
<tr>
<td><strong>Multiple controls</strong></td>
<td>137</td>
<td>59</td>
<td>Mantra meditation (65 groups, 29 studies)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>TM® (25), Ananda marga (2), Mantra (NS) (2)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Mindfulness meditation (16 groups, 7 studies)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Zen Buddhist meditation (5), MM (NS) (1), Vipassana (1)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Yoga (14 groups, 7 studies)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Qi Gong (30 groups, 7 studies)</td>
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<td></td>
<td></td>
<td></td>
<td>Tai Chi (12 groups, 6 studies)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Miscellaneous meditation practices (7 groups, 2 studies)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Meditation practices (ND) (3 groups, 1 study)</td>
</tr>
</tbody>
</table>

Meditation Practices Separated by the Diseases, Conditions, and Populations for Which They Have Been Examined

Eight hundred and thirteen studies contributed to the description of the diseases, conditions, and populations for which meditation practices have been examined. Overall, 69 percent (n = 564) of the studies included healthy participants only, whereas 30 percent (n = 244) reported on clinical populations. Five studies (0.6 percent) included both healthy and clinical participants in the study populations. Overall, the median number of participants per study was 40 (IQR, 23 to 71), with a median age of 37 years (IQR, 26 to 50; n = 536). Both male and females were equally represented in the studies (median number of males per study, 19; IQR, 10 to 36; median number of females per study, 19; IQR, 7 to 39).

Table 21 displays the diseases, conditions, and populations that have been examined in intervention and observational analytical studies on meditation practices.

Table 21. Types of populations and conditions included in studies on meditation (continued)

<table>
<thead>
<tr>
<th>Category of interest</th>
<th>Study condition</th>
<th>Intervention studies</th>
<th>Observational analytical studies</th>
<th>Total</th>
<th>Total studies per category</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dental</td>
<td>Dental problems (NS)</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Periodontitis</td>
<td></td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dermatology</td>
<td>Psoriasis</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Endocrine</td>
<td>Obesity</td>
<td>1</td>
<td>1</td>
<td>11</td>
<td></td>
</tr>
<tr>
<td>Gastrointestinal</td>
<td>Gastrointestinal disorders</td>
<td>1</td>
<td>1</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Irritable bowel syndrome</td>
<td>2</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gynecology</td>
<td>Infertility</td>
<td>1</td>
<td>1</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Menopause</td>
<td>2</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Postmenopause</td>
<td>1</td>
<td>3</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Pregnancy</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Premenstrual syndrome</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Healthy</td>
<td>College and university students</td>
<td>123</td>
<td>65</td>
<td>189</td>
<td>553</td>
</tr>
<tr>
<td></td>
<td>Elderly</td>
<td>34</td>
<td>26</td>
<td>60</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Healthy volunteers</td>
<td>90</td>
<td>160</td>
<td>250</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Army and military</td>
<td>8</td>
<td></td>
<td>8</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Prison inmates</td>
<td>7</td>
<td>3</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Workers</td>
<td>25</td>
<td>3</td>
<td>28</td>
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<td></td>
<td>Athletes</td>
<td>6</td>
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</tr>
<tr>
<td></td>
<td>Smokers</td>
<td>3</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Immunologic</td>
<td>HIV</td>
<td>3</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Sleep disorders</td>
<td>Insomnia</td>
<td>2</td>
<td></td>
<td>2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Chronic insomnia</td>
<td>3</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Mental health disorders</td>
<td>Anger management</td>
<td>1</td>
<td></td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Anxiety disorders</td>
<td>12</td>
<td></td>
<td>14</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Binge eating disorder</td>
<td>3</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Burnout</td>
<td>1</td>
<td></td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Depression</td>
<td>11</td>
<td></td>
<td>11</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Miscellaneous psychiatric conditions</td>
<td>6</td>
<td></td>
<td>1</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>Mood disorders</td>
<td>3</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Neurosis</td>
<td>1</td>
<td></td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Obsessive-compulsive disorder</td>
<td>1</td>
<td></td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Parents of children with behavior problems</td>
<td>1</td>
<td></td>
<td>1</td>
<td></td>
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<tr>
<td></td>
<td>Personality disorders</td>
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<td>1</td>
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</tr>
<tr>
<td></td>
<td>Posttraumatic stress disorders</td>
<td>1</td>
<td></td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Psychosis</td>
<td>1</td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

COPD = chronic obstructive pulmonary disease; HIV = human immunodeficiency virus; NS = not specified
In general, the majority of studies (68 percent) on meditation practices have been conducted in healthy populations such as college and university students, healthy elderly participants from the community, army and military personnel, prison inmates, workers, athletes, and smokers (553 studies comprising 196 intervention studies and 257 observational analytical studies). Individuals with mental health disorders constituted the second most studied population (and the most frequently studied category of clinical conditions) examined in studies on meditation practices (66 studies: 65 intervention studies, and 1 observational analytical study). Mental health conditions included substance abuse, anxiety disorders, depression, and binge eating disorders, among others.

People with cardiovascular and circulatory conditions were the third most studied population and the second most frequently studied clinical condition (61 studies comprising 59 intervention studies and 2 observational analytical studies). There were 37 studies on hypertensive participants (35 intervention studies and 2 observational analytical studies). Cardiovascular conditions (24 intervention studies) included hypertension and a group of heterogeneous cardiovascular diseases (diseases of the circulatory system—the heart, the blood vessels of the heart, and the veins and arteries throughout the body and within the brain) such as coronary artery disease, chronic heart failure, ischemic heart disease, and myocardial infarction.

Forty-two studies on meditation practices (41 intervention studies and 1 observational analytical study) have been conducted in musculoskeletal conditions including chronic pain, fibromyalgia, rheumatoid arthritis, and osteoarthritis. Respiratory conditions (e.g., asthma and chronic obstructive pulmonary disease) have been examined in 16 intervention studies. Twelve intervention studies in oncology have been conducted using different types of cancer populations, such as breast, prostate, skin and lymphoma. Endocrine diseases such as type II diabetes mellitus (DM) and obesity conditions have been examined in 11 intervention studies on meditation practices. Heterogeneous patient populations with a variety of medical conditions not specified have been examined in 11 intervention studies.

Gynecological conditions such as postmenopause, menopause, premenstrual syndrome, pregnancy, and infertility have been examined in 10 intervention studies. Populations with gastrointestinal disorders have been examined in three intervention studies. Three intervention studies have examined the effect of meditation practices in dermatological disorders, such as psoriasis, and on vestibular problems, such as tinnitus. Finally, patients with dental problems (one intervention study, one observational study), end-stage renal disease (one intervention study), and organ transplants (one intervention study) have been used as study populations for studies on meditation practices.

<table>
<thead>
<tr>
<th>Category of interest</th>
<th>Study condition</th>
<th>Intervention studies</th>
<th>Observational analytical studies</th>
<th>Total studies per category</th>
</tr>
</thead>
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<tr>
<td>Mental health disorders</td>
<td>Schizophrenia</td>
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<td>...</td>
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<tr>
<td>(continued)</td>
<td>Schizophrenia AND antisocial personality disorders</td>
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<tr>
<td></td>
<td>Substance abuse</td>
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<td>...</td>
<td>18</td>
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<tr>
<td>Miscellaneous</td>
<td>Heterogeneous patient population</td>
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<td>...</td>
<td>10</td>
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<tr>
<td>medical conditions</td>
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<td>Musculoskeletal</td>
<td>Balance disorders</td>
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<td>Carpal tunnel syndrome</td>
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</tr>
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<td>Multiple sclerosis</td>
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<td>...</td>
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</tr>
<tr>
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<td>Muscular dystrophy</td>
<td>1</td>
<td>...</td>
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<tr>
<td></td>
<td>Chronic pain</td>
<td>10</td>
<td>1</td>
<td>11</td>
</tr>
<tr>
<td></td>
<td>Chronic rheumatic diseases</td>
<td>1</td>
<td>...</td>
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<td></td>
<td>Fibromyalgia</td>
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<td>...</td>
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<td>Regional pain syndrome</td>
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<td>Rheumatoid arthritis</td>
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<td>Hyperkypsis</td>
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<td>Osteoarthritis</td>
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<td></td>
<td>Osteoporosis</td>
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<td>...</td>
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<td></td>
<td>Postpolio syndrome</td>
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<td></td>
<td>Total hip and knee replacement</td>
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<td>...</td>
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<td>Neurological</td>
<td>Developmental disabilities</td>
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<td>Epilepsy</td>
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<td>Migraine and tension headaches</td>
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<td>Stroke</td>
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<td></td>
<td>Traumatic brain injuries</td>
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<td>...</td>
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<td>Organ transplant</td>
<td>Organ transplantation</td>
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<td>Renal</td>
<td>End-stage renal disease</td>
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<td>...</td>
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</tr>
<tr>
<td>Respiratory and pulmonary</td>
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<td>11</td>
</tr>
<tr>
<td></td>
<td>COPD</td>
<td>1</td>
<td>...</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Chronic airways obstruction</td>
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<td>...</td>
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</tr>
<tr>
<td></td>
<td>Chronic bronchitis</td>
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<td>...</td>
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<td>Pleural effusion</td>
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<td>Vestibular</td>
<td>Tinnitus</td>
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<td>Total Vestibulopathy</td>
<td>1</td>
<td>...</td>
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<td>547</td>
</tr>
</tbody>
</table>

Table 21. Type of populations and conditions included in studies on meditation (continued)
After excluding healthy populations, the distribution of conditions or disorders for which meditation practices have been examined was

1. hypertension (35 intervention studies and 2 observational analytical studies);
2. other cardiovascular diseases (24 intervention studies);
3. substance abuse disorders (18 intervention studies);
4. anxiety disorders (14 intervention studies);
5. cancer (12 intervention studies);
6. asthma (11 intervention studies);
7. chronic pain (10 intervention studies and 1 observational analytical study);
8. type II DM (10 intervention studies);
9. fibromyalgia (10 intervention studies); and
10. miscellaneous psychiatric conditions (six intervention studies and one observational analytical study).

Table G9 in Appendix G provides a summary of the number and study references by meditation practice, separated by the conditions and populations for which they have been examined.

**Mantra meditation.** Among the intervention studies on TM®, the majority (72 percent, 57/80) have been conducted in healthy populations (college and university students [24 studies], healthy volunteers from the community [19 studies], prison inmates [4 studies], elderly [3 studies], smokers [2 studies], and athletes [1 study]). The second largest group of TM® studies examined its effects on mental health disorders (nine studies) such as substance abuse (five studies), anxiety disorders (two studies), posttraumatic stress disorder (one study), and other miscellaneous psychiatric conditions (one study). Participants with circulatory or cardiovascular diseases such as hypertension (9 studies) and coronary artery disease (1 study) have been included in 10 studies on TM®. Other conditions such as asthma (two studies), chronic insomnia (one study), and a miscellaneous group of cancer patients (one study) have also been included in intervention studies on TM®.

The vast majority of observational analytical studies on TM® (98 percent, 148/151) have been conducted in healthy populations (healthy volunteers from the community [91 studies], college and university students [48 studies], prison inmates [3 studies], and workers [1 study]). Conditions such as pregnancy (one study), postmenopause (one study), and dental problems (e.g., periodontitis, one study) have also been examined.

**Intervention studies on RR have included mainly healthy populations (31 studies), in addition to circulatory and cardiovascular conditions (hypertension [4 studies], other cardiovascular conditions [5 studies] including chronic heart failure, congestive heart failure, ischemic heart disease, premature ventricular contractions, and peripheral vascular disease), mental health disorders (substance abuse [2 studies], anxiety disorders [1 study], schizophrenia or antisocial personality disorders [1 study]), gynecological conditions (menopause [1 study], premenstrual syndrome [1 study]), and other clinical conditions such as irritable bowel syndrome (1 study), total knee replacement (1 study), skin cancer (1 study), and a group of patients with heterogeneous clinical conditions (1 study). The only observational analytical study on RR has been conducted in a population of hypertensive patients.

**Nine**teen intervention studies on mantra meditation techniques not further described have been conducted with healthy populations. Other populations included people with mental health disorders (anxiety disorders [three studies], substance abuse [two studies], miscellaneous psychiatric conditions [one study]), hypertension (one study), and epilepsy (one study). The six observational analytical studies conducted on mantra techniques not further described have included healthy volunteers from the community.

Seven intervention studies on CSM have been conducted on healthy populations, three on mental disorders such as anxiety disorders (one study), schizophrenia (one study), and substance abuse (one study), and another study on chronic insomnia.

All the intervention and observational analytical studies on Acem meditation, Ananda Marga, Cayce’s meditation, and Rosary prayer have been conducted with healthy populations.

**Yoga.** Among the intervention studies on Yoga, more than half (80/158) have been conducted with healthy populations (healthy volunteers from the community [34 studies], college and university students [26 studies], army and military personnel [7 studies], workers [5 studies], prison inmates [4 studies], and athletes [1 study]). The second largest group of conditions studied is constituted by circulatory and cardiovascular diseases (21 studies) such as hypertension (13 studies), and other cardiovascular conditions (8 studies). Studies on Yoga have also included participants with mental health disorders (16 studies) such as depression (7 studies), anxiety disorders (3 studies), substance abuse (3 studies), other miscellaneous psychiatric conditions (2 studies), and obsessive-compulsive disorders (1 study). Respiratory and pulmonary conditions such as asthma (nine studies), chronic airways obstruction, chronic bronchitis, pleural effusion, and pulmonary tuberculosis (one study each) have also been examined. Participants with musculoskeletal conditions such as chronic pain, rheumatoid arthritis (two studies each), carpal tunnel syndrome, chronic rheumatic diseases, fibromyalgia, hyperkypthosis, multiple sclerosis, osteoarthritis, and postpolio syndrome (one study each) have been included in intervention studies on Yoga. Other conditions examined in Yoga studies were gastrointestinal disorders (two studies), epilepsy, migraine, pregnancy, human immunodeficiency virus (HIV), lymphoma, chronic insomnia, tinnitus, and heterogeneous patient populations (one study each). All the observational analytic studies on Yoga (33 studies) have been conducted with healthy populations.

**Mindfulness meditation.** Among the 49 intervention studies on MBSR, 12 were conducted with healthy populations and 12 with populations with mental health disorders. Mental health disorders included anxiety disorders (three studies), mood disorders (two studies), substance abuse (two studies), binge eating disorders, burnout, personality disorders, miscellaneous psychiatric conditions, and stress-related conditions of parents of children with behavioral problems (one study each).

Intervention studies on RR have included mainly healthy populations (31 studies), in addition to circulatory and cardiovascular conditions (hypertension [4 studies], other cardiovascular conditions [5 studies] including chronic heart failure, congestive heart failure, ischemic heart disease, premature ventricular contractions, and peripheral vascular disease), mental health disorders (substance abuse [2 studies], anxiety disorders [1 study], schizophrenia or antisocial personality disorders [1 study]), gynecological conditions (menopause [1 study], premenstrual syndrome [1 study]), and other clinical conditions such as irritable bowel syndrome (1 study), total knee replacement (1 study), skin cancer (1 study), and a group of patients with heterogeneous clinical conditions (1 study). The only observational analytical study on RR has been conducted in a population of hypertensive patients.

Appendices and evidence tables cited in this report are provided electronically at http://www.ahrq.gov/clinic/tp/medittp.htm

Nineteen intervention studies on mantra meditation techniques not further described have been conducted with healthy populations. Other populations included people with mental health disorders (anxiety disorders [three studies], substance abuse [two studies], miscellaneous psychiatric conditions [one study]), hypertension (one study), and epilepsy (one study). The six observational analytical studies conducted on mantra techniques not further described have included healthy volunteers from the community.

Seven intervention studies on CSM have been conducted on healthy populations, three on mental disorders such as anxiety disorders (one study), schizophrenia (one study), and substance abuse (one study), and another study on chronic insomnia.

All the intervention and observational analytical studies on Acem meditation, Ananda Marga, Cayce’s meditation, and Rosary prayer have been conducted with healthy populations.

**Yoga.** Among the intervention studies on Yoga, more than half (80/158) have been conducted with healthy populations (healthy volunteers from the community [34 studies], college and university students [26 studies], army and military personnel [7 studies], workers [5 studies], prison inmates [4 studies], and athletes [1 study]). The second largest group of conditions studied is constituted by circulatory and cardiovascular diseases (21 studies) such as hypertension (13 studies), and other cardiovascular conditions (8 studies). Studies on Yoga have also included participants with mental health disorders (16 studies) such as depression (7 studies), anxiety disorders (3 studies), substance abuse (3 studies), other miscellaneous psychiatric conditions (2 studies), and obsessive-compulsive disorders (1 study). Respiratory and pulmonary conditions such as asthma (nine studies), chronic airways obstruction, chronic bronchitis, pleural effusion, and pulmonary tuberculosis (one study each) have also been examined. Participants with musculoskeletal conditions such as chronic pain, rheumatoid arthritis (two studies each), carpal tunnel syndrome, chronic rheumatic diseases, fibromyalgia, hyperkypthosis, multiple sclerosis, osteoarthritis, and postpolio syndrome (one study each) have been included in intervention studies on Yoga. Other conditions examined in Yoga studies were gastrointestinal disorders (two studies), epilepsy, migraine, pregnancy, human immunodeficiency virus (HIV), lymphoma, chronic insomnia, tinnitus, and heterogeneous patient populations (one study each). All the observational analytic studies on Yoga (33 studies) have been conducted with healthy populations.

**Mindfulness meditation.** Among the 49 intervention studies on MBSR, 12 were conducted with healthy populations and 12 with populations with mental health disorders. Mental health disorders included anxiety disorders (three studies), mood disorders (two studies), substance abuse (two studies), binge eating disorders, burnout, personality disorders, miscellaneous psychiatric conditions, and stress-related conditions of parents of children with behavioral problems (one study each).

Eleven intervention studies on mindfulness meditation techniques not further specified have been conducted with healthy populations. Other populations included mental health disorders (binge eating disorders [two studies], anxiety disorders, psychosis, substance abuse [one study each]).
Musculoskeletal conditions such as fibromyalgia (three studies) and chronic pain (two studies), cardiovascular diseases, cancer (three studies each), psoriasis, infertility, and heterogeneous patient populations (one study each) have been included also. The majority of observational analytical studies on mindfulness meditation techniques not further specified (six studies) have been conducted in healthy populations, with only one observational study conducted in a clinical population (individuals with chronic pain).

The majority of intervention studies (73 percent) on Zen Buddhist meditation have been conducted on healthy participants (11 studies). Clinical conditions that have been studied in intervention studies include hypertension (two studies), coronary artery disease, and insomnia (one study each). All the observational analytical studies conducted on Zen Buddhist meditation (13 studies) have included healthy volunteers.

Three intervention studies on MBC have included patients with a depressive disorder. Other populations that have been examined are individuals with fibromyalgia, stroke, tinnitus, and healthy workers (one study each). No observational studies on MBCT were identified.

Intervention studies on Vipassana meditation have involved healthy populations from the community and patients with migraine or tension headaches (one study each). The observational analytical studies conducted on Vipassana meditation (four studies) have employed healthy populations from the community (two studies), college and university students, and elderly individuals (one study each).

Tai Chi. Intervention studies on Tai Chi have mainly assessed healthy populations (38 studies), particularly the elderly (25 studies). Clinical conditions examined in intervention studies of Tai Chi include musculoskeletal conditions such as rheumatoid arthritis (four studies), osteoarthritis (three studies), chronic pain (two studies), balance disorders, fibromyalgia, multiple sclerosis, and osteoporosis (one study each). Circulatory and cardiovascular conditions have been examined in four studies. Other populations examined in studies on Tai Chi are menopause, postmenopause, depression, miscellaneous psychiatric conditions, developmental disabilities, stroke, type II DM, HIV, breast cancer, end-stage renal disease, and vestibulopathy (one study each). The majority (91 percent, 20/22) of the observational analytical studies conducted in Tai Chi have examined groups of healthy, elderly individuals or other healthy individuals from the community. Two observational studies have been conducted in groups of postmenopausal women.

Qi Gong. Intervention studies on Qi Gong have examined populations of healthy participants (seven studies), patients with circulatory and cardiovascular disorders (hypertension [four studies], coronary artery disease [one study]), musculoskeletal conditions (fibromyalgia [two studies], muscular dystrophy and regional pain syndrome [one study each]), type II DM, substance abuse, miscellaneous medical conditions, migraine, and chronic obstructive pulmonary disease (COPD) (one study each). Almost all the observational analytical Qi Gong studies (14/15) were conducted with healthy populations; one was conducted with hypertensives.

Meditation practices (ND). Among the 19 intervention studies that failed to describe the meditation practice under study, 12 examined healthy college and university students (nine studies), workers (2 studies), and healthy volunteers from the community (one study). Intervention studies on clinical conditions included patients with hypertension, dental problems, and insomnia (one study each). Two observational studies included respectively, healthy college and university students and individuals with miscellaneous psychiatric conditions.

Miscellaneous meditation practices. Five of the six intervention studies that combined different meditation practices were conducted in healthy populations (three studies), miscellaneous psychiatric conditions, and heterogeneous populations of patients (one study each). One intervention study was conducted in patients with breast cancer. All five observational studies on miscellaneous meditation practices examined healthy populations.

Tables 22 and 23 summarize the diseases, conditions, and populations for which meditation practices have been studied in intervention and observational analytical studies.
Table 22. Intervention studies conducted on meditation practices by populations examined

<table>
<thead>
<tr>
<th>Category</th>
<th>Population</th>
<th>Mantra meditation (N)</th>
<th>Mindfulness meditation (N)</th>
<th>Meditation practices (ND) (N)</th>
<th>Miscellaneous meditation practices (N)</th>
<th>Qi Gong (N)</th>
<th>Yogs (N)</th>
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*Only conditions for which studies were available.

COPD = chronic obstructive pulmonary disease; HIV = human immunodeficiency virus; ND = not described; NS = not specified.
Table 22. Intervention studies conducted on meditation practices by populations examined (continued)

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<th>Category</th>
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<th>Meditation practices (ND) (N)</th>
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### Table 22. Intervention studies conducted on meditation practices by populations examined (continued)

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### Table 23. Observational analytical studies conducted on meditation practices by populations examined*

<table>
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<tr>
<th>Category</th>
<th>Population</th>
<th>Mantra meditation (N)</th>
<th>Mindfulness meditation (N)</th>
<th>Meditation practices (ND) (N)</th>
<th>Miscellaneous meditation practices (N)</th>
<th>Qi Gong (N)</th>
<th>Tai Chi (N)</th>
<th>Yoga (N)</th>
<th>Total (N)</th>
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<tr>
<td>Dental</td>
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<td>Postmenopause</td>
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<tr>
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<td>College and university students</td>
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<td>15</td>
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*Only conditions for which studies were available
ND = not described; NS = not specified
Table 24. Type of outcome measures examined in studies on meditation practices

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<tr>
<th>Domain</th>
<th>Outcomes</th>
<th>No. measures (%)</th>
<th>No. per domain</th>
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<td><strong>Physiological</strong></td>
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</tr>
<tr>
<td>Cardiovascular</td>
<td>496 (13.51)</td>
<td>1.474</td>
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</tr>
<tr>
<td>Pulmonary and respiratory</td>
<td>251 (6.85)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nutritional biochemistry and metabolism</td>
<td>235 (6.41)</td>
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</tr>
<tr>
<td>Endocrine and hormonal</td>
<td>125 (3.41)</td>
<td></td>
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</tr>
<tr>
<td>Brain and nervous system</td>
<td>112 (3.06)</td>
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<td></td>
</tr>
<tr>
<td>Electrodermal responses</td>
<td>72 (1.96)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Muscular</td>
<td>46 (1.26)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lymphatic and immunological</td>
<td>45 (1.23)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Blood</td>
<td>28 (0.76)</td>
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<tr>
<td>Thermoregulatory</td>
<td>22 (0.60)</td>
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<tr>
<td>Skeletal</td>
<td>14 (0.38)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ocular</td>
<td>13 (0.35)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sensory</td>
<td>8 (0.22)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Renal and excretory</td>
<td>7 (0.19)</td>
<td></td>
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</tr>
<tr>
<td>Gastric</td>
<td>1 (0.03)</td>
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<td></td>
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<tr>
<td><strong>Psychosocial</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Psychiatric and psychological symptoms</td>
<td>645 (15.6)</td>
<td>1.204</td>
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<tr>
<td>Positive psychology outcomes</td>
<td>108 (2.95)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Social and interpersonal relations</td>
<td>50 (1.36)</td>
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<td></td>
</tr>
<tr>
<td>Health-related quality of life</td>
<td>42 (1.15)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Activities of daily living and events impact</td>
<td>26 (0.71)</td>
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<tr>
<td>Other behavioral</td>
<td>20 (0.55)</td>
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<td></td>
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<tr>
<td><strong>Clinical</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Physical functionality</td>
<td>252 (6.88)</td>
<td>698</td>
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</tr>
<tr>
<td>Clinical events and symptoms improvement</td>
<td>154 (4.20)</td>
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<tr>
<td>Nutritional status, body composition or weight</td>
<td>74 (2.02)</td>
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<tr>
<td>Health status or well-being</td>
<td>70 (1.91)</td>
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<tr>
<td>Sleep</td>
<td>55 (1.50)</td>
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<td></td>
</tr>
<tr>
<td>Pain and pain-related behavior</td>
<td>54 (1.47)</td>
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<td>Adherence</td>
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<tr>
<td>Mortality</td>
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<tr>
<td>Longevity</td>
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</table>

The most frequently studied outcomes were those of physiological functions (1,474 measures), followed by psychosocial outcomes (1,204 measures), outcomes related to clinical events and health status (698 measures), cognitive and neuropsychological functions (239 measures), and healthcare utilization (50 outcomes).

Studies on mantra meditation techniques reported the largest number of outcome measures (1,306 measures), followed by studies on Yoga (989 measures), mindfulness meditation techniques (567 measures), Tai Chi (489 measures), and Qi Gong (197 measures). Studies that did not describe the meditation practice under study reported 76 measures and studies that combined practices reported 41 measures.

Table 25 provides a summary of the type and number of outcome measures examined by meditation practice.

**Physiological outcomes.** Cardiovascular measures (495 measures) were the most frequently examined variables among the physiological outcomes. They included variables such as changes in systolic and diastolic blood pressure, heart rate, oxygen consumption, and electrocardiogram patterns. Other physiological measures frequently reported included pulmonary and respiratory outcomes (251 measures) such as respiratory rate, lung function testing measures (e.g., forced expiratory volume [FEV1], forced vital capacity [FVC], peak expiratory flow rate [PEFR]), and carbon monoxide levels. Nutritional biochemistry and metabolism outcomes (235 measures) included biochemical and metabolic processes measures that act as markers of certain diseases or conditions. These measures included serum levels of cholesterol, tryglicerides, glucose, lactate, potassium, calcium, sodium, and lipid profile.

Endocrine and hormonal outcomes (125 measures) described changes in substances secreted by the endocrine system to regulate the activity of the organs. They included measures of cortisol levels, neurohormones, catecholamines, endorphines, adrenaline, and aldosterone. Brain and nervous system measures (112 measures) included electroencephalogram (EEG) profile, P300 latencies, and neurotransmitter levels. Electrodermal responses, also known as galvanic skin responses, skin conductance, and skin resistance (72 measures), included measures of the ability of the skin to conduct an electrical current as a sympathetic reaction to emotional arousal and stress. Muscular physiology (46 measures), as a proxy for emotional arousal, was examined for variables such as muscle tension and relaxation, frontal electromyographic activity, muscle voltage, and reflex function, among others. Outcomes related to the physiological functioning of the immune system (45 measures) included immunoglobulin (IgA, IgG, and IgM) concentrations, leukocytes, lymphocytes, monocytes, and neutrophil levels in general, natural killer cell activity, white blood cell count, and number of monoclonal antibodies. There were 28 outcomes related to...
blood products and hemodynamic parameters, 22 on thermoregulatory functions such as skin or body temperature, and 14 measures related to the skeletal system, for example, bone mineral density. Other physiological outcomes less frequently reported included ocular (e.g., intraocular pressure, pupillary dilatation) (13 measures), sensory, for example, auditory thresholds (8 measures), renal function tests (7 measures), and gastric measures, for example, gastric motility (1 measure).

<table>
<thead>
<tr>
<th>Category</th>
<th>Population</th>
<th>Mantra meditation (N)</th>
<th>Mindfulness meditation (N)</th>
<th>Meditation practice (ND) (N)</th>
<th>Miscellaneous meditation practices (N)</th>
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<th>Tai Chi (N)</th>
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ND = not described
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<th>Category</th>
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<th>Tai Chi (N)</th>
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<td>1</td>
<td>8</td>
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<td>252</td>
<td>698</td>
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<td>8</td>
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<td>...</td>
<td>...</td>
<td>2</td>
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</tr>
</tbody>
</table>

| Medical Concern                  |            |                       |                           |                              |                                        |            |             |           |                          |
| Sensory perceptual and motor functions | 48         | 18                     | 3                         | 2                            |                                        |            |             |           |                          |
| Reasoning and executive functions | 21         | 11                     | 5                         | 1                            |                                        |            |             |           |                          |
| General functions                | 17         | 5                      | 1                         | 1                            |                                        |            |             |           |                          |
| Memory                           | 14         | 3                      | 2                         | ...                          | ...                                    | ...        | ...         |            |                          |
| Attention                        | 10         | 5                      | ...                       | ...                          | ...                                    | ...        | ...         |            |                          |
| Language                         | 5          | 1                      | ...                       | ...                          | ...                                    | ...        | ...         |            |                          |
| Medication use                   | 4          | 3                      | ...                       | ...                          | ...                                    | ...        | ...         |            |                          |
| Healthcare utilization and economic outcomes | 13        | 4                      | ...                       | ...                          | ...                                    | ...        | ...         |            |                          |
| Total                            | 1321       | 567                    | 76                        | 41                           | 197                                    | 489        | 3680        | 3680      |                          |
Psychosocial outcomes. The most studied psychosocial outcomes were those measuring psychiatric and psychological symptoms (645 measures) of anxiety, depression, stress, mood states, irritability and anger expression, and abuse of psychoactive or other substances causing psychological dependence. Measures of personality (both normal and abnormal) were reported for 313 outcomes. These studies reported data on either general characteristics of the personality (e.g., personality and psychological profiles, ego strength, and coping styles) or particular traits or characteristics of the individual psychological functioning (e.g., locus of control, neuroticism, psychoticism, extraversion, self-actualization, self-esteem, and hostility traits). Positive psychology outcomes (measures of processes that contribute to flourishing or optimal functioning of individuals (e.g., empathy, assertive behavior, happiness, spirituality, autonomy) were reported in 108 outcomes). Outcomes related to social and interpersonal relationships such as marital adjustment, level of interpersonal conflicts, social adjustment, and social functioning, were examined in 50 measures. Health-related quality of life measures were reported for 42 outcomes. Other psychosocial outcomes included activities of daily living (26 measures), and other miscellaneous and nonspecific behavioral measures not further classified, such as “level of relaxation” and “hypnotic response.”

Clinical outcomes. Measures examining physical functions such as balance, strength, flexibility, mobility, and postural stability were the most frequently reported types of clinical outcomes (252 measures). They were followed by measures of discrete clinical events, or indicators of symptom improvement that were particular to the conditions under study, such as change in fibromyalgia symptoms, number of asthma episodes, and angina pectoris symptoms (154 measures). Outcomes related to the nutritional status or body composition of individuals (74 measures) included body weight, body mass index, and diet and nutritional patterns. There were 70 outcomes related to general health status and well-being, 55 outcomes for sleep characteristics, and 54 for pain-related symptoms. Seventeen outcomes reported on the frequency of falls or falls-related behaviors. Other clinical outcomes included adherence (12 measures), mortality (8 measures), and longevity (2 measures).

Cognitive and neuropsychological measures. Measures related to sensory perception and motor functions (103 measures) were the most frequently examined cognitive and neuropsychological outcomes. These measures included psychomotor performance, perceptual motor skills, field independence, absorption, autonomic arousal, and visual-spatial ability. Other cognitive and neuropsychological measures less frequently examined included reasoning and execution functions (40 measures) (e.g., cognitive flexibility, logical reasoning, thought categorization, and associate learning). General cognitive outcomes (37 measures) included global measures of intelligence, cognitive status, and neuropsychological functioning. Memory functions (e.g., short- and long-term, verbal and visual, declarative and procedural) were reported by 24 measures. Finally, language (e.g., verbal fluency, vocabulary, language comprehension, reading skills) and attention functions (e.g., concentration, sustained focusing capacity) were each reported by seven measures.

Healthcare utilization: A number of outcomes addressed factors related to the use of healthcare resources, such as medication use (30 measures), length of hospital stay, medical utilization rates, number of sick leaves, and payments to the healthcare system (20 measures).

When the outcome measures were analyzed by the type of meditation practice under study, we found that the 10 most frequently reported outcome measures in mantra meditation studies were

1. psychiatric and psychological symptoms (231 measures); 2. physiological cardiovascular outcomes (196 measures); 3. personality outcomes (146 measures); 4. physiological pulmonary and respiratory outcomes (83 measures); 5. physiological nutrition, biochemical and metabolic outcomes (76 measures); 6. physiological brain and nervous system outcomes (73 measures); 7. physiological electrophysiological outcomes (53 measures); 8. physiological endocrine and hormonal outcomes (49 measures); 9. sensory perceptual and motor neuropsychological functions (48 measures); and 10. positive psychology outcomes (37 measures).

There are no studies on mantra meditation practices that have reported skeletal, renal and excretory, or gastric physiology outcomes or the occurrence of falls or fall-related behaviors.

The 10 most frequently reported outcome measures in studies on Yoga were

1. physiological cardiovascular outcomes (151 measures); 2. psychiatric and psychological symptoms (140 measures); 3. physiological nutrition, biochemical and metabolic outcomes (110 measures); 4. physiological pulmonary and respiratory outcomes (106 measures); 5. personality outcomes (61 measures); 6. clinical events and symptom improvement (61 measures); 7. physical functionality outcomes (58 measures); 8. physiological endocrine and hormonal outcomes (42 measures); 9. outcomes of nutritional status and body composition (27 measures); and 10. sensory perceptual and motor neuropsychological functions (24 measures).

No studies on Yoga reported on the occurrence of falls or fall-related behaviors, or on longevity of study participants.

The 10 most frequently reported outcome measures in studies on Tai Chi were

1. physical functionality (165 measures); 2. physiological cardiovascular outcomes (87 measures); 3. physiological pulmonary and respiratory outcomes (33 measures); 4. psychiatric and psychological symptoms (33 measures); 5. physiological nutrition, biochemical and metabolic outcomes (20 measures); 6. clinical events and symptom improvement (17 measures); 7. falls and fall-related behavior (16 measures); 8. personality measures (14 measures); 9. measures of health status and well-being (13 measures); and 10. physiological skeletal outcomes (12 measures).

There are no studies on Tai Chi that reported physiological outcomes related to the brain and central nervous system, ocular, sensory, or gastrointestinal systems, or electrodermal response. Studies on Tai Chi have not examined outcomes related to mortality, longevity, healthcare utilization, or cognitive and neuropsychological functions such as reasoning, memory, attention, and language.
The 10 most frequently outcome measures in studies on mindfulness meditation practices were:

1. psychiatric and psychological symptoms (183 measures);
2. personality measures (66 measures);
3. positive psychology outcomes (37 measures);
4. clinical events and symptom improvement (31 measures);
5. physiological cardiovascular outcomes (25 measures);
6. measures of health status and well-being (23 measures);
7. measures of pain and pain-related behavior (20 measures);
8. sensory perceptual and motor neuropsychological functions (18 measures);
9. physiological pulmonary and respiratory outcomes (14 measures); and
10. social and interpersonal relationships measures (14 measures).

There are no studies on Qi Gong that reported physiological outcomes related to the muscular, skeletal, ocular, sensory, and gastric systems or on electrodermal response. Other outcomes that have not been examined in studies on Qi Gong include positive psychology, interpersonal and social relationships, and cognitive functions such as memory, attention, language, and reasoning and executive functions.

Finally, the most studied outcome measures in studies that combined miscellaneous approaches to the meditation practice were:

1. psychiatric and psychological symptoms (13 measures);
2. personality measures (6 measures); and
3. positive psychology outcomes (5 measures).

### Summary of the Results

**General remarks.** Evidence regarding the state of research on the therapeutic use of meditation was provided in 813 studies. Half of the studies on meditation practices were published after 1994. Most of the studies have been published as journal articles, and have been conducted in North America. More than half of the studies have examined meditation practices in intervention studies. The majority of the intervention studies on meditation practices are RCTs, followed by before-and-after studies, and NRCTs. A lesser proportion of studies have used observational analytical designs, the majority being cohort studies, and compared groups of meditators versus nonmeditators or compared different groups of meditators.

**Methodological quality of the included studies.** Overall, the methodological quality of both intervention and observational analytical studies on meditation practices is poor. A small proportion of RCTs reported adequately on the methods of randomization, blinding, description of withdrawals, and concealment of the sequence of allocation to treatment. Half of the RCTs explicitly reported the source of funding, as did a smaller proportion of NRCTs and before-and-after studies. The observational analytical studies that have been conducted on meditation practices are prone to biases affecting the representativeness of the study and comparison groups, the ascertainment of both exposure and outcome and, in the case of longitudinal studies (i.e., cohort studies), the integrity of the followup period. Compared to the cohort studies, the cross-sectional studies have less prominent methodological weaknesses. The only methodological aspect that did not appear to be severely jeopardized in the observational studies was the methods used to control for confounders in the design or analysis. More than half of observational studies have attempted to control for confounding either in the design or the analysis of the results.

**Meditation practices examined in intervention and observational analytical studies.** The category of meditation practices that has been most frequently studied in the scientific literature is mantra meditation. This category includes a group of meditation techniques that, despite differences in principles of practice and theoretical grounds, all have a mantra as an important component of their practice. Both intervention and observational analytical studies on TM® dominate the literature on mantra meditation techniques, followed by studies on RR. Other mantra techniques such as CSM, Acem meditation, Ananda Marga, concentrative prayer, and Cayce’s meditation have been examined less frequently.

The second category of meditation practices most frequently examined is Yoga. This category includes a heterogeneous group of practices rooted in yogic traditions such as Hatha, Kundalini, and Sahaja yoga. Mindfulness meditation is the third most studied group of practices.
Within this category, MBSR and Zen Buddhist meditation have been most frequently examined. The practice of Tai Chi is the fourth most frequently examined practice, followed by Qi Gong. Finally, less than five percent of the studies on meditation practices did not explicitly describe the practice under study or have combined different approaches to meditation in a single intervention without describing the individual components of the intervention.

Control groups. The number of control groups per study ranged from one to four. Among the six hundred and sixty-eight studies that used control groups, the majority of them utilized an active concurrent control for their comparisons. Among the RCTs and NRCTs, the practice of exercise and other physical activities constituted the most frequent active comparator followed by conditions involving states of rest and relaxation, educational activities, and PMR. Other active control groups included cognitive behavioral techniques, pharmacological interventions, psychotherapy, BF techniques, reading, hypnosis, therapeutic massage, and acupuncture. Almost half of the RCTs and NRCTs included comparison groups consisting of participants assigned to waiting lists or participants that did not receive any intervention. A lower proportion of RCTs and NRCTs compared different meditation practices against each other, different doses of the practice, or modified formats of similar techniques.

The vast majority of observational analytical studies used comparison groups consisting of individuals that had not been exposed to any type of meditation practice. A smaller proportion of observational analytical studies compared groups of individuals that have been actively exposed to different meditation practices.

Diseases, conditions, and populations examined in studies on meditation practices. The vast majority of studies on meditation practices have been conducted in healthy populations. The three most studied clinical conditions are hypertension, other cardiovascular diseases, and substance abuse. Other diseases that have been frequently examined include anxiety disorders, cancer, asthma, chronic pain, type II DM, fibromyalgia, and a variety of psychiatric conditions studied altogether. Studies on hypertension have been conducted mainly on mantra meditation and Yoga. Studies on other cardiovascular diseases have been conducted with Yoga, mindfulness meditation techniques, and mantra meditation. Studies on substance abuse have been conducted mainly on mantra meditation.

Outcome measures examined in studies on meditation practices. Studies on meditation practices tend to report a median number of four outcomes per study. The most frequently studied outcomes were those of physiological functions, followed by psychosocial outcomes, outcomes related to clinical events and health status, cognitive and neuropsychological functions, and healthcare utilization outcomes. Cardiovascular measures were the most frequently examined variables among the physiological outcomes. The most studied psychosocial outcomes were measures of psychiatric and psychological symptoms (e.g., anxiety and depression). Other psychosocial outcomes frequently reported include personality measures, positive psychology outcomes, and others related to social relationships, quality of life, and activities of daily living. Outcomes related to clinical events focused on measures of physical functions and the incidence of discrete clinical events. Among the cognitive and neuropsychological outcomes, measures of sensory perceptual and motor functions, and reasoning and executive functions were frequently examined. Finally, measures reporting healthcare utilization were uncommon.

The number of control groups per study ranged from one to four. Among

The trials were published between 1975 and 2005 (median year of publication, 1995; IQR, 1982 to 2003). Twenty-four of these trials have been published in journals[185,203-205,207-209,211,212,215,216,217,219,222,224,226] while three[203,204,211] were identified from the gray literature. Nine trials[205,206,207,208,212,216,224,226] were conducted in the United States, four[204,212,217,219] in India, three[203,218,219] in the United Kingdom, two[213,214] in China, two[211,212] in South Korea, and one each in Germany[215], Hong Kong[216], The Netherlands[212], New Zealand[217], Russia[212], Taiwan[212], and Thailand[212]. The trials contained a total of 1,940 participants. The median sample size was 65 participants per study (IQR, 23 to 392; data from 19 trials). Seven[203,205,206,212,221,222,225] out of 19 trials had study sample sizes greater than 100 participants. The mean age of participants was 50.7 ± 9.6 years (range, 28 to 68 years; data from 20 trials). Two trials[205,227] were conducted in samples with an average age between 20 and 40 years. Sixteen trials[185,203,205,206,207,208,212,213,216,219,220,221,222,224,226] were conducted in samples with mean ages ranging from 41 to 60 years. Two trials[212,222] included study populations with mean ages of 61 years and above. Seven trials[203,204,211,212,213,217,225] did not report the age of participants.

When the trials that reported the gender of participants were combined (n = 23), 54 percent of the participants were male and 46 percent were female. Samples in four trials[203,204,211,226] were entirely male while none of the trials included entirely female samples. Four trials[185,203,212,217] failed to report the gender of participants. Six trials explicitly indicated the ethnicity of their

600
106
107
601

Topic III. Evidence on the Efficacy and Effectiveness of Meditation Practices

The three most studied diseases identified in topic II were hypertension, cardiovascular diseases, and substance abuse disorders. Sixty-five RCTs and NRCTs (27 on hypertension, 21 on cardiovascular diseases, and 17 on substance abuse disorders) were included in the review on the efficacy and effectiveness of meditation practices. All qualifying studies are presented in summary tables in the appropriate sections. Details regarding these studies are available in Appendix H.1

Hypertension

Description of the Included Studies

Twenty-seven trials (24 RCTs[185,203-225] and 3 NRCTs[226-228]) were identified that evaluated the effects of meditation practices in hypertensive individuals (see Appendix H). The included trials evaluated eight meditation practices aimed to ameliorate a variety of outcomes associated with hypertension. The group of studies comprised eight trials on yoga[204,206,212,217,219,222,225], five trials on TMB[205,206,210,212,222], four trials on RR[204,209,218,225], four trials on Qi Gong[207,211,213,214], two trials on Zen Buddhist meditation[225,227], one trial on a technique modeled after TM[222], one trial on Tai Chi[223], one trial on a mantra technique not further described[203], and one trial on a meditation practice that did not specify the technique[215].

The included trials were published between 1975 and 2005 (median year of publication, 1995; IQR, 1982 to 2003). Twenty-four of these trials have been published in journals[185,203-205,207-219] while three[203,210,215] were identified from the gray literature. Nine trials[205,206,212,219] were conducted in the United States, four[204,212,217,219] in India, three[203,218,219] in the United Kingdom, two[213,214] in China, two[211,212] in South Korea, and one each in Germany[215], Hong Kong[216], The Netherlands[212], New Zealand[217], Russia[212], Taiwan[212], and Thailand[212]. The trials contained a total of 1,940 participants. The median sample size was 65 participants per study (IQR, 23 to 392; data from 19 trials). Seven[203,205,206,212,221,222,225] out of 19 trials had study sample sizes greater than 100 participants. The mean age of participants was 50.7 ± 9.6 years (range, 28 to 68 years; data from 20 trials). Two trials[205,227] were conducted in samples with an average age between 20 and 40 years. Sixteen trials[185,203,205,206,207,208,212,213,216,219,220,221,222,224,226] were conducted in samples with mean ages ranging from 41 to 60 years. Two trials[212,222] included study populations with mean ages of 61 years and above. Seven trials[203,204,211,212,213,217,225] did not report the age of participants.

When the trials that reported the gender of participants were combined (n = 23), 54 percent of the participants were male and 46 percent were female. Samples in four trials[203,204,211,226] were entirely male while none of the trials included entirely female samples. Four trials[185,203,212,217] did not report the gender of participants. Six trials explicitly indicated the ethnicity of their
samples. Five of them\textsuperscript{185,206,210,220,221} were conducted in African-American samples, whereas one trial\textsuperscript{185,206,210,220,221} stated that only white participants took part in the study.

All the trials were conducted in patients with a diagnosis of essential hypertension. All trials except five\textsuperscript{185,204,208,211,217} provided a definition of hypertension in their selection criteria. Half of the trials (n = 14)\textsuperscript{204,205,207,209,213,216,218,220,221,223,225,226,228} included participants diagnosed with Stage 1 hypertension (mean systolic blood pressure [SBP] between 140 and 159 mm Hg and/or mean diastolic blood pressure [DBP] between 90 and 99 mm Hg) and with Stage 2 hypertension (mean SBP 160 mm Hg and above and/or mean DBP 100 mm Hg and above). One study\textsuperscript{206} included participants with prehypertension (mean SBP between 120 and 139 mm Hg, and/or DBP between 80 and 89 mm Hg), Stage 1, and Stage 2 hypertension. Another study\textsuperscript{205} was conducted in patients with prehypertension or with Stage 1 hypertension. Five trials\textsuperscript{185,210,222,224,227} included only participants with Stage 2 hypertension, whereas one trial\textsuperscript{222} included only participants with Stage 1 hypertension.

All 27 trials employed a parallel study design. The length of the trials varied from 8 days\textsuperscript{204} to 1 year.\textsuperscript{203,210,211,212,225} The median duration of the trials was 3 months (IQR, 2 to 6). Twelve studies\textsuperscript{204,208,209,213,217,219,222,223,228} were short-term trials (less than 3 months), nine trials\textsuperscript{185,206,207,212,213,216,220,221,225} had a duration from 3 to 6 months, and six trials\textsuperscript{203,206,210,211,221,224} lasted longer than 6 months.

The 27 trials comprised six comparisons between meditation practices and no intervention,\textsuperscript{185,203,204,215,217,225} four comparisons between meditation practices and waiting list\textsuperscript{208,213,214,222}, and one comparison\textsuperscript{222} between meditation practices and placebo. There were 29 comparisons between meditation practices and active therapies other than no intervention, WL, or placebo. Because some trials had more than one comparison arm, the total number of comparisons exceeded the number of trials. Of the 29 active comparisons, the comparative treatments were health education (HE),\textsuperscript{205,206,207,210,212,216,218,220,221,225,226} BF,\textsuperscript{208,209,213,225} PMR,\textsuperscript{204,220,221} rest or relaxation,\textsuperscript{204,199,233} antihypertensive medication,\textsuperscript{211,217} blood pressure checks,\textsuperscript{225,227} exercise,\textsuperscript{207} orthostatic tilt,\textsuperscript{207} and meditation practice plus BF.\textsuperscript{185} The median number of comparisons per study was one (IQR, 1 to 2).

Methodological Quality of the Included Studies

A summary of the methodological quality of the included trials is provided in Table 26. As a measure of methodological quality for included trials, the overall median Jadad score was 2/5 (IQR, 1 to 2). Only two trials\textsuperscript{20,221} obtained 3 points and were considered of high quality. Twelve trials\textsuperscript{185,205,206,207,210,212,216,218,219,222,224} obtained 2 points, nine trials\textsuperscript{204,208,209,213,215,217,222,225} obtained 1 point, and four trials\textsuperscript{212} did not obtain any points. All the trials except three\textsuperscript{220,221} were described as randomized; however, the details of the description of randomization varied. The majority of trials (n = 19)\textsuperscript{185,203,205,207,211,214,216,218,219,222,225} did not describe how the randomization was performed. Three trials\textsuperscript{206,220,221} described an appropriate method to generate the sequence of randomization, whereas two trials\textsuperscript{212,213} reported the use of inadequate approaches to sequence generation. None of the trials were described as double-blind. The adequacy of allocation concealment was unclear in all trials.

An intention-to-treat statistical analysis was specified in five trials.\textsuperscript{195,206,207,220,221} Nineteen trials\textsuperscript{85,203,205,207,209,210,212,213,216,218,225} reported the number of dropouts for the total study sample (mean dropout rate: 21 percent; range 3 to 57 percent). Seven trials\textsuperscript{185,206,209,212,213,220,225} had a dropout rate of more than 20 percent. Withdrawals and dropouts per treatment group were clearly described in 14 trials.\textsuperscript{185,205,207,216,213,214,216,218-225} On average, 14 percent of participants (range 0 to 26 percent) dropped out of the meditation groups. The mean dropout rate for the control groups was also 14 percent (range 4 to 25 percent; 16 control groups).

Fifteen trials\textsuperscript{185,203,205,207,216,219,222,227,228} disclosed their source of funding. Nine trials\textsuperscript{205,206,209,210,212,220,223,227,228} received funding from government sources, six studies\textsuperscript{205,207,209,213,221,222} received funding from a private donor or foundation, and one\textsuperscript{214} received internal funding.
Table 26. Methodological quality of trials of meditation practices for hypertension

<table>
<thead>
<tr>
<th>Study, year</th>
<th>Meditation practice</th>
<th>Randomization</th>
<th>Double blinding</th>
<th>Allocation concealment</th>
<th>Jadad score</th>
<th>Report</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aivazyan TA, 1988</td>
<td>Mantra meditation (NS) + relaxation techniques</td>
<td>Yes</td>
<td>Unclear</td>
<td>No</td>
<td>NA</td>
<td>Yes</td>
</tr>
<tr>
<td>Broota A, 1995</td>
<td>Yoga</td>
<td>Yes</td>
<td>Unclear</td>
<td>No</td>
<td>NA</td>
<td>No</td>
</tr>
<tr>
<td>Calderon R Jr, 2000</td>
<td>TM®</td>
<td>Yes</td>
<td>Unclear</td>
<td>No</td>
<td>NA</td>
<td>No</td>
</tr>
<tr>
<td>Castillio-Richmond A, 2000</td>
<td>TM®</td>
<td>Yes</td>
<td>Adequate</td>
<td>No</td>
<td>NA</td>
<td>No</td>
</tr>
<tr>
<td>Cheung BMY, 2005</td>
<td>Qi Gong</td>
<td>Yes</td>
<td>Unclear</td>
<td>No</td>
<td>NA</td>
<td>Yes</td>
</tr>
<tr>
<td>Cohen J, 1993</td>
<td>RR</td>
<td>Yes</td>
<td>Unclear</td>
<td>No</td>
<td>NA</td>
<td>No</td>
</tr>
<tr>
<td>Hafner Rj, 1982</td>
<td>Yoga + BF</td>
<td>Yes</td>
<td>Unclear</td>
<td>No</td>
<td>NA</td>
<td>Yes</td>
</tr>
<tr>
<td>Hager JL, 1978</td>
<td>RR</td>
<td>Yes</td>
<td>Unclear</td>
<td>No</td>
<td>NA</td>
<td>No</td>
</tr>
<tr>
<td>Kondwani KA, 1999</td>
<td>TM®</td>
<td>Yes</td>
<td>Unclear</td>
<td>No</td>
<td>NA</td>
<td>Yes</td>
</tr>
<tr>
<td>Kuang AK, 1983</td>
<td>Qi Gong + AHM</td>
<td>Yes</td>
<td>Unclear</td>
<td>No</td>
<td>NA</td>
<td>No</td>
</tr>
<tr>
<td>Latha DR, 1991</td>
<td>Yoga + BF (thermal)</td>
<td>Yes</td>
<td>Adequate</td>
<td>No</td>
<td>NA</td>
<td>No</td>
</tr>
<tr>
<td>Lee MS, 2003</td>
<td>Qi Gong</td>
<td>Yes</td>
<td>Unclear</td>
<td>No</td>
<td>NA</td>
<td>Yes</td>
</tr>
<tr>
<td>Lee MS, 2004</td>
<td>Qi Gong</td>
<td>Yes</td>
<td>Inadequate</td>
<td>No</td>
<td>NA</td>
<td>Yes</td>
</tr>
<tr>
<td>Manikonda P, 2008</td>
<td>CMBT</td>
<td>Yes</td>
<td>Unclear</td>
<td>No</td>
<td>NA</td>
<td>No</td>
</tr>
</tbody>
</table>

AHM = antihypertensive medication; AT = autogenic training; BF = breathing exercises; BE = biofeedback; CMBT = contemplative meditation and breathing technique; NA = not applicable; NS = not specified; PMR = progressive muscle relaxation; RR = Relaxation Response; TM® = Transcendental Meditation
Results of Direct Comparisons

Table 27 summarizes the meditation practices, comparison groups, and outcomes that were available for direct meta-analyses on the efficacy and effectiveness of meditation practices to treat hypertension. Direct meta-analyses were conducted when two or more studies assessed the same meditation practice, used similar comparison groups, and had usable data for common outcomes of interest. No single diagnostic criterion was chosen for categorizing study populations as hypertensive; rather, we included all studies conducted in hypertensive patients, as defined by the authors of the primary studies. Fifteen comparisons (14 studies) were not suitable for direct meta-analyses because no more than one study was available for statistical pooling: SRELAX (technique modeled after TM®) versus waiting list (WL), SRELAX versus placebo, RR versus HE, Qi Gong versus antihypertensive medication (AHM), Qi Gong versus exercise, Tai Chi versus rest, Yoga versus orthostatic tilt, Yoga versus progressive muscle relaxation (PMR), Yoga versus relaxation, Yoga versus Yoga plus BF, Zen Buddhist meditation versus NT, mantras meditation not specified versus NT, and meditation practice not further specified versus NT. Data from 16 studies were available for direct meta-analyses that involved eight comparisons: TM® versus HE, Yoga versus HE, Yoga versus rest, and Zen Buddhist meditation versus blood pressure checks. Outcomes of interest and comparisons for which data could be combined into a direct meta-analysis were

1. blood pressure: TM® versus HE, TM® versus PMR, RR versus BF, Qi Gong versus WL, Yoga versus NT, Yoga versus HE, Zen Buddhist meditation versus blood pressure checks;
2. body weight: TM® versus HE;
3. heart rate: TM® versus HE;
4. stress: TM® versus HE, Yoga versus HE;
5. anger: TM® versus HE;
6. self-efficacy: TM® versus HE;
7. total cholesterol (TC): TM® versus HE;
8. high-density lipoprotein cholesterol (LDL-C): TM® versus HE;
9. low-density lipoprotein cholesterol (LDL-C): TM® versus HE;
10. dietary intake (caloric intake, total fat intake, and sodium intake): TM® versus HE; and
11. physical activity: TM® versus HE.

Results from individual studies not included in a meta-analysis of clinical trials of meditation practices in hypertension are summarized in Table H1 in Appendix H.

### Table 27. Summary of outcomes by meditation practice and by comparison group included in meta-analyses of the efficacy and effectiveness of meditation practices for hypertension

<table>
<thead>
<tr>
<th>Intervention</th>
<th>Comparator</th>
<th>Outcome</th>
<th>No. studies</th>
<th>Meta-analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td>TM®</td>
<td>HE</td>
<td>TC, TG, LDL-C, HDL-C, BP changes, anger, stress, personal efficacy, diet, physical activity, pulse rate, cIMT, BP changes, weight, PR, TC, LDL-C, pulse pressure, smoking, exercise, LVMI, BP changes (DBP, SBP), weight, PR, PWT, LVDD, LVDS, IVST, E/A ratio, energy, stress impact, sleep, positive affect, sleep pattern, anxiety, depression, anger, self-efficacy, locus of control, diet, activity level, compliance</td>
<td>5</td>
<td>Yes</td>
</tr>
<tr>
<td>PMR</td>
<td>BP changes (DBP, SBP), compliance</td>
<td>2</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>PLB</td>
<td>BP changes (DBP, SBP), change in AHM</td>
<td>1</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>SRELAX</td>
<td>HE</td>
<td>BP changes (DBP, SBP), compliance</td>
<td>1</td>
<td>No</td>
</tr>
<tr>
<td>WL</td>
<td>BP changes (DBP, SBP)</td>
<td>1</td>
<td>No</td>
<td></td>
</tr>
</tbody>
</table>

AHM = antihypertensive medication; AI = alpha index; APO-A1 = apolipoprotein A1; BF = biofeedback; BMI = body mass index; BP = blood pressure thickness; CO = cardiac output; CPR = cold pressor response; Cre = creatinine; DBH = dopamine beta hydroxylase; DBP = diastolic blood pressure; E/E' atrial constriction; EGG = electroencephalogram; EMG = electromyography; EPI = epinephrine; FEV1 = forced expiratory volume in 1 second; FVC = forced vital capacity; GSR = galvanic skin response; HDL-C = high density lipoprotein cholesterol; HE = health education; HR = heart rate; HRQL = health-related quality of life; thickness; K = potassium; LVIDD = left ventricular internal dimension at diastole; LVDD = left ventricular internal dimension at systole; LVMI = left ventricular mass index; NA = not applicable; Na = sodium; NE = norepinephrine; NS = not specified; NT = no treatment; PLB = placebo relaxation; PRA = plasma renin activity; PR = pulse rate; PWT = posterior wall thickness; RPP = rate pressure product; RR = Relaxation Response; SBP = systolic blood pressure; TG = triglycerides; TM® = Transcendental Meditation®; WL = waiting list

*Appendices and evidence tables cited in this report are provided electronically at http://www.ahrq.gov/clinic/tp/medtrp.htm
Table 27. Summary of outcomes by meditation practice and by comparison group included in meta-analyses of the efficacy and effectiveness of meditation practices for hypertension (continued)

<table>
<thead>
<tr>
<th>Intervention</th>
<th>Comparator</th>
<th>Outcome Description</th>
<th>No. studies</th>
<th>Meta-analysis</th>
<th>Outcomes for Meta-analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Qi Gong</td>
<td>AHM</td>
<td>Plasma 18-OH-DOC levels, BP changes(DBP, SBP)</td>
<td>1</td>
<td>No</td>
<td>NA</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Exercise BP, health status, anxiety, depression, HR, weight, BMI, body fat, waist/hip circumference, renin excretion, Na, K, urea, Cr, TC, HDL-C, LDL-C, TG, aldosterone, urine cortisol, urine Cr, urine Na, urine protein, LVMI, ejection fraction</td>
<td>1</td>
<td>No</td>
<td>NA</td>
</tr>
<tr>
<td></td>
<td></td>
<td>BP changes (DBP, SBP, RPP), HR, PCR, EPI, NE, PVC, FESIV, cortisol^12^</td>
<td>2</td>
<td>Yes</td>
<td>BP changes (DBP, SBP)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>BP changes (DBP, SBP), APO-A1, TC, HDL-C, TG, self-efficacy^23^</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tai Chi</td>
<td>Red</td>
<td>BP changes (DBP, SBP), HR, TC, HDL-C, LDL-C, TG, BMI, anxiety^23^</td>
<td>1</td>
<td>No</td>
<td>NA</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Stress, BP changes (DBP, SBP), PR, weight^12^</td>
<td>1</td>
<td>No</td>
<td>NA</td>
</tr>
<tr>
<td></td>
<td></td>
<td>BP changes (DBP, SBP), anxiety, GSR</td>
<td>3</td>
<td>Yes</td>
<td>BP changes (DBP, SBP)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>BP changes (DBP, SBP), hostility, assertive behavior, psychological symptoms^12, 16</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Stress, BP changes (DBP, SBP), PR, weight^12^</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HE</td>
<td>NT</td>
<td>BP changes (DBP, SBP), AHM intake, stress control, negative responses to stress, coping behavior, somatic symptoms, symptom severity^12</td>
<td>2</td>
<td>Yes</td>
<td>BP changes (DBP, SBP)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Stress, BP changes (DBP, SBP), BMI, HR^16</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Orthostatic tilt</td>
<td>NT</td>
<td>BP changes (DBP, SBP), AI-EEG, CO, HR, NE, EPI, PRA, urine K, urine Na, CPR^16</td>
<td>1</td>
<td>No</td>
<td>NA</td>
</tr>
<tr>
<td></td>
<td></td>
<td>BP changes (DBP, SBP), APO-A1, TC, HDL-C, TG, self-efficacy^23^</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PMR</td>
<td>NT</td>
<td>BP changes (DBP, SBP), anxiety, GSR</td>
<td>1</td>
<td>No</td>
<td>NA</td>
</tr>
<tr>
<td></td>
<td></td>
<td>BP changes (DBP, SBP), hostility, assertive behavior, anxiety, depression^16</td>
<td>2</td>
<td>Yes</td>
<td>BP changes (DBP, SBP)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Stress, BP changes (DBP, SBP), PR, weight^12^</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Relaxation</td>
<td>NT</td>
<td>BP changes (DBP, SBP), body weight, urine Na, TC^24</td>
<td>1</td>
<td>No</td>
<td>NA</td>
</tr>
<tr>
<td></td>
<td>Yoga</td>
<td>BP changes (DBP, SBP), AHM intake, stress control, negative responses to stress, coping behavior, somatic symptoms, symptom severity^12</td>
<td>2</td>
<td>Yes</td>
<td>BP changes (DBP, SBP)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Stress, BP changes (DBP, SBP), BMI, HR^16</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Orthostatic tilt BP changes (DBP, SBP), AI-EEG, CO, HR, NE, EPI, PRA, urine K, urine Na, CPR^16</td>
<td>1</td>
<td>No</td>
<td>NA</td>
</tr>
<tr>
<td>Blood pressure checks</td>
<td>NT</td>
<td>BP changes (DBP, SBP), changes in plasma DBH, plasma volume, PRA^25</td>
<td>2</td>
<td>Yes</td>
<td>BP changes (DBP, SBP)</td>
</tr>
<tr>
<td>Zen Buddhist meditation</td>
<td>NT</td>
<td>BP changes (DBP, SBP), anxiety, GSR</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Stress, BP changes (DBP, SBP), PR, weight^12^</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Mantra (NS)</td>
<td>BP changes (DBP, SBP), time of BP restoration, HRQL, emotional stress, number of sick leaves</td>
<td>1</td>
<td>No</td>
<td>NA</td>
</tr>
<tr>
<td>Meditation practice (NS)</td>
<td>NT</td>
<td>BP changes (DBP, SBP)^25</td>
<td>1</td>
<td>No</td>
<td>NA</td>
</tr>
</tbody>
</table>

Transcendental Meditation®

Five RCTs assessing the effects of TM® in hypertensive patients were identified. Five trials^206,208,210,212,221 compared TM® versus HE, and two trials^210,211 compared TM® versus PMR. Meta-analyses were conducted for the comparisons TM® versus HE, and TM® versus PMR.

**TM® versus HE**

**Blood pressure.** Five trials^206,208,210,212,221 totaling 337 participants (TM® = 175, HE = 162) provided data on the effects of TM® versus HE on SBP and DBP (Figure 3). The combined estimate of changes in SBP (mm Hg) indicated a small, nonsignificant improvement (reduction) in favor of TM® (WMD = -1.10; 95% CI, -5.24 to 3.04). There was evidence of heterogeneity among the studies regarding the mean change in SBP (p = 0.05; I² = 56.9 percent).

Possible causes of heterogeneity in the outcome of SBP were explored. The five trials were similar in terms of the type of participants, severity of hypertension, characteristics of the interventions, and methodological quality. There were differences, however, in the duration of the trials and followup period. All but one study^212 were medium- or long-term trials (more than 3 months). The study with the shortest duration^211 (3 months) was the only trial that reported statistically significant changes in SBP favoring TM®. The medium- or long-term trials did not find statistically significant differences between TM® and HE for changes in SBP. A subgroup analysis based on the duration of the studies (Figure 4) showed that greater homogeneity (p = 0.64, I² = 0 percent) was observed for the studies that assessed the medium- and long-term effects of TM® and HE on SBP. After excluding the short-term study, the direction of the effect changed to a small, nonsignificant reduction of SBP in favor of HE (WMD = 0.70; 95% CI, -2.29 to 3.68).
The combined estimate of changes in DBP (mm Hg) indicated a small, nonsignificant improvement (reduction) in favor of TM® (WMD = -0.58; 95% CI, -4.22 to 3.06). We found significant heterogeneity (p = 0.003; $I^2 = 74.8$ percent) among the studies for this outcome, which may be attributed to variations in the duration of the studies. The study with the shortest duration\textsuperscript{221} (3 months) was the only trial that reported statistically significant changes in DBP favoring TM®. The other medium- or long-term trials did not find statistically significant differences between TM® and HE for changes in DBP. After excluding the short-term study,\textsuperscript{221} the magnitude of the effect estimate changed to a small, nonsignificant reduction of DBP in favor of HE (WMD = 1.02; 95% CI, 1.41 to 3.44).

**Figure 5. Subgroup analysis by study duration of the effect of TM® versus HE on DBP**

<table>
<thead>
<tr>
<th>Study of sub-category</th>
<th>TM® (Mean (SD))</th>
<th>HE (Mean (SD))</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Short-term</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Schwenger 1995</td>
<td>-5.70 (8.73)</td>
<td>0.69 (8.45)</td>
<td>58</td>
</tr>
<tr>
<td>Subtotal (95% CI)</td>
<td>$I^2 = 0.00000$</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Test for heterogeneity not applicable</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Test for overall effect</td>
<td>Z = -2.45 ($p = 0.015$)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Long-term</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Campbell 2003</td>
<td>-5.20 (2.70)</td>
<td>2.24 (1.60)</td>
<td>53</td>
</tr>
<tr>
<td>Costello-Richmond 00</td>
<td>-0.20 (9.09)</td>
<td>0.75 (9.79)</td>
<td>29</td>
</tr>
<tr>
<td>Subtotal (95% CI)</td>
<td>$I^2 = 0.00000$</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Test for heterogeneity: CHI² = 9.01; df = 3; $p = 0.026$, $I^2 = 25.2$%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Test for overall effect: Z = 1.15 ($p = 0.243$)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Figure 6. Meta-analysis of the effect of TM® versus HE on body weight**

<table>
<thead>
<tr>
<th>Study of sub-category</th>
<th>TM® (Mean (SD))</th>
<th>HE (Mean (SD))</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total (95% CI)</td>
<td></td>
<td></td>
<td>100</td>
</tr>
<tr>
<td>Test for heterogeneity: CHI² = 0.02; df = 1 ($p = 0.90$)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Test for overall effect: Z = 0.04 ($p = 0.94$)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Body weight.** Three trials\textsuperscript{205,206,210} totaling 166 participants (TM® = 86, HE = 80) provided data on the effects of TM® versus HE on changes in body weight (lbs) (Figure 6). The results of the trials for changes in body weight were homogeneous (p = 0.34; $I^2 = 8.3$ percent). The combined WMD of -0.43 (95% CI, -1.41 to 0) indicated a small, nonsignificant reduction in pulse rate with TM®.

**Heart rate.** Three trials\textsuperscript{205,206,210} totaling 165 participants (TM® = 85, HE = 80) provided data on the effects of TM® versus HE on heart rate (bpm) (Figure 7). The results were statistically homogeneous (p = 0.34; $I^2 = 8.3$ percent). The combined WMD of -0.43 (95% CI, -1.41 to 0) indicated a small, nonsignificant reduction in pulse rate with TM®.

**Figure 7. Meta-analysis of the effect of TM® versus HE on heart rate**

<table>
<thead>
<tr>
<th>Study of sub-category</th>
<th>TM® (Mean (SD))</th>
<th>HE (Mean (SD))</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total (95% CI)</td>
<td></td>
<td></td>
<td>100</td>
</tr>
<tr>
<td>Test for heterogeneity: CHI² = 0.32; df = 2 ($p = 0.90$)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Test for overall effect: Z = 0.04 ($p = 0.94$)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Stress.** Two trials\textsuperscript{205,210} totaling 105 participants (TM® = 54, HE = 51) contributed data on the effects of TM® versus HE on measures of stress (Figure 8). The combined estimate (SMD = 0.12; 95% CI, -0.27 to 0.50) indicated a small, nonsignificant reduction in stress scores with HE. There was evidence of homogeneity between the studies regarding the outcome of stress (p = 0.38; $I^2 = 0$ percent).
Anger. Two trials\(^2\,5\) totaling 105 participants (TM\(^{a}\) = 54, HE = 51) examined the effects of TM\(^{a}\) versus HE on measures of anger (Figure 9). The results of the trials for changes in measures of anger were homogeneous (\(p = 0.64, \Gamma^2 = 0\) percent), and the combined SMD of -0.06 (95% CI, -0.45 to 0.32) showed a small and nonsignificant reduction in scores of anger with TM\(^{a}\).

Self-efficacy. Data on changes in measures of self-efficacy were available from two trials\(^2\,5\) with a total of 105 participants (TM\(^{a}\) = 54, HE = 51) (Figure 10). The combined SMD in measures of self-efficacy for trials of TM\(^{a}\) compared with HE was -0.36 (95% CI, -0.92 to 0.19), and showed a nonsignificant improvement in self-efficacy in favor of TM\(^{a}\). The results of the trials for changes in self-efficacy were moderately heterogeneous (\(p = 0.18, \Gamma^2 = 44.8\) percent).

Total cholesterol (TC). Information on TC changes (mg/dL) was available from two trials\(^5\,6\) with a total of 126 participants (TM\(^{a}\) = 65, HE = 61) (Figure 11). The combined effect estimate showed no differences between TM\(^{a}\) and HE in TC changes (WMD = -0.94; 95% CI, -11.49 to 9.62). The results of the trials were homogeneous (\(p = 0.80, \Gamma^2 = 0\) percent).

High-density lipoprotein cholesterol (HDL-C). Two trials\(^5\,6\) totaling 126 participants (TM\(^{a}\) = 65, HE = 61) provided data on the effects of TM\(^{a}\) versus HE on changes in HDL-C (mg/dL) (Figure 12). The results of the trials were homogeneous (\(p = 0.35, \Gamma^2 = 0\) percent), and the combined WMD of -2.58 (95% CI, -6.12 to 0.96) showed a nonsignificant benefit (increase) with HE for HDL-C.
is THE Medical Concern

Low-density lipoprotein cholesterol (LDL-C). Two trials totaling 126 participants (TM = 65, HE = 61) contributed data on the effects of TM versus HE on changes in LDL-C (mg/dL) (Figure 13). The pooled results of the trials were homogeneous (p = 0.90; I² = 0 percent), and the combined WMD of 1.08 (95% CI, -8.65 to 10.81) showed a nonsignificant benefit (reduction) with HE for LDL-C.

Dietary intake. Two trials totaling 49 participants (TM = 30, HE = 19) provided data on the effects of TM versus HE on dietary intake, expressed as caloric intake, total fat intake, and sodium intake (Figure 14). The results of the trials for caloric intake were homogeneous (p = 0.97; I² = 0 percent), and the combined SMD of 0.28 (95% CI, -0.30 to 0.86) showed a nonsignificant reduction in caloric intake in the HE group. The results of the trials for total fat intake were homogeneous (p = 0.23; I² = 30.7 percent), and the combined SMD of 0.50 (95% CI, -0.21 to 1.21) showed a nonsignificant reduction in fat intake in the HE group. The results of the trials for sodium intake were homogeneous (p = 0.64; I² = 0 percent), and the combined SMD of 0.14 (95% CI, -0.44 to 0.72) showed a nonsignificant reduction in sodium intake in the HE group.

Physical activity. Three trials totaling 138 participants (TM = 68, HE = 70) provided data on the effects of TM versus HE on changes in physical activity (Figure 15). The combined results showed a nonsignificant reduction in changes in favor of the HE group (SMD = -0.20; 95% CI, -0.14 to 0.53). The results of the trials for changes in physical activity were homogeneous (p = 0.57; I² = 0 percent).

TM versus PMR

Blood pressure. Two trials totaling 179 participants (TM = 90, PMR = 89) provided data on the effects of TM versus PMR on SBP and DBP (Figure 16). The combined estimate of changes in SBP (mm Hg) indicated a significant improvement (reduction) in favor of TM (WMD = -4.30; 95% CI, -8.02 to -0.57). The results of the trials for changes in SBP were homogeneous (p = 0.25; I² = 25.6 percent).
The combined estimate of changes in DBP (mm Hg) indicated a significant improvement (reduction) in favor of TM® (WMD = -3.11; 95% CI, -5.00 to -1.22). The results of the trials for changes in DBP were homogeneous (p = 0.67; I² = 0 percent).

Figure 16. Meta-analysis of the effect of TM® versus PMR on blood pressure (SBP and DBP)

<table>
<thead>
<tr>
<th>Study or sub-category</th>
<th>N</th>
<th>RR Mean (SD)</th>
<th>p-value</th>
<th>N</th>
<th>RR Mean (SD)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>01 Systolic</td>
<td>0</td>
<td>0.99 (1.4; 0.69)</td>
<td>0.7</td>
<td>0</td>
<td>0.06 (0.7; 0.68)</td>
<td>0.01</td>
</tr>
<tr>
<td>02 DBP</td>
<td>10</td>
<td>-1.00 (1.0; 0.63)</td>
<td>0.05</td>
<td>10</td>
<td>-0.81 (0.8; 0.66)</td>
<td>0.06</td>
</tr>
<tr>
<td>03 Total (SBP, DBP)</td>
<td>20</td>
<td>-0.40 (0.4; 0.68)</td>
<td>0.5</td>
<td>20</td>
<td>-0.40 (0.4; 0.68)</td>
<td>0.5</td>
</tr>
</tbody>
</table>

Relaxation Response

Five trials assessing the effects of RR in hypertensive patients were identified. Three trials compared RR versus BF, one trial compared RR versus HE, and one trial compared RR versus WL. A meta-analysis was conducted for the comparison between RR and BF.

RR versus BF

**Blood pressure.** Three trials totaling 53 participants (RR = 28, BF = 25) provided data for a meta-analysis of the effects of RR versus BF on SBP and DBP (Figure 17). The combined estimate of changes in SBP (mm Hg) showed that BF produced a greater but nonsignificant reduction in SBP when compared to RR (WMD = 2.39; 95% CI, -5.13 to 9.91). The results were homogeneous across the trials (p = 0.55; I² = 0 percent). Likewise, the combined estimate of changes in DBP (mm Hg) indicated a small, nonsignificant improvement (reduction) in favor of BF (WMD = 4.44; 95% CI, -4.00 to 12.88). The results of the trials for changes in DBP were homogeneous (p = 0.42; I² = 0 percent).

Qi Gong

Four trials assessing the effects of Qi Gong in hypertensive patients were identified. Two trials compared Qi Gong versus WL, one trial compared Qi Gong versus AHM, and another trial compared Qi Gong versus exercise. A meta-analysis was conducted for the comparison between Qi Gong and WL.

**Qi Gong versus WL**

**Blood pressure.** Two trials totaling 94 participants (Qi Gong = 46, WL = 48) provided data for a meta-analysis of the effects of Qi Gong versus WL on SBP and DBP (Figure 18). The combined estimate of changes in SBP (mm Hg) indicated a significant improvement (reduction) in favor of Qi Gong (WMD = -17.78; 95% CI, -22.03 to -13.54). The results were homogeneous across the trials (p = 0.57; I² = 0 percent). Likewise, the combined estimate of changes in DBP (mm Hg) indicated a significant improvement (reduction) of DBP in favor of Qi Gong (WMD = -12.06; 95% CI, -21.62 to -2.49). There was evidence of substantial heterogeneity among the studies in DBP (p <0.0001; I² = 93.5 percent). Possible causes of heterogeneity were explored. The two trials were similar in terms of the type of participants, severity of hypertension, characteristics of the interventions, study duration, and methodological quality. Therefore, it is unknown whether clinical heterogeneity produced statistical heterogeneity between the trials for the outcome of DBP. Although each trial showed the same direction of effect, the wide confidence intervals indicate that the estimates of effect are unreliable and consistent with a broad range of possible effect sizes. Therefore, heterogeneity obscures the clinical applicability of the WMD in the analysis.
Yoga

Figure 18. Meta-analysis of the effect of Qi Gong versus WL on blood pressure (SBP and DBP)

Eight trials\textsuperscript{183,204,212,216,217,219,224,226} assessing the effects of Yoga in hypertensive patients were identified. Three trials\textsuperscript{183,204,217} compared Yoga versus NT, two trials\textsuperscript{212,216} compared Yoga versus HE, two trials\textsuperscript{204,219} compared Yoga versus rest, one trial\textsuperscript{217} compared Yoga versus AHM, one trial\textsuperscript{226} compared Yoga versus orthostatic tilt, one trial\textsuperscript{204} compared Yoga versus PMR, one trial\textsuperscript{224} compared Yoga versus relaxation, and one trial\textsuperscript{185} compared Yoga versus a combination of Yoga and BF. Meta-analyses were conducted for the comparisons of Yoga versus NT, Yoga versus HE, and Yoga versus rest.

Yoga versus NT

Blood pressure. Three trials\textsuperscript{183,204,217} totaling 57 participants (Yoga = 28, NT = 29) provided data for a meta-analysis of the effects of Yoga versus NT on SBP and DBP (Figure 19). The combined estimate of changes in SBP (mm Hg) indicated a small, nonsignificant improvement (reduction) in favor of Yoga (WMD = -15.39; 95% CI, -31.97 to 1.19). There was evidence of significant (p = 0.006) and substantial (I\textsuperscript{2} = 80.2 percent) heterogeneity among the studies regarding the mean change in SBP.

Possible causes of heterogeneity in the outcome of SBP were explored. The three trials were similar in duration and methodological quality. The studies failed to appropriately report some important characteristics that would have been useful for appraising the potential sources of heterogeneity in the trials. Age of participants was similar in two studies,\textsuperscript{204,217} while the remaining study failed to provide this information. The distribution of males and females for the total study population was also unknown in two\textsuperscript{183,217} of the three trials. None of the studies provided a critical value for the presence or severity of hypertension. Treatment in the Broota study\textsuperscript{204} consisted of practicing Shavasana consecutively for 8 days, with each session lasting 20 minutes. The intervention group in the trial of Hafner\textsuperscript{185} practiced Yoga for eight 1-hour sessions at weekly intervals. Finally, participants in the Yoga group in the study of Murugesan\textsuperscript{217} engaged in a variety of yoga practices (i.e., asanas, Om recitation, and meditation) twice a day for 1 hour, 6 days a week.

The most obvious difference among the three studies was that control participants in the Broota\textsuperscript{204} and Hafner\textsuperscript{185} trials were assigned to a NT condition in which existing medical treatment was not interrupted, whereas controls in the trial of Murugesan\textsuperscript{217} did not receive any therapy. Therefore, it is likely that the conditions of NT in the Murugesan\textsuperscript{217} study were systematically different from the other two studies. Yoga was used as an adjuvant therapy in the studies of Broota\textsuperscript{204} and Hafner\textsuperscript{185} whereas in the Murugesan trial\textsuperscript{217} it was not. Murugesan\textsuperscript{217} was the only study to report statistically significant results in favor of Yoga for changes in SBP and DBP.

A subgroup analysis by concomitant therapy (Figure 20) showed that greater homogeneity (p = 0.86, I\textsuperscript{2} = 0 percent) was observed for the studies that continued medical therapy in the NT condition. After excluding the study that did not provide any therapy,\textsuperscript{217} the direction of the effect did not change, and a nonsignificant improvement (reduction) in favor of Yoga was found for SBP (WMD = -7.15; 95% CI, -17.70 to 3.39).

Figure 19. Meta-analysis of the effect of Yoga versus NT on blood pressure (SBP and DBP)

As depicted in Figure 19, the combined estimate of changes in DBP (mm Hg) indicated a significant improvement (reduction) in favor of Yoga (WMD = -13.95; 95% CI, -27.24 to -0.66). There was evidence of significant heterogeneity (p = 0.01; I\textsuperscript{2} = 76.5 percent) among the studies for this outcome, which may be accounted for by the use of concomitant therapy in the NT condition. A subgroup analysis based on the presence of concomitant treatment (Figure 21)
showed that homogeneity (p = 0.44, I^2 = 0 percent) was observed for the studies that did not interrupt existing medical therapy for the NT condition. After excluding the study that did not provide any concomitant therapy, the results remained similar, and a nonsignificant improvement (reduction) in favor of Yoga was found for DBP (WMD = -6.82, 95% CI, -15.51 to 1.87).

Figure 21. Subgroup analysis by concomitant therapy of Yoga versus NT on DBP

<table>
<thead>
<tr>
<th>Study or subcategory</th>
<th>N</th>
<th>Yoga Mean (SD)</th>
<th>N</th>
<th>NT Mean (SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Concomitant Therapy</td>
<td>1</td>
<td>10.0 (6.0)</td>
<td>1</td>
<td>12.0 (6.0)</td>
</tr>
<tr>
<td>No Concomitant Therapy</td>
<td>1</td>
<td>10.0 (6.0)</td>
<td>1</td>
<td>12.0 (6.0)</td>
</tr>
<tr>
<td>Test for heterogeneity: t = 1.04, df = 1, p = 0.30, I^2 = 0%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Test for overall effect: Z = 1.04, p = 0.30</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Yoga versus HE

Blood pressure. Two trials totaling 68 participants (Yoga = 34, HE = 34) provided data on the effects of Yoga versus HE on SBP and DBP (Figure 22). The combined estimate of changes in SBP (mm Hg) indicated a small, nonsignificant improvement (reduction) in favor of Yoga (WMD = -15.32, 95% CI, -38.77 to 8.14). There was evidence of heterogeneity between the studies regarding the mean change in SBP (p = 0.001; I^2 = 90.3 percent). Possible causes of heterogeneity in the outcome of SBP were explored. The studies failed to report appropriately some important characteristics that would have been useful for appraising the potential sources of heterogeneity. The two trials were similar in terms of the type of participants, and methodological quality. There were differences in the duration of trials that may explain the differences in the results from the individual studies, and the heterogeneity in the pooling of the results. The Latha study was a medium-term trial lasting 6 months, whereas the McCaffrey study was a short-term trial of 11 weeks. The short-term trial reported statistically significant changes in SBP for Yoga as compared to HE, whereas the effects seem to disappear at medium term, as reported by the statistically nonsignificant results of the McCaffrey trial.

The combined estimate of changes in DBP (mm Hg) indicated a nonsignificant improvement (reduction) in favor of Yoga (WMD = -11.35, 95% CI, -30.17 to 7.47). There was evidence of significant heterogeneity (p = 0.01; I^2 = 84.0 percent) between the studies for this outcome, which may be primarily accounted for by the duration of the trials. The difference in the significance of the individual study results may be a function of the duration of the trials, with the short-term trial showing statistically significant changes in DBP, and the medium term trial reporting nonstatistically significant results.

Figure 22. Meta-analysis of the effect of Yoga versus HE on blood pressure (SBP and DBP)

<table>
<thead>
<tr>
<th>Study or subcategory</th>
<th>N</th>
<th>Yoga Mean (SD)</th>
<th>N</th>
<th>HE Mean (SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Concomitant Therapy</td>
<td>7</td>
<td>34.0 (11.5)</td>
<td>7</td>
<td>50.0 (15.5)</td>
</tr>
<tr>
<td>Stress</td>
<td>24</td>
<td>24.0 (11.5)</td>
<td>24</td>
<td>30.0 (15.5)</td>
</tr>
<tr>
<td>Test for heterogeneity: t = 10.04, df = 1, p = 0.001, I^2 = 90.3%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Test for overall effect: Z = -1.04, p = 0.30</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Zenity Buddhist meditation

Two trials totaling 250 participants (Zen Buddhist meditation = 134, blood pressure checks = 116) provided data for a meta-analysis of the effects of Zen Buddhist meditation versus blood pressure checks (Figure 24). The combined estimate

Figure 23. Meta-analysis of the effect of Yoga versus HE on stress

<table>
<thead>
<tr>
<th>Study or subcategory</th>
<th>N</th>
<th>Yoga Mean (SD)</th>
<th>N</th>
<th>HE Mean (SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Concomitant Therapy</td>
<td>7</td>
<td>34.0 (11.5)</td>
<td>7</td>
<td>50.0 (15.5)</td>
</tr>
<tr>
<td>Stress</td>
<td>24</td>
<td>24.0 (11.5)</td>
<td>24</td>
<td>30.0 (15.5)</td>
</tr>
<tr>
<td>Test for heterogeneity: t = 10.04, df = 1, p = 0.001, I^2 = 90.3%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Test for overall effect: Z = -1.04, p = 0.30</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Zen Buddhist meditation versus blood pressure checks

Blood pressure. Two trials totaling 250 participants (Zen Buddhist meditation = 134, blood pressure checks = 116) provided data for a meta-analysis of the effects of Zen Buddhist meditation versus blood pressure checks on SBP and DBP (Figure 24). The combined estimate
of changes in SBP (mm Hg) indicated a nonsignificant improvement (reduction) in favor of Zen Buddhist meditation (WMD = -3.67; 95% CI, -9.04 to 1.70). The results were homogeneous (p = 0.34; I² = 0 percent). The combined estimate of changes in DBP (mm Hg) indicated a significant improvement (reduction) in favor of Zen Buddhist meditation (WMD = -6.08; 95% CI, -11.68 to -0.48). The results of the trials for changes in DBP were moderately homogeneous (p = 0.15; I² = 52.4 percent).

Figure 24. Meta-analysis of the effect of Zen Buddhist meditation versus blood pressure checks on blood pressure (SBP and DBP)

Mixed Treatment and Indirect Comparisons

**Blood pressure.** Since many of the studies of meditation practices in hypertensive patients reported data on SBP and DBP, we were able to do a mixed treatment analysis which allowed us to compare all interventions to one another.

Table 28 and Figure 25 show the results of the mixed treatment comparisons for SBP, ordered by the point estimate of difference from NT. The interventions ranged from reducing SBP from an average of 0.3 to 21.9 mm Hg. Tai Chi, Yoga plus BF, and Qi Gong seem to be more effective than the other interventions in terms of point estimates and likelihood of being the best intervention. However, we cannot make strong inferences on which is the best intervention due to a lack of statistical power.

Tai Chi, Yoga plus BF, and Yoga alone all reduced SBP significantly compared to NT. Yoga, Tai Chi, and Yoga plus BF were also found to be significantly superior to HE, while Qi Gong was significantly superior to a WL control (not shown). No other pair-wise comparisons were statistically significant.

<table>
<thead>
<tr>
<th>Intervention</th>
<th>Point estimate</th>
<th>95% credible interval</th>
<th>Probability of being “best” intervention (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tai Chi</td>
<td>-21.9</td>
<td>-37.8,-5.7</td>
<td>32.8</td>
</tr>
<tr>
<td>Yoga + BF</td>
<td>-20.1</td>
<td>-36.7,-3.1</td>
<td>23.8</td>
</tr>
<tr>
<td>Qi Gong</td>
<td>-18.4</td>
<td>-47.4,10.7</td>
<td>27.2</td>
</tr>
<tr>
<td>CMBT</td>
<td>-14.9</td>
<td>-30.6,0.9</td>
<td>8.1</td>
</tr>
<tr>
<td>Biofeedback</td>
<td>-13.2</td>
<td>-35.6,9.4</td>
<td>5.1</td>
</tr>
<tr>
<td>Yoga</td>
<td>-13.1</td>
<td>-21.7,-4.4</td>
<td>0.6</td>
</tr>
<tr>
<td>RR</td>
<td>-10.8</td>
<td>-30.5,8.9</td>
<td>0.9</td>
</tr>
<tr>
<td>Zen Buddhist meditation</td>
<td>-7.3</td>
<td>-22.1,7.6</td>
<td>0.9</td>
</tr>
<tr>
<td>Rest/Relaxation</td>
<td>-5.9</td>
<td>-22.4,11.0</td>
<td>0.3</td>
</tr>
<tr>
<td>Mantra meditation (NS)</td>
<td>-5.6</td>
<td>-21.8,10.5</td>
<td>1.0</td>
</tr>
<tr>
<td>TM (N)</td>
<td>-2.5</td>
<td>-14.0,8.7</td>
<td>0.0</td>
</tr>
<tr>
<td>PMR</td>
<td>-2.4</td>
<td>-15.0,9.6</td>
<td>0.0</td>
</tr>
<tr>
<td>HE</td>
<td>-0.5</td>
<td>-11.8,10.6</td>
<td>0.0</td>
</tr>
<tr>
<td>WL</td>
<td>-0.3</td>
<td>-26.8,26.3</td>
<td>0.0</td>
</tr>
<tr>
<td>NT</td>
<td>0.0</td>
<td>NA</td>
<td>0.0</td>
</tr>
</tbody>
</table>

BF = biofeedback; CMBT = contemplative meditation plus breathing techniques; HE = health education; NA = not applicable; NS = not specified; NT = no treatment; PMR = progressive muscle relaxation; RR = Relaxation Response; SBP = systolic blood pressure; TM = Transcendental Meditation; WL = waiting list.
Figure 25. SBP results (point estimate and 95% credible interval) for all intervention based on mixed treatment comparisons

Table 29. Mixed treatment comparisons on SBP (mm Hg) reductions compared to NT

<table>
<thead>
<tr>
<th>Intervention</th>
<th>Point Estimate</th>
<th>95% Credible Interval</th>
<th>Probability of “best” (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yoga + Biofeedback</td>
<td>-17.1</td>
<td>-30.9, -3.0</td>
<td>34.0</td>
</tr>
<tr>
<td>Qi Gong</td>
<td>-15.2</td>
<td>-40.4, 9.3</td>
<td>30.6</td>
</tr>
<tr>
<td>Tai Chi</td>
<td>-12.1</td>
<td>-25.8, 1.5</td>
<td>12.5</td>
</tr>
<tr>
<td>Zen Buddhist meditation</td>
<td>-12.0</td>
<td>-24.4, 0.2</td>
<td>9.1</td>
</tr>
<tr>
<td>Yoga</td>
<td>-11.8</td>
<td>-19.1, -4.6</td>
<td>1.8</td>
</tr>
<tr>
<td>BF</td>
<td>-11.4</td>
<td>-22.1, 8.5</td>
<td>9.2</td>
</tr>
<tr>
<td>Rest/Relaxation</td>
<td>-6.5</td>
<td>-22.0, 5.0</td>
<td>1.3</td>
</tr>
<tr>
<td>RR</td>
<td>-7.4</td>
<td>-24.2, 8.6</td>
<td>0.8</td>
</tr>
<tr>
<td>TM®</td>
<td>-3.4</td>
<td>-13.3, 5.9</td>
<td>0.1</td>
</tr>
<tr>
<td>WL</td>
<td>-3.3</td>
<td>-26.4, 19.3</td>
<td>0.0</td>
</tr>
<tr>
<td>PMR</td>
<td>-2.2</td>
<td>-12.8, 7.7</td>
<td>0.1</td>
</tr>
<tr>
<td>HE</td>
<td>-1.9</td>
<td>-11.8, 7.3</td>
<td>0.0</td>
</tr>
<tr>
<td>Mantra meditation (NS)</td>
<td>-1.0</td>
<td>-14.4, 12.4</td>
<td>0.6</td>
</tr>
<tr>
<td>NT</td>
<td>0.0</td>
<td>NA</td>
<td>0.0</td>
</tr>
</tbody>
</table>

BF = biofeedback; DBP = diastolic blood pressure; HE = health education; NA = not applicable; NS = not specified; NT = no treatment; PMR = progressive muscle relaxation; RR = Relaxation Response; TM® = Transcendental Meditation®; WL = waiting list

DBP. Table 29 and Figure 26 show the results of the mixed treatment comparisons for DBP, ordered by the point estimate of difference from NT. Note that the study\textsuperscript{215} that reported on the CMBT intervention did not report DBP and was excluded from this analysis, giving us one less intervention than the SBP analysis. The interventions ranged from reducing DBP from an average of 1.0 to 17.1 mm Hg. Yoga plus BF and Qi Gong were slightly above the other interventions in terms of point estimates and likelihood of being the best intervention, although the differences between interventions were even less than for SBP.

Yoga alone and Yoga plus BF were the only interventions that reduced DBP significantly compared to NT. The only other pair-wise comparisons (not shown) that were statistically significant were Yoga compared to HE and Qi Gong compared to WL.
Other indirect comparisons. We were able to make indirect comparisons between TM® and Yoga via HE for body mass index (BMI), heart rate, and stress. Yoga was nonsignificantly superior to TM® in reducing BMI (MD: -0.69; 95% CI, -2.53 to 1.15) and significantly superior in reducing both heart rate (MD: -15.6 bpm; 95% CI, -21.7 to -9.6) and stress (MD: -0.95; 95% CI, -1.76 to -0.14).

We were also able to make an indirect comparison of TM® versus RR in reducing cigarette smoking via direct comparisons with HE. RR was found to significantly reduce smoking compared to TM® (MD: -2.8; 95% CI, 0.3 to 5.4).

Analysis of Publication Bias

Because of the very small number of trials available for each comparison, the statistical tests lacked the power to detect publication bias. Therefore the analysis of the effect of publication bias on the meta-analyses presented above was not conducted.

Cardiovascular Diseases

Description of the Included Studies

Twenty-one trials (15 RCTs and 6 NRCTs) that evaluated the effects of meditation practices in individuals with cardiovascular diseases were identified. They included seven trials on Yoga, three on Tai Chi, three on RR, two on MBSR, one on Qi Gong, one on TM®, and one on Zen Buddhist meditation.

The trials were published between 1988 and 2005 (median year of publication: 2002; IQR, 1998 to 2004). Fifteen of these trials have been published in journals, while six were identified from the gray literature. Five of 20 trials that provided data on sample size had more than 100 participants assigned to the study groups. The mean age of participants based on data from 17 trials was 63 ± 7 years (range: 52 to 77 years). Eight trials were conducted in samples with mean ages ranging from 41 to 60 years. Nine trials included study populations with ages above 61 years. Four trials did not report on the age of participants.

Across all the trials that reported the gender of participants (n = 17), 70 percent were males and 30 percent were females. The samples in three trials were entirely male while samples in two trials were entirely female. Four trials did not report the gender of participants. Five trials explicitly indicated the race or ethnicity of their samples. Around 80 percent of their samples consisted of Caucasian participants, except for one trial that involved Asian subjects only.

Twelve studies were conducted in patients with coronary artery disease (CAD), as described by the primary study authors. Clinical conditions included history of myocardial infarction (MI), chronic stable angina, valve diseases, and arrhythmias. CAD diagnoses were confirmed either by angiography, clinical history, or combining both clinical history and electrocardiogram. Three studies failed to provide a description of the diagnosis criteria for inclusion in the trials. Three studies were conducted in patients with coronary heart disease.

Appendices and evidence tables cited in this report are provided electronically at http://www.ahrq.gov/clinic/tp/medittp.htm
Three studies were conducted in patients with chronic heart failure (CHF). Patients from one of the studies on CHF met the functional capacity criteria for New York Heart Association (NYHA) classification I-IV. Patients in another study on CHF met the criteria for NYHA functional class II-III. The remaining study on CHF included patients that met both the Vasan and Lecy criteria for CHF, and the criteria for NYHA functional class I-II. Other cardiovascular conditions that were studied included acute myocardial infarction (AMI), peripheral vascular occlusive disease. Finally, one study was conducted in patients that underwent coronary artery bypass surgery.

All 21 trials employed a parallel study design. The length of the trials varied from 90 minutes to 3 years. The median duration of the trials was 3 months (IQR, 2 to 9; data from 20 trials). Six studies were short-term trials (less than 3 months in duration), nine studies were between 3 and 6 months, and five trials were longer than 6 months.

The 21 trials comprised 5 comparisons between meditation practices and no intervention, and one comparison between meditation and WL. There were 20 comparisons between meditation and active therapies other than no intervention or WL. As some trials had more than one comparison arm, the total number of comparisons exceeds the number of trials. The 20 active comparisons comprise exercise, HE, usual care, group therapy, pharmacological interventions, rest, listening to music, and cognitive restructuring training. Four studies were three-arm trials, while the remaining 17 were two-arm trials.

**Methodological Quality of Included Studies**

The methodological quality of the included trials as measured by the overall median Jadad score was 1/5 (IQR, 1 to 2). Two trials obtained 3 points and were considered of high quality (i.e., Jadad scores greater than or equal to 3 points). Seven trials obtained 2 points, 11 trials obtained 1 point, and one trial did not obtain any points. All the trials except six were randomized; however, the method of randomization varied. The majority of trials (n = 13) did not provide a description on how the randomization was performed. Two trials described appropriate methods of generating the sequence of randomization. None of the trials were described as double-blind. The adequacy of allocation concealment was unclear in all the trials except one. An intention-to-treat analysis was specified in two trials only.

<table>
<thead>
<tr>
<th>Study name</th>
<th>Meditation practice</th>
<th>Randomization</th>
<th>Double blinding</th>
<th>Description of withdrawals/dropouts</th>
<th>Jadad score</th>
<th>All comparisons</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ades PA, 2005</td>
<td>Yoga + BE</td>
<td>Stated</td>
<td>Method described</td>
<td>Stated</td>
<td>Method described</td>
<td>1</td>
</tr>
<tr>
<td>Chang BH, 2002</td>
<td>RR</td>
<td>Yes</td>
<td>Adequate</td>
<td>No</td>
<td>NA</td>
<td>Yes</td>
</tr>
<tr>
<td>Chenner KS, 1996</td>
<td>Tai Chi</td>
<td>Yes</td>
<td>Unclear</td>
<td>No</td>
<td>NA</td>
<td>Yes</td>
</tr>
<tr>
<td>Cuneo JA, 2009</td>
<td>RR + BE</td>
<td>Yes</td>
<td>Unclear</td>
<td>No</td>
<td>NA</td>
<td>Yes</td>
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<tr>
<td>Friedman NL, 2002</td>
<td>Zen Buddhist meditation</td>
<td>Yes</td>
<td>Unclear</td>
<td>No</td>
<td>NA</td>
<td>No</td>
</tr>
<tr>
<td>Hipp A, 1998</td>
<td>Yoga</td>
<td>No</td>
<td>NA</td>
<td>No</td>
<td>NA</td>
<td>No</td>
</tr>
<tr>
<td>Jatuporn S, 2003</td>
<td>Yoga + intensive lifestyle modification</td>
<td>Yes</td>
<td>Unclear</td>
<td>NA</td>
<td>Yes</td>
<td>2</td>
</tr>
<tr>
<td>Lan C, 1999</td>
<td>Tai Chi</td>
<td>No</td>
<td>NA</td>
<td>NA</td>
<td>Yes</td>
<td>1</td>
</tr>
<tr>
<td>Mahajan AS, 1999</td>
<td>Yoga + diet changes</td>
<td>Yes</td>
<td>Unclear</td>
<td>No</td>
<td>NA</td>
<td>No</td>
</tr>
<tr>
<td>Manchanda SC, 2000</td>
<td>Yoga + diet + Aerobic exercise</td>
<td>Yes</td>
<td>Unclear</td>
<td>No</td>
<td>NA</td>
<td>Yes</td>
</tr>
<tr>
<td>Mandle CL, 1988</td>
<td>RR</td>
<td>Yes</td>
<td>Adequate</td>
<td>No</td>
<td>NA</td>
<td>Yes</td>
</tr>
<tr>
<td>Pool JL, 1996</td>
<td>Mindfulness meditation (NS)</td>
<td>Yes</td>
<td>Unclear</td>
<td>No</td>
<td>NA</td>
<td>Yes</td>
</tr>
<tr>
<td>Quilliam-Wolfe RE, 2005</td>
<td>Mindfulness meditation (NS) + HE + health coaching</td>
<td>Yes</td>
<td>Unclear</td>
<td>No</td>
<td>NA</td>
<td>No</td>
</tr>
</tbody>
</table>

BE = breathing exercises; HE = health education; MBSR = mindfulness-based stress reduction; NA = not applicable; NS = not specified; PMR = progressive muscle relaxation; RR = Relaxation Response; TM® = Transcendental Meditation.
Table 30. Methodological quality of trials of meditation practices for other cardiovascular disorders (continued)

<table>
<thead>
<tr>
<th>Study name</th>
<th>Meditation practice</th>
<th>Randomization</th>
<th>Double blinding</th>
<th>Jadad score</th>
<th>Allocation concealment</th>
<th>Report of funding</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stenlund T., 2005</td>
<td>Qi Gong</td>
<td>Yes</td>
<td>Unclear</td>
<td>No</td>
<td>NA</td>
<td>Yes</td>
</tr>
<tr>
<td>Tacson MH, 2003</td>
<td>MSBR</td>
<td>Yes</td>
<td>Unclear</td>
<td>No</td>
<td>NA</td>
<td>Yes</td>
</tr>
<tr>
<td>Tsai SL, 2004</td>
<td>Mindfulness meditation + BE + PMR + imagery</td>
<td>No</td>
<td>NA</td>
<td>No</td>
<td>NA</td>
<td>Yes</td>
</tr>
<tr>
<td>Williams KA, 2001</td>
<td>MSBR</td>
<td>Yes</td>
<td>Unclear</td>
<td>No</td>
<td>NA</td>
<td>No</td>
</tr>
<tr>
<td>Yeh GY, 2004</td>
<td>Tai Chi</td>
<td>Yes</td>
<td>Unclear</td>
<td>No</td>
<td>NA</td>
<td>Yes</td>
</tr>
<tr>
<td>Yogendra J., 2004</td>
<td>Yoga + risk factors control + diet + stress management</td>
<td>No</td>
<td>NA</td>
<td>No</td>
<td>NA</td>
<td>Yes</td>
</tr>
<tr>
<td>Young JW, 2001</td>
<td>Yoga</td>
<td>No</td>
<td>NA</td>
<td>No</td>
<td>NA</td>
<td>Yes</td>
</tr>
<tr>
<td>Zamora JV, 1999</td>
<td>TM</td>
<td>No</td>
<td>NA</td>
<td>No</td>
<td>NA</td>
<td>Yes</td>
</tr>
</tbody>
</table>
Results of Direct Comparisons

Table 31 summarizes the type of meditation practice, comparison group, and outcomes that were available for direct meta-analyses on the efficacy and effectiveness of meditation practices to treat cardiovascular diseases. No single diagnostic criterion was chosen for categorizing study populations; rather, we included all studies conducted in patients with cardiovascular disorders, as defined by the authors of the primary studies. Direct meta-analyses were conducted when two or more studies assessed the same type of meditation practice, used similar comparison groups, and had usable data for common outcomes of interest. Briefly, the majority of the comparisons from 14 studies (16 out of 18 comparisons) were not suitable for direct meta-analyses. Common clinical outcomes were absent for the following comparisons: MBSR versus NT, yoga versus usual care, yoga versus medication, and yoga versus exercise. Outcomes of interest for which data could be combined into a direct meta-analysis were

1. heart rate; Tai Chi versus exercise;
2. total cholesterol (TC); Yoga versus medication;
3. low-density lipoprotein cholesterol (LDL-C); Yoga versus medication; and
4. body weight; Yoga versus exercise

Results from individual studies that were not included in a direct meta-analysis of clinical trials of meditation practices in cardiovascular are summarized in Table H2 in Appendix H.  

Table 31. Summary of outcomes by meditation practice and by comparison group included in meta-analyses of the efficacy and effectiveness of meditation practices in cardiovascular diseases

<table>
<thead>
<tr>
<th>Intervention</th>
<th>Comparator</th>
<th>Outcome</th>
<th>No. studies</th>
<th>Meta-analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td>MBSR</td>
<td>NT</td>
<td>Anxiety, coping styles, emotional control, health locus of control, cortisol, breathing frequency, total catecholamines, BP changes (DBP, SBP), HDL-cholesterol, perceived physical well-being</td>
<td>2</td>
<td>No</td>
</tr>
<tr>
<td>Mindfulness (NS)</td>
<td>CRT</td>
<td>BP changes (DBP, SBP), HR, anxiety, depression, psychological distress, irritability, hostility</td>
<td>1</td>
<td>No</td>
</tr>
<tr>
<td>Qi Gong</td>
<td>HE</td>
<td>Level of physical activity, balance, coordination, fear of falling</td>
<td>1</td>
<td>No</td>
</tr>
<tr>
<td>RR</td>
<td>HE</td>
<td>HRQL, VO2 max, Peak VO2, peak HR, HR, BP changes (DBP, SBP), PR</td>
<td>2</td>
<td>Yes</td>
</tr>
<tr>
<td>Tai Chi</td>
<td>HE</td>
<td>BP changes (DBP, SBP), secondary: HR, Peak VO2, peak HR, HR</td>
<td>1</td>
<td>No</td>
</tr>
<tr>
<td>TM</td>
<td>WL</td>
<td>Exercise tolerance, maximal workload, ST depression onset, rate-pressure product</td>
<td>1</td>
<td>No</td>
</tr>
<tr>
<td>Yoga</td>
<td>Exercise</td>
<td>TEE, body strength, body weight, BMI, fat-free mass, left ventricular function, VO2 max, depression, Body weight, lipid profile (TC, HDL-C, LDL-C)</td>
<td>3</td>
<td>Yes</td>
</tr>
</tbody>
</table>

BNI = B-type natriuretic peptide; BMI = body mass index, BP = blood pressure; CRT = cognitive restructuring training; DBP = diastolic blood pressure; HDL-C = high density lipoprotein cholesterol; HE = health education; HRQL = health-related quality of life; HRV = heart rate variability; LDL-C = low density lipoprotein cholesterol; LLMM = lipid lowering medication; LV EF = left ventricular ejection fraction; LVDD = left ventricular end diastolic volume index; MBSR = mindfulness-based stress reduction; NA = not applicable; NE = norepinephrine; NT = no treatment; P-MDA = plasma malondialdehyde; PMR = progressive muscle relaxation; SBP = systolic blood pressure; TC = total cholesterol; TEE = total energy expenditure; TG = triglycerides; TM® = Transcendental Meditation; UC = usual care; VO2 max = maximum oxygen consumption; WR = work rate

Appendices and evidence tables cited in this report are provided electronically at http://www.ahrq.gov/clinic/tp/medittp.htm
Table 31. Summary of outcomes by meditation practice and by comparison group included in meta-analyses of the efficacy and effectiveness of meditation practices in cardiovascular diseases (continued)

<table>
<thead>
<tr>
<th>Intervention</th>
<th>Comparator</th>
<th>Outcome</th>
<th>No. studies</th>
<th>Meta-analysis</th>
<th>Outcomes for meta-analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Yoga (continued)</strong></td>
<td>NT</td>
<td>TC, HDL-C, LDL-C, VLDL-C, TG[^247] Anxiety, somatization, tension, depression, global status, mood disturbances[^257]</td>
<td>2</td>
<td>No</td>
<td>NA</td>
</tr>
<tr>
<td><strong>LLM</strong></td>
<td></td>
<td>Total antioxidant status, vitamin C, vitamin E, TC, HDL-C, LDL-C, P-MDA, erythrocyte GSH, BMI[^238] TC, LDL-C, clinical improvement, caloric intake, regression of disease, anxiety, depression, myocardial perfusion[^220]</td>
<td>2</td>
<td>Yes</td>
<td>TC[^238,250], LDL-C[^238,250]</td>
</tr>
<tr>
<td><strong>Zen Buddhist meditation</strong></td>
<td>HE</td>
<td>HRV[^237]</td>
<td>1</td>
<td>No</td>
<td>NA</td>
</tr>
</tbody>
</table>

**Tai Chi versus exercise**

**Heart rate.** Two trials[^35,248] totaling 99 participants (Tai Chi = 47, exercise = 52) provided data on the effects of Tai Chi versus exercise on heart rate (HR). After analyzing the substantial heterogeneity of the studies (I² = 70 percent), it was considered inappropriate to combine the study results into a single effect estimate. There were substantial differences between the two studies regarding the characteristics of participants in the studies, the methods to evaluate HR, study design, and the duration of the followup period. The study by Chanter[^235] was an 8-week RCT conducted in patients who had suffered acute MI within 3 weeks prior to enrolling in the trial. Measures of HR were taken at rest. Individual study results showed a significant benefit (reduction) in resting heart rate that favored Tai Chi over exercise. The study of Lann[^236] was a 1-year NRCT conducted in patients that underwent coronary artery bypass surgery. Measures of HR were taken during exercise. Individual study results showed a nonsignificant improvement (increase) in HR during exercise as compared to Tai Chi.

**Yoga versus lipid lowering medication (LLM)**

**Total cholesterol (TC).** Two trials[^238,250] totaling 157 participants (Yoga = 93, LLM = 64) provided data on the effects of Yoga versus LLM on TC. After analyzing the substantial heterogeneity of the studies (I² = 97.4 percent), it was considered inappropriate to combine the study results into a single effect estimate. There were substantial differences between the two studies regarding the characteristics of participants in the studies, study design, and the duration of the followup period. The study of Jatuporn[^238] was a 4-month RCT conducted in patients with coronary artery disease that compared the practice of Yoga and the administration of LLM. Individual study results showed a significant benefit (reduction) over the short-term in TC that favored LLM over Yoga. The study of Yogendra[^250] was a 1-year NRCT conducted in patients with coronary artery disease that compared Yoga versus LLM. Individual study results showed a nonsignificant improvement (reduction) over the long-term in TC that favored Yoga over LLM.

**Low-density lipoprotein cholesterol (LDL-C).** Two trials[^238,250] totaling 157 participants (Yoga = 93, LLM = 64) provided data on the effects of Yoga versus LLM on TC. As mentioned before, there was considerable clinical heterogeneity between the studies (I² = 97.3 percent) that precluded the pooling of the results. The short-term RCT of Jatuporn[^238] reported a significant reduction in LDL-C with LLM. The long-term NRCT of Yogendra[^250] showed a nonsignificant decrease in LDL-C that favored Yoga over LLM.

**Yoga versus exercise**

**Body weight.** Two trials[^233,239] totaling 95 participants (Yoga = 51, exercise = 44) provided data on the effects of Yoga versus exercise on body weight changes (Figure 27). The combined estimate of changes in body weight (kg) indicated a nonsignificant improvement (reduction) in favor of Yoga (WMD = -2.14; 95% CI, -7.30 to 3.02). The results were statistically homogeneous (p = 0.61; I² = 0 percent).
Indirect Comparisons

We were able to indirectly compare changes in measures of anxiety in Yoga versus MBSR (i.e., each was compared to NT in separate studies). There was no significant difference between the two interventions in terms of measures of anxiety (SMD = 0.03; 95% CI, -1.16 to 1.22).

Analysis of Publication Bias

Because of the very small number of trials available for each comparison, the statistical tests lacked the power to detect publication bias. Therefore the analysis of the effect of publication bias on the meta-analyses presented above was not conducted.

Substance Abuse

Description of the Included Studies

Seventeen trials (13 RCTs and 4 NRCTs) that evaluated the effects of meditation practices in individuals with substance abuse disorders were identified. They included five trials on TM, three on Yoga, two on MBSR, two on RR, one on CMS, one on a medical meditation involving the use of mantra and breathing techniques, one on Qi Gong, one on mindfulness meditation not further specified, and one on a meditation practice not further described.

The trials were published between 1956 and 2004 (median year of publication: 1986; IQR, 1979 to 1999). All the trials were published in journals, except for two, which were identified from the gray literature. The majority of trials (n = 13) were conducted in the United States; two studies were conducted in India, one study was conducted in China, and one in Sweden. Characteristics of the trials are summarized in Table H3 in Appendix H.

A total of 825 individuals were assigned to meditation practices or control groups. The median sample size based on data from 16 trials was 45 participants per study (IQR, 30 to 77).

Table H3 in Appendix H

<table>
<thead>
<tr>
<th>Study</th>
<th>Intervention</th>
<th>Control</th>
<th>Jadad Score</th>
<th>Sample Size (SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1956</td>
<td>Yoga</td>
<td>NT</td>
<td>2</td>
<td>100 (SD)</td>
</tr>
<tr>
<td>2000</td>
<td>MBSR</td>
<td>NT</td>
<td>3</td>
<td>200 (SD)</td>
</tr>
<tr>
<td>2002</td>
<td>RR</td>
<td>NT</td>
<td>2</td>
<td>120 (SD)</td>
</tr>
<tr>
<td>2004</td>
<td>CMS</td>
<td>NT</td>
<td>1</td>
<td>50 (SD)</td>
</tr>
<tr>
<td>2006</td>
<td>Meditation</td>
<td>NT</td>
<td>1</td>
<td>30 (SD)</td>
</tr>
</tbody>
</table>

Figure 27. Meta-analysis of the effect of Yoga versus exercise on body weight

<table>
<thead>
<tr>
<th>Study</th>
<th>Intervention</th>
<th>Control</th>
<th>SMD</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>1956</td>
<td>Yoga</td>
<td>NT</td>
<td>0.23</td>
<td>-1.16 to 1.22</td>
</tr>
<tr>
<td>2000</td>
<td>MBSR</td>
<td>NT</td>
<td>0.63</td>
<td>-1.16 to 1.22</td>
</tr>
<tr>
<td>2002</td>
<td>RR</td>
<td>NT</td>
<td>0.70</td>
<td>-1.16 to 1.22</td>
</tr>
</tbody>
</table>

The race of ethnicity of samples was reported in five trials. African American participants constituted more than 60 percent of the study population in three trials, whereas Caucasian participants constituted more than 80 percent of the study population in two trials.

All the trials except five attempted to use formal criteria or validated instruments to select participants in their studies. Two studies used the Addiction Severity Index, one study used the DSM-III criteria for alcohol dependence, and another used the Drinking Practices Questionnaire. The remaining 13 trials selected the study participants based on their reported history of substance abuse.

Methodological Quality of Included Studies

As a measure of methodological quality for included trials, the overall median Jadad score was 1 (IQR, 1 to 2). Three trials obtained 3 points and were considered high quality (i.e., Jadad scores of 3 points or more). Three trials obtained 2 points, seven trials obtained 1 point, and four trials did not obtain any points. All the trials except four were described as randomized; however, the description of randomization varied. The majority

References

1. Appendixes and evidence tables cited in this report are provided electronically at http://www.ahrq.gov/clinic/tp/medittp.htm
of trials (8 out of 13) did not provide a description on how the randomization was performed. Four trials described an appropriate method of generating the sequence of randomization, whereas one trial reported an inadequate method of sequence generation. None of the trials were described as double-blind. The adequacy of allocation concealment was unclear in all included trials.

None of the studies reported the use of intention-to-treat analysis. Eight trials reported dropout information for the total study sample (mean dropout rate: 34 percent; range: 0 to 87 percent). Four trials had a dropout rate of more than 20 percent. Withdrawals and dropouts per treatment group were clearly described in six trials. Among the six studies that reported dropouts per treatment group, 24 percent of participants (range: 0 to 48 percent) dropped out from the meditation groups. The mean dropout rate for the control groups was similar (21 percent; range: 0 to 44 percent; eight control groups).

Seven trials reported their source of funding. Five trials received government funding and two received internal funding. A comparative summary of the methodological quality of the included trials is provided in Table 32.
Results of Quantitative Analysis

Table 33 summarizes the type of meditation practice, comparison group, and outcomes that were available for meta-analysis. No single diagnostic criterion was chosen for categorizing study populations. Rather, we included all studies conducted in patients with substance abuse, as defined by the authors of the primary studies. Studies were too dissimilar in type of meditation practice, comparison group, and data for common outcomes of interest to allow direct or indirect comparisons of the effectiveness of meditation practices for substance abuse. No more than one study was available for statistical pooling of any of the 23 comparisons.

Results from individual clinical trials of meditation practices in substance abuse are summarized in Table H3 in Appendix H.

Analysis of Publication Bias

The lack of trials available for a meta-analysis on the effects of meditation practices in substance abuse precluded an assessment of publication bias.

---

Table 33. Summary of outcomes by meditation practice and by comparison group included in meta-analyses of efficacy and effectiveness

<table>
<thead>
<tr>
<th>Intervention</th>
<th>Comparator</th>
<th>Outcome</th>
<th>No. studies</th>
<th>Meta-analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td>TM®</td>
<td>NT</td>
<td>Anxiety, behavioral changes, inmate infractions&lt;sup&gt;559&lt;/sup&gt;</td>
<td>1</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td>WL</td>
<td>Anxiety, behavioral changes, inmate infractions&lt;sup&gt;559&lt;/sup&gt;</td>
<td>2</td>
<td>No</td>
</tr>
<tr>
<td>Group therapy</td>
<td>Frequency of drug use, leisure activity, self-confidence, anxiety, psychomotor retardation&lt;sup&gt;61&lt;/sup&gt;</td>
<td>1</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>Control (NS)</td>
<td>Self-concept, emotional stability, maturity, hostility, overconcern with physical symptoms&lt;sup&gt;61&lt;/sup&gt;</td>
<td>1</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>BF</td>
<td>Drinking days, complete abstinence, mood states&lt;sup&gt;564&lt;/sup&gt;</td>
<td>1</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>Neurotherapy</td>
<td>Drinking days, complete abstinence, mood states&lt;sup&gt;564&lt;/sup&gt;</td>
<td>1</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>Counseling</td>
<td>Drinking days, complete abstinence, mood states&lt;sup&gt;564&lt;/sup&gt;</td>
<td>1</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>CSM</td>
<td>Exercise</td>
<td>Alcohol consumption, VO&lt;sub&gt;2&lt;/sub&gt; max&lt;sup&gt;664&lt;/sup&gt;</td>
<td>1</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td>NT</td>
<td>Alcohol consumption, VO&lt;sub&gt;2&lt;/sub&gt; max&lt;sup&gt;664&lt;/sup&gt;</td>
<td>1</td>
<td>No</td>
</tr>
<tr>
<td>MBSR</td>
<td>NT</td>
<td>Coping styles, psychopathology symptoms&lt;sup&gt;72&lt;/sup&gt;</td>
<td>1</td>
<td>No</td>
</tr>
<tr>
<td>PMR</td>
<td>Egocentrism, anger, impulsivity, cortisol levels&lt;sup&gt;62&lt;/sup&gt;</td>
<td>1</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>Medical meditation (mantra + BE)</td>
<td>Rest</td>
<td>BP changes (DBP, SBP, RR, GSR, spirituality&lt;sup&gt;70&lt;/sup&gt;</td>
<td>1</td>
<td>No</td>
</tr>
<tr>
<td>Qi Gong</td>
<td>Methadone</td>
<td>Withdrawal symptoms, anxiety, urine morphine&lt;sup&gt;568&lt;/sup&gt;</td>
<td>1</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td>NT</td>
<td>Withdrawal symptoms, anxiety, urine morphine&lt;sup&gt;568&lt;/sup&gt;</td>
<td>1</td>
<td>No</td>
</tr>
<tr>
<td>RR</td>
<td>PMR</td>
<td>Anxiety, BP changes (DBP, SBP), HR, GSR, tension&lt;sup&gt;565&lt;/sup&gt;</td>
<td>1</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td>Rest</td>
<td>Anxiety, BP changes (DBP, SBP), HR, GSR, tension&lt;sup&gt;565&lt;/sup&gt;</td>
<td>1</td>
<td>No</td>
</tr>
<tr>
<td>Control (NS)</td>
<td>Anxiety, anger, depression, alcohol consumption, locus of control, irrational beliefs&lt;sup&gt;69&lt;/sup&gt;</td>
<td>1</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>Yoga</td>
<td>Exercise</td>
<td>Recovery rate&lt;sup&gt;664&lt;/sup&gt;</td>
<td>1</td>
<td>No</td>
</tr>
<tr>
<td>Group therapy</td>
<td>Addiction severity, psychological symptoms&lt;sup&gt;69&lt;/sup&gt;</td>
<td>1</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>Psychotherapy</td>
<td>Clinical status, psychological status, WBC count, ESR, blood glucose, TC, cortisol, lactic acid, PBI, S-HIAA, Hb, catecholamines, S-Ca, S-Mg, VMA, HVA, 17-KS, PT, MHPG, cholinesterase&lt;sup&gt;72&lt;/sup&gt;</td>
<td>1</td>
<td>No</td>
<td></td>
</tr>
</tbody>
</table>

5-HIAA = 5-hydroxyindole acetic acid; 17-KS = 17-ketosteroids; BE = breathing exercises; BF = biofeedback; BP = blood pressure; CSM = clinically standardized meditation; DBP = diastolic blood pressure; ESR = erythrocyte sedimentation rate; GSR = galvanic skin response; Hb = hemoglobin; HR = heart rate; HVA = low frequency pulsed magnetic field; MHPG = 3-methoxy-4-hydroxyphenylglycol; MBSR = mindfulness-based stress reduction; NA = not applicable; PBI = protein bound iodine; PMR = progressive muscle relaxation; PR = pulse rate; RR = Relaxation Response; SBP = systolic blood pressure; S-Ca = serum calcium; S-Mg = serum magnesium; TC = total cholesterol; TM® = Transcendental Meditation®; VMA = vanillylmandelic acid; WL = waiting list.

<sup>559</sup>Appendices and evidence tables cited in this report are provided electronically at http://www.ahrq.gov/clinic/tp/medittp.htm
Table 33. Summary of outcomes by meditation practice and by comparison group included in meta-analyses of efficacy and effectiveness (continued)

<table>
<thead>
<tr>
<th>Intervention</th>
<th>Comparator</th>
<th>Outcome</th>
<th>No. studies</th>
<th>Meta-analysis</th>
<th>Outcomes for meta-analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yoga (continued)</td>
<td>Stereotaxic surgery</td>
<td>Clinical status, psychological status, WBC count, ESR, blood glucose, TC, cortisol, lactic acid, PBI, 5-HIAA, Hb, catecholamines, S-Ca, S-Mg, VMA, HVA, 17-KS, PT, MHPG, cholinesesterase</td>
<td>1</td>
<td>No</td>
<td>NA</td>
</tr>
<tr>
<td>BF</td>
<td>Clinical status, psychological status, WBC count, ESR, blood glucose, TC, cortisol, lactic acid, PBI, 5-HIAA, Hb, catecholamines, S-Ca, S-Mg, VMA, HVA, 17-KS, PT, MHPG, cholinesesterase</td>
<td>1</td>
<td>No</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>LFPMF</td>
<td>Clinical status, psychological status, WBC count, ESR, blood glucose, TC, cortisol, lactic acid, PBI, 5-HIAA, Hb, catecholamines, S-Ca, S-Mg, VMA, HVA, 17-KS, PT, MHPG, cholinesesterase</td>
<td>1</td>
<td>No</td>
<td>NA</td>
<td></td>
</tr>
</tbody>
</table>

Summary of the Results

Table 34 summarizes the results of the meta-analyses of the treatment effects (statistical and clinical significance) of meditation practices in hypertension and cardiovascular diseases.

Hypertension

Twenty-seven trials (24 RCTs, and 3 NRCTs) have evaluated the effects of meditation practices in hypertension. The majority of trials on hypertension have been conducted in Yoga (eight studies). The trials have been predominantly conducted in the United States in participants with a mean age of 51 years (range: 41 to 60 years). All studies were conducted in patients with a diagnosis of essential hypertension and used a parallel-group design. The majority of the trials were short- and medium-term. Comparison groups included HE, NT, WL, BF, PMR, and rest. The methodological quality of trials was low with only two trials considered high quality.

Data from 16 studies were available for direct meta-analyses. Outcomes suitable for meta-analysis included blood pressure, body weight, heart rate, total cholesterol, HDL-C, LDL-C, dietary intake, physical activity, and psychological measures such as stress, anger, and self-efficacy.

Direct meta-analyses showed that compared to HE, TM did not produce significantly greater benefits on blood pressure (SBP and DBP), heart rate, TC, HDL-C, LDL-C, body weight, dietary intake, physical activity, measures of stress, anger, and self-efficacy. A subgroup analysis by study duration showed short-term significant improvement in SBP with TM, but not over the long-term. When compared to PMR, TM produced significantly greater benefits in SBP and DBP. When RR was compared to BF, RR did not produce significantly greater benefits on blood pressure (SBP and DBP). Qi Gong was significantly more effective than a WL in reducing SBP. Compared to NT, Yoga produced significant reductions in DBP, but not in SBP. As the results among trials were heterogeneous, a subgroup analysis showed that the effect of Yoga on SBP was significantly greater when compared to a control group without an adjuvant treatment. The same subgroup analysis was conducted for the outcome of DBP and the magnitude of the effect changed from significant to nonsignificant when Yoga was compared to a control group with an adjuvant treatment. When compared to HE, Yoga did not produce significantly greater benefits on blood pressure checks, Zen Buddhist meditation did not produce significantly greater reduction in SBP, but did produce a significant reduction in DBP.

When Tai Chi, Yoga plus BF, and Yoga were indirectly compared with NT, they significantly reduced SBP. These three interventions were also better than HE to reduce SBP. For the outcome of DBP, Yoga plus BF and Yoga alone were the only interventions that significantly reduced DBP when compared to NT. Yoga was also better than HE. Yoga was nonsignificantly superior to TM for the outcomes of body weight, heart rate and stress. Compared to TM, RR significantly helped to reduce smoking.
Cardiovascular Diseases

Twenty-one trials (15 RCTs and 6 NRCTs) have evaluated the effects of meditation practices in cardiovascular diseases. The majority of trials have been conducted in Yoga (seven studies). The trials have been predominantly conducted in the United States in participants with a mean age of 63 years (range: 52 to 77 years). Clinical conditions of study populations included MI, coronary artery disease, angina, arrhythmias, peripheral occlusive disease, and congestive heart failure. All studies used a parallel-group design. The majority of the trials were medium-term. Comparison groups included exercise, no intervention group, pharmacological interventions, HE, usual care not specified, group therapy, WL, listening to music, cognitive restructuring training. The methodological quality of trials was low with only two trials considered high quality.

Data from six studies were available for direct meta-analyses. Outcomes suitable for meta-analysis included TC, LDL-C, and body weight; however, only the results from the two trials comparing the use of Yoga with exercise for the reduction of body weight could be combined. This direct meta-analysis showed that Yoga was no better than exercise at producing changes in body weight. Indirect comparisons showed that there were no significant differences in measures of anxiety between Yoga and MBSR.

Table 34. Summary of the meta-analyses of the treatment effects of meditation practices in hypertension and cardiovascular diseases (statistical and clinical significance) (continued)

<table>
<thead>
<tr>
<th>Comparison</th>
<th>Outcome</th>
<th>Statistical significance</th>
<th>Clinical significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>TM® versus HE</td>
<td>SBP</td>
<td>WMD = 0.70 mm Hg (95% CI, -2.29 to 3.68)</td>
<td>No</td>
</tr>
<tr>
<td>TM® versus PMR</td>
<td>SBP</td>
<td>WMD = -3.11 mm Hg (95% CI, -5.00 to -1.22)</td>
<td>TM® better than HE</td>
</tr>
<tr>
<td>RR versus BF</td>
<td>SBP</td>
<td>WMD = 2.39 mm Hg (95% CI, -5.13 to 9.91)</td>
<td>Borderline</td>
</tr>
<tr>
<td>Qi Gong versus WL</td>
<td>SBP</td>
<td>WMD = -17.78 mm Hg (95% CI, -22.03 to -13.54)</td>
<td>Questionable</td>
</tr>
<tr>
<td>Yoga versus NT</td>
<td>SBP</td>
<td>WMD = -7.15 mm Hg (95% CI, -17.70 to 3.39)</td>
<td>No</td>
</tr>
<tr>
<td>Yoga versus HE</td>
<td>DBP</td>
<td>WMD = -12.06 mm Hg (95% CI, -21.62 to -2.49)</td>
<td>Questionable</td>
</tr>
<tr>
<td>Yoga versus NT</td>
<td>DBP</td>
<td>WMD = -6.82 mm Hg (95% CI, -15.51 to 1.87)</td>
<td>No</td>
</tr>
<tr>
<td>Yoga versus HE</td>
<td>Stress</td>
<td>SMD = -1.10 (95% CI, -1.81 to -0.58)</td>
<td>No</td>
</tr>
<tr>
<td>Zen Buddhist meditation versus blood pressure checks</td>
<td>SBP</td>
<td>WMD = -3.67 mm Hg (95% CI, -9.04 to 1.70)</td>
<td>No</td>
</tr>
<tr>
<td>Zen Buddhist meditation no better than blood pressure checks</td>
<td>DBP</td>
<td>WMD = -6.08 mm Hg (95% CI, -11.68 to -0.48)</td>
<td>Yes</td>
</tr>
<tr>
<td>Cardiovascular diseases</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Comparison</td>
<td>Outcome</td>
<td>Statistical significance</td>
<td>Clinical significance</td>
</tr>
<tr>
<td>Yoga versus NT</td>
<td>Body weight</td>
<td>WMD = -2.14 (95% CI, -7.30 to 3.02)</td>
<td>No</td>
</tr>
<tr>
<td>MBSR versus Yoga (indirect comparison)</td>
<td>Anxiety</td>
<td>No; SMD: 0.03; 95% CI, -1.16 to 1.22</td>
<td>MBSR no better than yoga</td>
</tr>
</tbody>
</table>

Table 35. Summary of the meta-analyses of the treatment effects of meditation practices in hypertension and cardiovascular diseases (statistical and clinical significance) (continued)

<table>
<thead>
<tr>
<th>Comparison</th>
<th>Outcome</th>
<th>Statistical significance</th>
<th>Clinical significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>TM® versus HE</td>
<td>Physical activity</td>
<td>SMD = -0.20 (95% CI, -0.14 to 0.53)</td>
<td>No</td>
</tr>
<tr>
<td>TM® versus PMR</td>
<td>SBP</td>
<td>WMD = -0.82 mm Hg (95% CI, -1.61 to 0.21)</td>
<td>Questionable</td>
</tr>
<tr>
<td>RR versus BF</td>
<td>SBP</td>
<td>WMD = 2.39 mm Hg (95% CI, -5.13 to 9.91)</td>
<td>Borderline</td>
</tr>
<tr>
<td>Qi Gong versus WL</td>
<td>SBP</td>
<td>WMD = -11.77 mm Hg (95% CI, -22.03 to -13.54)</td>
<td>Questionable</td>
</tr>
<tr>
<td>Yoga versus NT</td>
<td>SBP</td>
<td>WMD = -7.15 mm Hg (95% CI, -17.70 to 3.39)</td>
<td>No</td>
</tr>
<tr>
<td>Yoga versus HE</td>
<td>DBP</td>
<td>WMD = -6.08 mm Hg (95% CI, -11.68 to -0.48)</td>
<td>Yes</td>
</tr>
</tbody>
</table>
| Substance Abuse

Seventeen trials (13 RCTs and 4 NRCTs) have evaluated the effects of meditation practices in substance abuse. The majority of the trials have been conducted on TM® (five studies). The trials have been predominantly conducted in the United States in participants with a mean age of 33 years (range: 21 to 45 years). All studies used a parallel-group design. The majority of the trials were short- and medium-term. Control groups included BF, exercise, group therapy, PMR, rest, counseling, psychotherapy, relaxation, neurotherapy, stereotaxic surgery, low frequency pulsed magnetic field therapy, and pharmacotherapy. The methodological quality of trials was low with only three trials considered high quality. Study results were not combined because the trials were
too dissimilar in meditation practice, comparison group, and data for common outcomes of interest. In addition, the results of the three highest quality trials258,265,266 (Jadad score = 3/5) examining, respectively, Mindfulness meditation, RR, and Yoga are inconclusive with respect to the effectiveness of meditation practices.

The study comparing Mindfulness meditation with usual care (NS)258 for alcohol and cocaine abuse found little indication that Mindfulness meditation enhanced treatment outcomes for substance abuse patients. The study comparing RR with PMR and rest groups265 for alcohol abuse found generalized effects for BP, but not for the other outcome measures (anxiety, HR, and GSR). The RR and PMR groups did not exhibit increased BP as observed in control subjects. RR and PMR produced significant changes in tension. The study comparing Yoga with exercise266 for alcohol abuse found a significantly greater recovery rate for the Yoga group.

Table 32 provides a summary of the meta-analyses of the treatment effects of meditation practices in hypertension and cardiovascular diseases in terms of the statistical and clinical significance of the findings. Overall, we found that TM had no advantages over HE to improve measures of SBP, DBP, body weight, heart rate, stress, anger, self-efficacy, cholesterol, dietary intake, and level of physical activity in hypertensive patients. Compared to PMR, TM produced clinically and statistically significant benefits to reduce SBP. The results for DBP were of borderline clinical significance. Caution should be exerted when interpreting these results. Meta-analyses were derived from only two open label trials; therefore, performance bias and detection bias may have contributed to an overestimate of the treatment effect. RR was not shown to be superior to BF at reducing blood pressure in hypertension.

Qi Gong was superior to WL to reduce blood pressure in subjects with essential hypertension; however, the clinical significance of this finding is questionable, as the effect estimate is quite imprecise (i.e., wide confidence interval), the comparison is based on a few low-quality studies, and the appropriateness of a WL comparison group is questionable. Yoga did not produce clinically or statistically significant effects in blood pressure when compared to NT. Compared to HE, Yoga produced statistically significant changes in measures of stress. The clinical value of this change, however, is questionable (approximately a one-point reduction in measures of stress). Results were obtained from only two open label trials and this could have affected the subjective determination of outcomes. Finally, Zen Buddhist meditation was not better than blood pressure checks to reduce SBP. Although the result for DBP was clinically and statistically significant, caution should be exerted as there was some heterogeneity among the studies that contributed data for this outcome.

Yoga was no better than physical exercises to reduce body weight in patients with cardiovascular disorders. When the relative effectiveness of a variety of meditation practices was assessed using indirect meta-analysis, we found that there were no significant differences between MBSR and Yoga to control anxiety symptoms in cardiovascular patients.

**Topic IV. Evidence on the Role of Effect Modifiers for the Practice of Meditation**

We aimed to identify the role of effect modifiers (e.g., patient and meditation characteristics) as moderators of the treatment effect measured in clinical trials of meditation practices in hypertension, other cardiovascular diseases, and substance abuse. The small number of trials per comparison and the limited data from primary studies precluded meta-regression analyses using RCT-level covariates to assess the role of specific effect modifiers for the practice of meditation. We were also unable to conduct subgroup analyses to explore differences among subgroups of patients as the trials failed to report results by the effect modifiers being considered (i.e., characteristics of the practice or patients). Therefore, we will describe the findings from the individual studies that reported data on the role of effect modifiers.

### Hypertension

Of 27 trials that examined the effect of meditation practices for hypertension, only seven trials203,205,206,209,220,222 conducted a subgroup analysis or a multiple regression analysis to explore the role of a variety of effect modifiers. A summary of the analysis is provided in Table 35. Four studies205,206,220,222 conducted an analysis of the role of effect modifiers on health outcomes resulting from the practice of TM. They used multiple regression models205,220,221 or subgroup analyses205,220 by a variety of effect modifiers such as age,205,206,209 gender,205 antihypertensive medication use,205,206,220 income,205 education,205 and smoking.205 One study209 conducted a subgroup analysis by age, gender, severity of hypertension, duration of disease, and medication use for the effects of RR. Another study205 conducted a subgroup analysis by severity of hypertension and duration of the disease on the effects of mantra meditation and relaxation techniques. Finally, one study on a technique modeled after TM222 conducted subgroup analyses of medication use222 and marital status.222 All the trials were likely to have conducted post hoc analyses as the analyses were not reported as part of the plan of analysis in the Methods sections of the studies. It is unknown whether authors of the trials decided to selectively report on the variables that showed a statistically significant positive effect.

None of the trials that provided data on effect modifiers of meditation practices for hypertension analyzed the effect of the dose of practice necessary to achieve health outcomes. Neither the role of the direction of attention during meditation nor the rhythmic aspects of the practice were explored in the studies. The trials did not provide data on how ethnicity predicts health outcomes resulting from the practice of meditation. The role of individual variables to predict success in the process of meditation (expressed as adherence or acceptance) was not explored in the trials of meditation practice and hypertension.
Table 35. Summary of the analyses of effect modifiers for achieving benefits from meditation practice for hypertension

<table>
<thead>
<tr>
<th>Study, year, country</th>
<th>Study design, duration, follow-up, ITT</th>
<th>Intervention</th>
<th>Comparator groups</th>
<th>Type of analysis</th>
<th>Authors’ conclusions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Avazyan TA, 1989(^{225})</td>
<td>RCT parallel 2 arms, Duration: 12 mo., ITT: Yes</td>
<td>TM(^{R}), meditation + relaxation techniques</td>
<td>NT</td>
<td>Subgroup analysis by severity and duration of disease (post hoc)</td>
<td>The responders had higher BP and shorter hypertension duration than did the nonresponders.</td>
</tr>
<tr>
<td>Russia</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Calderon R Jr, 2000(^{237})</td>
<td>RCT parallel 2 arms, Duration: 6 mo., ITT: NR</td>
<td>TM(^{R})</td>
<td>HE</td>
<td>Multiple regression analysis controlling by age, income, education. Subgroup analysis by education (post hoc)</td>
<td>Subjects with high school education differed significantly in magnitude of reduction in TC and LDL-C compared to those with college education. Education SES may interact with lipid response to the practice of TM(^{R}).</td>
</tr>
<tr>
<td>United States</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Castillo-Richmond A, 2000(^{231})</td>
<td>RCT parallel 2 arms, Duration: 9 mo.</td>
<td>TM(^{R})</td>
<td>HE</td>
<td>Multiple regression analysis controlling by age, AHM use, and smoking (post hoc)</td>
<td>No significant differences in SBP and DBP were observed after controlling for age, AHM use, and smoking.</td>
</tr>
<tr>
<td>United States</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hager JL, 1978(^{238})</td>
<td>RCT parallel 2 arms, Duration: 4 wk., ITT: No</td>
<td>RR</td>
<td>BF (BP)</td>
<td>Subgroup analysis by age, sex, duration of disease, and medication use (post hoc)</td>
<td>There were no significant effects of age, sex, severity and duration of disease, and medication use on BP mean changes.</td>
</tr>
<tr>
<td>United States</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Schneider RH, 1989(^{234,235})</td>
<td>RCT parallel 3 arms, Duration: 3 mo., ITT: Yes</td>
<td>TM(^{R})</td>
<td>PMR</td>
<td>Multiple regression analysis controlling by age, sex, risk-level</td>
<td>Both SBP and DBP significantly improved for both sexes and for high- and low-risk levels.</td>
</tr>
<tr>
<td>United States</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 35. Summary of the analysis of effect modifiers for achieving benefits from meditation practice for hypertension (continued)

<table>
<thead>
<tr>
<th>Study, year, country</th>
<th>Study design, duration, follow-up, ITT</th>
<th>Intervention</th>
<th>Comparator groups</th>
<th>Type of analysis</th>
<th>Authors’ conclusions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Schneider RH, 2005(^{239})</td>
<td>RCT parallel 3 arms, Duration: 1 yr, ITT: Yes</td>
<td>TM(^{R})</td>
<td>PMR</td>
<td>Subgroup analysis by sex (post hoc)</td>
<td>The change of SBP in women was not significantly greater than in men. There was no significant overall difference in DBP. Compared to the other groups, women in the TM(^{R}) group decreased more on both SBP and DBP.</td>
</tr>
<tr>
<td>United States</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Seer P., 1980(^{222})</td>
<td>RCT parallel 3 arms, Duration: 3 mo., ITT: NR</td>
<td>SRELAX (technique modeled after TM(^{R}))</td>
<td>PLB</td>
<td>Subgroup analysis by sex, marital status, use of AHM in the past, duration of disease (post hoc)</td>
<td>Responders had a significantly longer hypertension history. Sex, marital status, and use of hypertensive medication in the past did not affect outcomes.</td>
</tr>
<tr>
<td>New Zealand</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Cardiovascular Diseases

Of 21 trials on the effects of meditation practice on cardiovascular (CV) diseases, only two trials\(^{34,219}\) conducted subgroup or multiple regression analyses to explore the role of effect modifiers on achieving potential benefits of meditation practice. A summary of the analysis is provided in Table 36. Using a multiple regression model, one trial\(^{234}\) explored whether age, education, medication use, and diet restrictions were predictors of the effectiveness of RR in patients with CV diseases. Another trial\(^{239}\) conducted a subgroup analysis by type of condition, (i.e., patients with angina versus patients with risk factors) of the effect of an intervention that combined Yoga and dietary changes. Both trials likely conducted post hoc analyses as they were not reported as part of a plan of analysis in the Methods sections of the studies. It is unknown whether there is an outcome selection bias in the reporting of variables that were included in the analysis. None of the trials explored the effect of the dose practice necessary to achieve health outcomes, the role of direction of attention during meditation, or the rhythmic aspects of the practice. The trials did not provide data on whether ethnicity or other individual variables affect associated health outcomes or whether these variables can be used to predict the successful practice of meditation.

AHM = antihypertensive medication; AT = autogenic training; BE = breathing exercises; BF = biofeedback; BHT = borderline hypertension; BP = blood pressure; CMBT = contemplative meditation with breathing techniques; DBP = diastolic blood pressure; HE = health education; ITT = intention-to-treat; LDL-C = low-density lipoprotein cholesterol; mo. = months; NR = not reported; NRCT = nonrandomized clinical trial; NS = not specified; NT = no treatment; PLB = placebo; PMR = progressive muscle relaxation; RR = relaxation response; SBP = systolic blood pressure; TM\(^{R}\) = Transcendental Meditation\(^{R}\); UC = usual care; wk = weeks; WL = waiting list; yr = year.

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Substance Abuse

Of 17 trials investigating the effect of meditation practices on substance abuse disorders, only 4 trials264,267,268,274 conducted subgroup or multiple regression analyses to explore the role of a variety of effect modifiers on achieving potential benefits of meditation practices. A summary of the analysis of effect modifiers is provided in Table 37.

The trials did not report on effect variables such as age, gender, or ethnicity. One trial on the effect of RR that incorporated PMR and cognitive restructuring268 conducted a subgroup analysis by level of drinking and level of social support received. The effect of other patient characteristics on the outcomes achieved after practicing meditation were not reported in the studies. One study269 conducted a subgroup analysis by regularity of practice of TM. A third trial, on a meditation practice not further specified, conducted a subgroup analysis by participation in Alcoholic Anonymous groups. All the trials seemed to use exploratory post hoc analyses that were intended to be hypothesis generating. It is unknown whether authors of the trials selectively reported the variables that showed a statistically significant positive effect. The fourth trial274 conducted a subgroup analysis on differences in outcomes between high compliers and noncompliers.

None of the trials that provided data on effect modifiers of meditation practices for substance abuse analyzed the effect of the dose of practice necessary to achieve health outcomes, the role of direction of attention during meditation, or the rhythmic aspects of the practice.

Table 36. Summary of the analyses of effect modifiers for achieving benefits from meditation practice for cardiovascular diseases

<table>
<thead>
<tr>
<th>Study, year, country</th>
<th>Study design, duration, followup, ITT</th>
<th>Intervention</th>
<th>Comparison groups</th>
<th>Type of analysis</th>
<th>Authors’ conclusions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chang BH, 2009266</td>
<td>RCT parallel 3 arms Duration: 19 wk. ITT: Yes</td>
<td>RR</td>
<td>HE</td>
<td>Multiple regression analysis controlling by age, education, medication use, and diet restrictions (post hoc)</td>
<td>No significant differences were observed in the adjusted change values of VO2 max, total exercise time, and exercise capacity</td>
</tr>
<tr>
<td>United States</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mahajan AS, 1999274</td>
<td>RCT parallel 2 arms Duration: 14 wk. ITT: NR</td>
<td>Yoga + diet changes Exercise + diet changes Subgroup analysis by condition (risk factor group, angina group)</td>
<td>Subjects with coronary risk factors had significant decreases in body weight, TC, LDL-C, and increase in HDL-C Subjects with angina had a decrease in body weight, TG and HDL-C increased Changes in angina patients were acute (4 wk.) while those in subjects with subject factors lasted 10 wk.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>India</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

CADI = coronary artery disease; HDL-C = high-density lipoprotein cholesterol; HE = health education; ITT = intention-to-treat; LDL-C = low-density lipoprotein cholesterol; NS = not specified; TC = total cholesterol; TG = triglycerides; VO2 max = maximum oxygen consumption; UC = usual care; wk. = weeks

Table 37. Summary of the analysis of effect modifiers for achieving benefits from meditation practice for substance abuse

<table>
<thead>
<tr>
<th>Study, year, country</th>
<th>Study design, duration, followup, ITT</th>
<th>Intervention</th>
<th>Comparison groups</th>
<th>Type of analysis</th>
<th>Authors’ conclusions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Murphy TJ, 1986264</td>
<td>RCT parallel 3 arms Duration: 8 wk. ITT: NR</td>
<td>CSM</td>
<td>Exercise</td>
<td>Subgroup analysis by compliance (post hoc)</td>
<td>Statistically significant differences between high compliers and noncompliers in ethanol consumption and in VO2 gains among meditators</td>
</tr>
<tr>
<td>United States</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ramirez J, 1990267</td>
<td>RCT parallel 2 arms Duration: NR ITT: NR</td>
<td>TM</td>
<td>Control (NS)</td>
<td>Subgroup analysis by regularity of practice (post hoc)</td>
<td>Regular TM practitioners showed a significantly greater increase in a measure of self-concept No differences between regular versus irregular TM practitioners were found for measures of internality-externality</td>
</tr>
<tr>
<td>United States</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rohsenow DJ, 1985268</td>
<td>RCT parallel 2 arms Duration: 6 mo. ITT: NR</td>
<td>RR + PMR + cognitive restructuring</td>
<td>Control (NS)</td>
<td>Subgroup analysis by level of drinking and social support (post hoc)</td>
<td>Participants with heavier drinking behavior and greater social support at baseline obtained significantly greater decreases in alcohol consumption</td>
</tr>
<tr>
<td>United States</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wong MR, 1981274</td>
<td>NRCT parallel 2 arms Duration: 6 mo. ITT: NR</td>
<td>Meditation practice (NS)</td>
<td>Relaxation</td>
<td>Subgroup analysis by participation in AA (post hoc)</td>
<td>Participants in the meditation group that took part in AA showed greater improvements in measures of impulsivity</td>
</tr>
<tr>
<td>United States</td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

Summary of the Results

The role of effect modifiers such as characteristics of the practice or patient characteristics has so far been neglected in primary research on the effects of meditation practices. Therefore, we were unable to use a linear meta-regression procedure to explore any interactions between patient characteristics or characteristics of the practice and the magnitude of the overall effect of meditation practices for hypertension, cardiovascular diseases, and substance abuse. Individual studies (seven trials on hypertension, two on cardiovascular diseases, and four on substance abuse) conducted subgroup or multiple regression analysis; however, no analyses were reported in the “Methods” sections of the studies. No conclusions on the role of effect modifiers
can be drawn from the analysis of the individual studies. Individual patient data are required to appropriately examine this issue.

**Topic V. Evidence on the Physiological and Neuropsychological Effects of Meditation Practices**

Three hundred and eleven intervention studies provided evidence on 1,323 measures of the physiological and neuropsychological effects of meditation practices. Physiological outcomes only were reported in 253 studies, cognitive and neuropsychological outcomes only in 34 studies, and both physiological and neuropsychological outcomes were reported in 24 studies. The main characteristics and methodological quality of the studies included in topic V are summarized in Tables I1 to I3 in Appendix I.

**General Characteristics**

Of the 311 studies providing data for this topic, 54 percent (n = 167) were RCTs, 21 percent (n = 65) were NRCTs, and 25 percent (n = 79) used a before-and-after design. The studies that examined the physiological and neuropsychological effects of meditation practices were composed of 110 trials on Yoga, 47 on TM\textsuperscript{1}, 38 on Tai Chi, 34 on RR, 17 on mantra meditation not further described, 15 on Qi Gong, 12 on MBSR, 10 on Zen Buddhist meditation, 9 on meditation practices not further described, 8 on MM, 4 on CSM, 3 on Acem meditation, and 2 each on MBCT and Vipassana meditation. The studies were published between 1956 and 2005 (median year of publication, 1995; IQR, 1986 to 2002). Most of the studies (88 percent, n = 274) were published as journal articles. Seven percent (n = 22) were theses or dissertations, four percent (n = 13) were abstracts, and one percent (n = 2) were published as research letters. Fifty percent of the studies were conducted in North America (n = 155), followed by Asia (34 percent, n = 106), Europe (11 percent, n = 35), Australasia (three percent, n = 10), and other regions (two percent, n = 5).

**Overall Methodological Quality**

**Randomized controlled trials.** The methodological quality of the RCTs was analyzed by the individual components of the Jadad scale. Overall, the methodological quality of the 167 RCTs was poor (median Jadad score 2/5; IQR, 1 to 2). Thirteen percent (n = 21) of the RCTs were considered high quality (i.e., Jadad score of 3 or more). Only one study\textsuperscript{1} obtained a score of 4 and no study obtained a perfect score of 5. The remaining 146 RCTs had a high risk of bias.

We found that only 32 (19 percent) of the studies described the randomization procedure. Of these 32 studies, 24 described an adequate procedure to randomize study participants to treatment groups, and 8 described inadequate or unreliable methods of randomization that might have introduced imbalances between group characteristics and jeopardized the estimates of the overall treatment effect.

The majority of RCTs (97 percent, n = 162) did not use double blinding to conceal the identity of the interventions. Four studies (two percent) were reported as double-blind trials. Finally, 52 percent (n = 86) of the RCTs provided a description of withdrawals and dropouts from the study.

Adequate concealment of treatment allocation was reported in five percent (n = 8) of the RCTs and was reported but considered inadequate in one percent (n = 2). The remaining RCTs (94 percent, n = 157) failed to describe how they concealed the allocation of subjects to the interventions under study. Finally, the source of funding was disclosed in 46 percent (n = 76) of the RCTs. A summary of the methodological quality of RCTs is presented in Table 38.

**Nonrandomized controlled trials.** Overall, the quality of the 65 NRCTs was low (median modified-Jadad score 0/3; IQR, 0 to 1). Thirty-seven percent of the studies (n = 24) received one point out of three for the individual components of the Jadad scale, in all cases for a description of withdrawals or dropouts. The remaining 63 percent did not receive any points. No studies described themselves as double blind. Finally, the source of funding was reported in 32 percent (n = 21) of the NRCTs. A summary of the methodological quality of NRCTs is presented in Table 39.

**Before-and-after studies.** The quality of the 79 before-and-after studies was low. Only four percent (n = 3) of studies contained a sample population that could be considered representative of the target population. The blinding of outcome assessors to the intervention and assessment was described in 3 percent (n = 2) of studies, the number of study withdrawals in 15 percent (n = 12) and reasons for study withdrawals in 8 percent (n = 6). However, 94 percent of studies...
Outcomes on the physiological and neuropsychological effects of meditation practices for which data could be combined into a direct meta-analysis were provided by 53 unique studies for a total of 15 comparisons examining five meditation techniques: TM®️, RR, Yoga, Tai Chi, and Qi Gong. The remaining 258 studies were not suitable for direct meta-analysis because no more than one study was available for pooling. Yoga interventions provided the most studies for comparison (28 studies), followed by TM®️ (10 studies), Tai Chi (7 studies), RR (6 studies), and Qi Gong (2 studies). The trials were published between 1974 and 2005 (median year of publication, 1993; IQR, 1989 to 2001).

Of the 53 intervention studies included for meta-analysis, 20 used an RCT design, 8 used an NRCT design, and 25 were before-and-after studies. The majority of studies (n = 43) examined outcomes in healthy populations (athletes, college and university students, workers, military, prisoners, and elderly). The remaining studies examined individuals with hypertension (6 studies) and type II DM (4 studies). The main characteristics and conclusions of the individual studies included in the meta-analyses are provided in Appendix J.

### Results of Quantitative Analysis

To summarize the results of the physiological and neuropsychological effects of meditation practices, we combined study results when two or more studies agreed on the type of meditation practice, comparison group, outcomes assessed, and had usable outcome data. Table 41 summarizes the type of meditation practice, comparison group, and outcomes that were available for direct meta-analyses. Meta-analyses of physiological and neuropsychological outcomes on populations with hypertension, cardiovascular diseases or substance abuse have been reported in topic III.

---

**Table 40. Methodological quality of before-and-after studies on the physiological and neuropsychological effects of meditation practices**

<table>
<thead>
<tr>
<th>Quality components</th>
<th>N studies (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Study population representative of the target population</td>
<td>3 (3.8)</td>
</tr>
<tr>
<td>Method of outcome assessment is the same for pre- and post-intervention periods</td>
<td>74 (93.7)</td>
</tr>
<tr>
<td>Outcome assessors were blind to intervention and assessment period</td>
<td>2 (2.5)</td>
</tr>
<tr>
<td>Description of the number of study withdrawals</td>
<td>12 (15.2)</td>
</tr>
<tr>
<td>Description of the reasons for study withdrawal</td>
<td>6 (7.6)</td>
</tr>
<tr>
<td>Funding reported</td>
<td>25 (31.6)</td>
</tr>
</tbody>
</table>

**Outcome Measures**

The ten most commonly reported physiological outcome measures were (1) cardiovascular functioning such as heart rate or blood pressure (169 studies), (2) pulmonary functioning FEV<sub>1</sub> and FVC (67 studies), (3) peripheral nerve tests such as skin conductance (40 studies), (4) adrenocortical functioning such as cortisol and adrenaline levels (26 studies), (5) lipoprotein and FVC (67 studies), (3) peripheral nerve tests such as skin conductance (40 studies), (4) cognitive measures such as overall cognitive functioning (11 studies), (5) reasoning (10 studies), (1) attention (19 studies), (2) memory (12 studies), (3) perception (12 studies), (4) other cognitive measures such as overall cognitive functioning (11 studies), (5) reasoning (10 studies), (6) sensorimotor functioning (10 studies), (7) language (7 studies), (8) creativity (4 studies), (9) intelligence (4 studies), and (10) spatial ability (4 studies). Table I6 in Appendix I contains the complete list of reported outcome measures and their associated studies.

---

**Table 41. Summary of outcomes by meditation practice by comparison group by population included in meta-analyses of physiological and neuropsychological effects of meditation practices**

<table>
<thead>
<tr>
<th>Intervention</th>
<th>Comparator</th>
<th>Population</th>
<th>Outcome</th>
<th>No. of studies</th>
</tr>
</thead>
<tbody>
<tr>
<td>TM®️</td>
<td>No control</td>
<td>Healthy</td>
<td>BP change (SBP)</td>
<td>2</td>
</tr>
<tr>
<td>NT</td>
<td>Healthy</td>
<td>BP change (SBP)</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Healthy</td>
<td>BP change (SBP)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Healthy</td>
<td>Cholesterol level</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Healthy</td>
<td>Verbal fluency</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>WL</td>
<td>Healthy</td>
<td>HR</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Healthy</td>
<td>BP change (SBP)</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Healthy</td>
<td>BP change (DBP)</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RR</td>
<td>BF</td>
<td>Healthy</td>
<td>Muscle tension</td>
<td>2</td>
</tr>
<tr>
<td>Rest</td>
<td>Healthy</td>
<td>HR</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Healthy</td>
<td>BP change (SBP)</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Healthy</td>
<td>BP change (DBP)</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yoga</td>
<td>Exercise</td>
<td>Healthy</td>
<td>BP change (DBP)</td>
<td>2</td>
</tr>
<tr>
<td>Healthy</td>
<td>HR</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Free breathing</td>
<td>Healthy</td>
<td>Verbal ability</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Healthy</td>
<td>Spatial ability</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Medication</td>
<td>Healthy</td>
<td>VO&lt;sub&gt;2&lt;/sub&gt;</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Type II DM</td>
<td>Fasting blood glucose</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No control</td>
<td>Healthy</td>
<td>HR</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>Hypertension</td>
<td>HR</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Healthy</td>
<td>BP change (SBP)</td>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Healthy</td>
<td>BP change (DBP)</td>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Healthy</td>
<td>Respiratory rate</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Healthy</td>
<td>Galvanic skin resistance</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Type II DM</td>
<td>Fasting glucose</td>
<td>2</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Appendices and evidence tables cited in this report are provided electronically at [http://www.ahrq.gov/clinic/tp/medittp.htm](http://www.ahrq.gov/clinic/tp/medittp.htm)*
BF = biofeedback; BP = blood pressure; DBP = diastolic blood pressure; DM = diabetes mellitus; HE = health education; HR = heart rate; NT = no treatment; RR = Relaxation Response; SBP = systolic blood pressure; ULNB = unilateral left nostril breathing; URNB = unilateral right nostril breathing; WL = wait list

Table 41. Summary of outcomes by meditation practice by comparison group by population included in meta-analyses of physiological and neuropsychological effects of meditation practices (continued)

<table>
<thead>
<tr>
<th>Intervention</th>
<th>Comparator</th>
<th>Population</th>
<th>Outcome</th>
<th>No. of studies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yoga (continued)</td>
<td>No control (continued)</td>
<td>Healthy</td>
<td>Fasting glucose</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Healthy</td>
<td>Total cholesterol</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Healthy</td>
<td>Breath holding time (inspiration)</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Healthy</td>
<td>Breath holding time (expiration)</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Healthy</td>
<td>Auditory reaction time</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Healthy</td>
<td>Visual reaction time</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Healthy</td>
<td>Intraocular pressure</td>
<td>2</td>
</tr>
<tr>
<td>NT</td>
<td>Healthy</td>
<td>BP change (SBP)</td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>URNB</td>
<td>Healthy</td>
<td>HR</td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>Tai Chi</td>
<td>Exercise</td>
<td>Healthy</td>
<td>BP change (SBP)</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>No control</td>
<td>Healthy</td>
<td>HR</td>
<td>2</td>
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<tr>
<td></td>
<td></td>
<td>Healthy</td>
<td>BP change (DBP)</td>
<td>2</td>
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<tr>
<td></td>
<td></td>
<td>Healthy</td>
<td>BP change (DBP)</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>NT</td>
<td>Healthy</td>
<td>BP change (SBP)</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Healthy</td>
<td>BP change (SBP)</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Qi Gong</td>
<td>No control</td>
<td>Healthy</td>
<td>HR</td>
<td>2</td>
</tr>
</tbody>
</table>

Methodological Quality of Included Studies

**Intervention studies.** The median Jadad score for the 20 RCTs was 2/5 (IQR, 1 to 2) (Table 40). No trials were described as double blind and no studies were considered to have employed adequate concealment of treatment allocation. A description of withdrawals and dropouts was provided in 10 of the trials.278-287 Only five RCTs reported the source of funding.281,284,285,286,288

The median Jadad score for the eight NRCTs was 1/3 (IQR, 0 to 1). No NRCTs described themselves as double blind (blinding of participant and outcome assessor). Five trials provided a description of withdrawals and dropouts.289-293 Three NRCTs reported the source of funding180,181,293 (Table 42).

**Before-and-after studies.** The overall methodological quality of the 25 included before-and-after studies was low (Table 43). Only one study294 was considered to have a study population representative of the population of interest. Twenty-five studies employed the same method of outcome assessment for pre and post periods; no studies reported binding of outcome assessors. Two studies295,296 provided a description of withdrawals or dropouts; no studies provided reasons for withdrawals. Nine studies reported their source of funding.294,296-303

Table 42. Methodological quality of RCTs and NRCTs included in meta-analyses for physiological and neuropsychological effects of meditation practices

<table>
<thead>
<tr>
<th>Study</th>
<th>Meditation practice</th>
<th>Randomization</th>
<th>Double blinding</th>
<th>Description of withdrawals and dropouts</th>
<th>Overall Jadad score</th>
<th>Allocation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abrams AI, 1978</td>
<td>TM®</td>
<td>No</td>
<td>NA</td>
<td>No</td>
<td>Yes</td>
<td>1</td>
</tr>
<tr>
<td>Agrawal RP, 2003</td>
<td>Yoga</td>
<td>Yes</td>
<td>Unclear</td>
<td>No</td>
<td>NA</td>
<td>2</td>
</tr>
<tr>
<td>Alexander CN, 1991</td>
<td>TM®</td>
<td>Yes</td>
<td>Unclear</td>
<td>No</td>
<td>NA</td>
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<tr>
<td>Bahrie MS, 1978</td>
<td>RR</td>
<td>Yes</td>
<td>Unclear</td>
<td>No</td>
<td>NA</td>
<td>1</td>
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<tr>
<td>Block RA, 1989</td>
<td>Yoga (UNB)</td>
<td>Yes</td>
<td>Unclear</td>
<td>No</td>
<td>NA</td>
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<td>Blumenholt JA, 1991</td>
<td>Yoga</td>
<td>Yes</td>
<td>Unclear</td>
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<td>NA</td>
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<tr>
<td>Bose S, 1987</td>
<td>Yoga (Shavasana)</td>
<td>Yes</td>
<td>Unclear</td>
<td>No</td>
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<tr>
<td>Bowman AJ, 1997</td>
<td>Yoga</td>
<td>Yes</td>
<td>Unclear</td>
<td>No</td>
<td>NA</td>
<td>2</td>
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<tr>
<td>Broksa A, 1995</td>
<td>Yoga (Shavasana)</td>
<td>Yes</td>
<td>Unclear</td>
<td>No</td>
<td>NA</td>
<td>1</td>
</tr>
<tr>
<td>Chen WW, 1993</td>
<td>Tai Chi</td>
<td>No</td>
<td>NA</td>
<td>Yes</td>
<td>NA</td>
<td>1</td>
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<tr>
<td>Cooper MJ, 1990</td>
<td>TM®</td>
<td>No</td>
<td>NA</td>
<td>No</td>
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<tr>
<td>Culbert B, 1981</td>
<td>RR</td>
<td>No</td>
<td>NA</td>
<td>NA</td>
<td>No</td>
<td>0</td>
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<tr>
<td>De Armond DL, 1998</td>
<td>TM®</td>
<td>No</td>
<td>NA</td>
<td>NA</td>
<td>No</td>
<td>1</td>
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<tr>
<td>Fields et, 2002</td>
<td>TM® + herbal food supplements + diet + Yoga asanas</td>
<td>Yes</td>
<td>Adequate</td>
<td>No</td>
<td>NA</td>
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<tr>
<td>Hoffman, JW, 1982</td>
<td>RR</td>
<td>Yes</td>
<td>Unclear</td>
<td>No</td>
<td>NA</td>
<td>2</td>
</tr>
<tr>
<td>Jin P, 1992</td>
<td>Tai Chi</td>
<td>Yes</td>
<td>Unclear</td>
<td>No</td>
<td>NA</td>
<td>1</td>
</tr>
</tbody>
</table>

NA = not applicable; RR = Relaxation Response; TM® = Transcendental Meditation®; UNB = unilateral nostril breathing
Table 42. Methodological quality of RCTs and NRCTs included in meta-analyses for physiological and neuropsychological effects of meditation (continued)

<table>
<thead>
<tr>
<th>Study</th>
<th>Meditation practice</th>
<th>Randomization</th>
<th>Double blinding</th>
<th>Description of withdrawals and dropouts</th>
<th>Overall Jadad score</th>
<th>Allocation concealment</th>
<th>Report of funding</th>
<th>Meditation practice</th>
<th>Study population representative</th>
<th>Outcome method same for pre and post periods</th>
<th>Blinding of outcome assessors</th>
<th>Description of withdrawals/ dropouts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mohan SM, 2002</td>
<td>Yoga (UNB)</td>
<td>No</td>
<td>NA</td>
<td>No</td>
<td>0</td>
<td>Unclear</td>
<td>Armstrong BJ, 1999</td>
<td>TM</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Monro R, 1992</td>
<td>Yoga</td>
<td>Yes</td>
<td>Adequate</td>
<td>No</td>
<td>2</td>
<td>Inadequate</td>
<td>Berson H, 1994</td>
<td>TM</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Peters RK, 1977</td>
<td>RR</td>
<td>Yes</td>
<td>Adequate</td>
<td>Yes</td>
<td>3</td>
<td>Inadequate</td>
<td>Chang R, 1964</td>
<td>Yoga (pranayama)</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
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<td>Polilak MH, 1979</td>
<td>RR</td>
<td>Yes</td>
<td>Unclear</td>
<td>No</td>
<td>1</td>
<td>Inadequate</td>
<td>Chen JC, 1964</td>
<td>Yoga (UNB)</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Reddy KM, 1998</td>
<td>TM</td>
<td>Yes</td>
<td>Unclear</td>
<td>No</td>
<td>1</td>
<td>Inadequate</td>
<td>Dahodaran A, 1992</td>
<td>Yoga (pranayama)</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Sanders B, 1994</td>
<td>Yoga (UNB)</td>
<td>No</td>
<td>NA</td>
<td>No</td>
<td>0</td>
<td>Unclear</td>
<td>Jain SK, 1993</td>
<td>Yoga</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Sun WY, 1998</td>
<td>Tai Chi</td>
<td>Yes</td>
<td>Unclear</td>
<td>No</td>
<td>2</td>
<td>Inadequate</td>
<td>Jain SK, 1993</td>
<td>Tai Chi</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Teles S, 1994</td>
<td>Yoga (UNB)</td>
<td>Yes</td>
<td>Unclear</td>
<td>No</td>
<td>1</td>
<td>Inadequate</td>
<td>Jain SK, 1993</td>
<td>Qi Gong</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
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<tr>
<td>Thornton EW, 2004</td>
<td>Tai Chi</td>
<td>Yes</td>
<td>Unclear</td>
<td>No</td>
<td>2</td>
<td>Inadequate</td>
<td>Jain SK, 1993</td>
<td>Yoga (pranayama + meditation)</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
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<tr>
<td>Travis FT, 1999</td>
<td>TM</td>
<td>No</td>
<td>NA</td>
<td>Yes</td>
<td>1</td>
<td>Unclear</td>
<td>Jain SK, 1993</td>
<td>Yoga (pranayama)</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Young DR, 1999</td>
<td>Tai Chi</td>
<td>Yes</td>
<td>Unclear</td>
<td>Yes</td>
<td>3</td>
<td>Inadequate</td>
<td>Jain SK, 1993</td>
<td>Yoga (pranayama)</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
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<tr>
<td>Zaichkowsky LD, 1978</td>
<td>RR</td>
<td>Yes</td>
<td>Adequate</td>
<td>No</td>
<td>1</td>
<td>Inadequate</td>
<td>Lin TA, 1993</td>
<td>Qi Gong</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
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<td></td>
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<td></td>
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<td></td>
<td></td>
<td>Liu S, 1996</td>
<td>Tai Chi</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
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<td></td>
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<td></td>
<td></td>
<td></td>
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<td>Madamohan, 1992</td>
<td>Yoga</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
</tbody>
</table>

RR = Relaxation Response; TM = Transcendental Meditation; UNB = unilateral nostril breathing
Table 43. Methodological quality of before-and-after studies included in meta-analysis for physiological and neuropsychological effects of meditation practices (continued)

<table>
<thead>
<tr>
<th>Study</th>
<th>Meditation practice</th>
<th>Study population representative</th>
<th>Outcome method same for pre and post periods</th>
<th>Blinding of outcome assessors</th>
<th>Description of withdrawals/dropouts</th>
<th>Reasons for withdrawal</th>
<th>Report of funding</th>
</tr>
</thead>
<tbody>
<tr>
<td>Malathi A, 1989</td>
<td>Yoga (asanas + pranayamas)</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Manjunatha S, 2005</td>
<td>Yoga</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Pollack AA, 1977</td>
<td>TM®</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Raju PS, 1986</td>
<td>Yoga (asanas + pranayamas)</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Schmidt TFH, 1984</td>
<td>Yoga + vegetarian diet</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Singh S, 2004</td>
<td>Yoga (asanas + pranayamas)</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
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<tr>
<td>Sung BH, 2002</td>
<td>Yoga</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Telles S, 1993</td>
<td>Yoga</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Telles S, 1993</td>
<td>Yoga</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Telles P, 2004</td>
<td>Yoga (asanas + pranayamas)</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
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</table>

<table>
<thead>
<tr>
<th>Transcendental Meditation®</th>
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</table>

Ten studies assessing the physiological and neuropsychological effects of TM® were identified for meta-analysis: three RCTs, two NRCTs, and three before-and-after studies. Among the controlled studies, five studies compared TM® versus NT, and two compared TM® versus WL. The combined estimate of changes in SBP (mm Hg) showed a small, but nonsignificant improvement (reduction) in favor of NT (WMD = 0.93; 95% CI, -9.53 to 11.39). There was evidence of high heterogeneity among the studies regarding the mean change in SBP (I² = 69.7 percent). The studies differed in duration with two studies being long-term (10 and 12 months, respectively) and the remaining study being short-term (3 months). A subgroup analysis indicated that for the long-term studies there was a nonsignificant improvement (reduction) in SBP favoring TM® (WMD = -1.63, 95% CI, -0.10 to 3.17). For the short-term study, there was a statistically significant improvement favoring NT (Figure 28).
analysis indicated a statistically and clinically significant reduction in DBP in favor of TM® (WMD = -5.19, 95% CI, -10.24 to -0.13) in the long-term studies (Figure 29).

**Figure 29. Meta-analysis of the effect of TM® versus NT on DBP**

<table>
<thead>
<tr>
<th>Study or sub-category</th>
<th>N</th>
<th>Mean (SD)</th>
<th>N</th>
<th>Mean (SD)</th>
<th>WMD (95% CI)</th>
<th>Weight</th>
<th>N</th>
<th>ME (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>D1 Shortterm</td>
<td>39</td>
<td>1.47 (2.03)</td>
<td>39</td>
<td>-2.30 (1.63)</td>
<td>-1.98 (1.64, 3.95)</td>
<td>42.83</td>
<td>4.03</td>
<td>1.57 (1.63, 3.95)</td>
</tr>
<tr>
<td>Subtotal (95%)</td>
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<td></td>
<td></td>
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<tr>
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<td></td>
<td></td>
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<tr>
<td>E2 Longterm</td>
<td>19</td>
<td>-4.61 (3.06)</td>
<td>22</td>
<td>5.36 (2.85)</td>
<td>-4.21 (2.85, 7.95)</td>
<td>54.94</td>
<td>-6.61 (2.85, -7.95)</td>
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</tr>
<tr>
<td>Field2002</td>
<td>9</td>
<td>-7.30 (5.09)</td>
<td>5</td>
<td>-3.80 (4.7)</td>
<td>-3.93 (4.7, -2.23)</td>
<td>24.49</td>
<td>-2.93 (4.7, -2.23)</td>
<td></td>
</tr>
<tr>
<td>Subtotal (95%)</td>
<td>28</td>
<td></td>
<td></td>
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<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Test for overall effect</td>
<td>2 x 10(5)</td>
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<td></td>
</tr>
<tr>
<td>Total (95%)</td>
<td>67</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Test for overall effect</td>
<td>2 x 10(5)</td>
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</tbody>
</table>

**Cholesterol level.** Three studies totaling 132 participants (TM® = 67, NT = 65) provided data on the effects of TM® on LDL-C levels in healthy populations. The combined estimate of changes in LDL-C level (mg/dL) indicated a small, nonsignificant improvement (reduction) in favor of TM® (WMD = -15.08; 95% CI, -29.03 to -1.14). The results for the trials were homogeneous (p = 0.44, I² = 0 percent). However, because of the difference in duration of the studies noted above (two were long-term and one was short-term), we conducted a subgroup analysis by duration of study (Figure 30). The long-term studies indicated a statistically significant improvement (reduction) in favor of TM® (WMD = -23.94; 95% CI, -43.87 to -4.00).

**Verbal fluency.** Two studies totaling 117 participants (TM® = 66, NT = 51) provided data on the effects of TM® on verbal creativity in healthy populations (Figure 31). The combined estimate of changes in measures of verbal fluency showed a large, significant improvement (increase) in favor of TM® (SMD = -0.74; 95% CI, -1.12 to -0.36). The results of the combined studies were homogeneous (p = 0.73, I² = 0 percent).

**TM® (no control)**

**Blood pressure.** Three before-and-after studies totaling 58 participants provided data on the effect of TM® on blood pressure (mm Hg) in hypertensive populations (Figure 32). The combined estimate of changes in SBP indicated a statistically and clinically significant improvement (reduction) favoring TM® (change from baseline = -10.95; 95% CI, -17.52 to -4.39). There was substantial heterogeneity in the study results (p = 0.06; I² = 64.1 percent).

The combined estimate of changes in DBP also indicated a statistically and clinically significant improvement (reduction) favoring TM® (change from baseline = -6.86; 95% CI, -
is THE Medical Concern

10.54 to -3.19). There was moderate heterogeneity in the study results for DBP (p = 0.16; \( I^2 = 46.3 \) percent).

All three studies were of low methodological quality; moreover, the potential biases inherent in the before-and-after design may be responsible for the variability of results. Similar interventions, durations (not reported by Benson\(^{311} \)), and study populations were used in the three studies. Though all three studies examined hypertensive patients, the baseline measures suggest that the DBP of participants in the Benson\(^{311} \) study (mean DBP 94 ± 9 mm Hg) was lower upon entrance to the trial than the other two studies (minimum 90 mm Hg).

Figure 32. Meta-analysis of the effect of TM\(^{\circ} \) (no control) on blood pressure

TM\(^{\circ} \) versus WL

Heart rate. Two studies\(^{289,309} \) totaling 70 participants (TM\(^{\circ} = 41 \), WL = 29) provided data on the effects of TM\(^{\circ} \) on heart rate (bpm) in healthy populations (Figure 33). The combined estimate of changes in heart rate showed small, significant improvement (reduction) favoring TM\(^{\circ} \) (WMD = -5.94; 95% CI, -11.54 to -0.35). The trial results were homogeneous (p = 0.73, \( I^2 = 0 \) percent).

Figure 33. Meta-analysis of the effect of TM\(^{\circ} \) versus WL on heart rate

Blood pressure. The same two studies\(^{289,309} \) provided data on the effects of TM\(^{\circ} \) on blood pressure in healthy populations (Figure 34). The combined estimate of changes in SBP (mm Hg) showed a small, significant improvement (reduction) favoring TM\(^{\circ} \) (WMD = -8.74; 95% CI, -17.47 to -0.02). There was moderate heterogeneity in the study results (p = 0.15; \( I^2 = 52.6 \) percent). It is unclear what clinical differences among the study participants are responsible for the heterogeneity of this outcome.

The combined estimate of changes in DBP (mm Hg) also showed a small, significant improvement (reduction) favoring TM\(^{\circ} \) (WMD = -3.61; 95% CI, -6.62 to -0.59). There was little heterogeneity in the study results (p = 0.31; \( I^2 = 4.6 \) percent).

Figure 34. Meta-analysis of the effect of TM\(^{\circ} \) versus WL on blood pressure

Relaxation Response

Six studies\(^{191,283,284,288,304,306b} \) assessing the effect of RR on physiological and neuropsychological outcomes were identified for meta-analysis: five RCTs\(^{191,283,284,288,304} \) and one NRCT.\(^{306b} \) Two studies compared RR versus BF\(^{191,306b} \) and four compared RR versus rest.\(^{283,284,288,304} \)

RR versus BF

Muscle tension. Two studies\(^{306b,191} \) totaling 48 participants (RR = 24, BF = 24) provided data on the effect of RR on muscle tension (Figure 35). The combined results of changes in muscle tension (microvolts) indicated a small, nonsignificant change favoring RR (WMD = -1.28; 95% CI, 0.55 to 1.90). There was little heterogeneity in the study results (p = 0.29; \( I^2 = 11.7 \) percent).

Figure 35. Meta-analysis of the effect of RR versus BF on muscle tension
RR versus rest

Heart rate. Three trials totaling 99 participants (RR = 45, rest = 44) provided data on the effect of RR on heart rate in healthy populations (Figure 36). The combined estimate of changes in heart rate (bpm) showed a significant improvement (reduction) favoring rest (WMD = 2.56; 95% CI, 1.32 to 3.80). The study results were homogeneous (p = 0.70, I² = 0 percent).

Blood pressure. Two studies totaling 109 participants (RR = 45, rest = 44) provided data on the effect of RR on blood pressure in healthy populations (Figure 37). The combined estimate of changes in SBP (mm Hg) indicated a small, nonsignificant improvement (reduction) favoring RR (WMD = -5.67; 95% CI, -12.76 to 1.42). There was evidence of moderate heterogeneity between the study results (p = 0.23; I² = 31.6 percent). The combined estimates for DBP showed a small, nonsignificant improvement favoring RR (WMD = -6.98; 95% CI, -16.05 to 2.09). There was evidence of considerable heterogeneity between the study results (p = 0.11; I² = 60.5 percent). Both studies were short-term and similar in participant characteristics (proportion of males to females, healthy) and intervention. The most likely source of heterogeneity is study design (RCT versus NRCT).

Yoga

Twenty-eight studies assessing the physiological and neuropsychological effect of Yoga were identified for meta-analysis: 8 RCTs, 2 NRCTs, and 18 before-and-after studies. Four trials compared Yoga versus NT, two trials compared Yoga versus exercise, two compared Yoga versus free breathing (FB), two compared Yoga versus medication, and two compared Yoga (unilateral left nostril breathing [ULNB]) versus another Yoga intervention (unilateral right nostril breathing [URNB]).

Yoga (no control)

Heart rate. Seven before-and-after studies (17, 10, 12, 50, 25, 40, and 18 participants, respectively) provided data on the effect of Yoga (no control) on heart rate (bpm) in healthy populations (Figure 38). The substantial heterogeneity among the study results (p < 0.00001; I² = 95.9 percent) precluded reporting a combined estimate. Four of the seven studies indicated significant improvements (reduction) after practicing Yoga, whereas three did not favor the intervention.

Possible sources for the observed heterogeneity were explored. Two studies were very short-term and reported study duration in number of sessions (one to six). The remaining five studies had a 3-month study period. The studies also differed in the frequency and length of intervention sessions: two studies reported sessions of less than 1 hour, two studies reported 1-hour sessions, and one study did not report session length. Five studies were considered to have used composite interventions composed of some combination of postures, breathing techniques, cleansing practices, meditation, and lectures. Two studies were considered to have used single interventions; however, the two studies employed different techniques (breathing exercises and Raja meditation). The age range of participants also varied, with the mean ages ranging from 25 to 35 years.
included both men and women in almost equal proportion,\textsuperscript{302,320} and one study failed to report the gender of participants.\textsuperscript{322}

Two studies\textsuperscript{294,303} totaling 33 participants provided data on the effect of Yoga on heart rate in hypertensive populations (Figure 39). The combined estimate of changes in heart rate (bpm) showed a small, significant improvement (reduction) favoring Yoga (change from baseline $= -6.79; 95\% \text{ CI}, -9.97$ to $-3.60$). There was evidence of moderate heterogeneity among the study results ($p = 0.21; I^2 = 35.6$ percent). The possible sources of heterogeneity were explored. While the subjects in both studies were similar in mean age, the Vijayalakshmi study\textsuperscript{303} did not include women, whereas Damodaran\textsuperscript{294} had a male to female ratio of 1:4. The two studies also differed in quality with Damodaran\textsuperscript{294} having a study population considered representative of the population of interest, while Vijayalakshmi\textsuperscript{303} had a nonrepresentative study population.

Figure 39. Meta-analysis of the effect of Yoga (no control) on heart rate in hypertensive populations

Blood pressure. Five studies\textsuperscript{302,310,313,322,323} totaling 201 participants provided data on the effect of Yoga on blood pressure in healthy populations (Figure 40). The combined estimate of changes in SBP (mm Hg) indicated a small, significant improvement (reduction) favoring Yoga (change from baseline $= -8.05; 95\% \text{ CI}, -14.01$ to $-2.09$). There was evidence of substantial heterogeneity among the study results ($p = 0.00001; I^2 = 89.1$ percent).

The combined estimate of changes in DBP (mm Hg) also indicated a small, significant improvement (reduction) favoring Yoga (change from baseline $= -6.22; 95\% \text{ CI}, -7.73$ to $-4.70$). The study results were homogeneous ($p = 0.52; I^2 = 0$ percent).

The discrepancy between the measures of heterogeneity found for SBP and DBP is possibly accounted for by the difference in baseline measures. The participants in the Schmidt study\textsuperscript{302} had a combined SBP baseline noticeably higher (9 mm Hg from the next highest) than the those of the other studies, and it is unclear what clinical differences may be responsible for this difference in baseline measures. Other than baseline measures, the studies were comparable in study design, duration, and other participant characteristics. The baseline measures of DBP were similar across all groups.

Figure 40. Meta-analysis of the effect of Yoga (no control) on blood pressure

Respiratory rate. Three studies\textsuperscript{83,310,323} with 17, 40, and 18 participants respectively provided data on the effect of Yoga on respiratory rate in healthy populations (Figure 41). The heterogeneity among study results was substantial ($p = 0.0001; I^2 = 85.5$ percent) and precluded combining the studies. The Telles study\textsuperscript{83} differed from the other two studies in duration and the type of yogic practice used. Anantharaman\textsuperscript{323} and Telles\textsuperscript{323} were short-term (3-month) studies using postures and breathing exercises. In contrast, Telles\textsuperscript{83} employed Raja yoga meditation (seated meditation with a fixed gaze) that lasted three sessions (approximately 1 week).

Figure 41. Meta-analysis of the effect of Yoga (no control) on respiratory rate

Galvanic skin resistance. Two studies\textsuperscript{83,323} totaling 58 participants provided data on the effect of Yoga on galvanic skin resistance in healthy populations (Figure 42). The combined estimate of changes in skin resistance (kilohms) indicated a nonsignificant difference favoring the “before Yoga” period (change from baseline $= 3.12; 95\% \text{ CI}, -12.15$ to $18.40$). There was evidence of moderate heterogeneity between the study results ($p = 0.24; I^2 = 27.2$ percent).
The possible sources of heterogeneity in the outcome of galvanic skin resistance were differences in the intervention, comparison period, and duration of study. One study used a multicomponent intervention that consisted of yogic postures, breathing exercises, meditation, cleansing exercises, and lectures. The comparison period preceded the learning of any yogic techniques, but was not fully described. The outcome measurements were taken at the end of a 3-month period. The second study used a seated meditation technique in which participants fixed their gaze on a light and thought positive thoughts about a universal force. The nonmeditation period involved sitting quietly without targeted thinking; the outcome measures were assessed the day after the baseline measures.

Fasting blood glucose (type II DM). Two studies, with 149 and 24 participants respectively, provided data on the effect of Yoga on levels of fasting blood glucose in populations with type II DM (Figure 43). The heterogeneity of the combined study results was too high (p = 0.001; $I^2 = 90.6\%$) to report an overall estimate. While both studies employed Yoga postures and breathing techniques, Jain employed two breathing techniques called “kapalabhati” (also described as a cleansing practice and a milder form of bhastrika) and “ujayi,” and a variety of postures and cleansing practices. Singh employed “bhastrika pranayama” (a breathing exercise) and postures, and did not use cleansing practices. In addition, while the Singh study used sessions of about 30 minutes duration, the daily sessions in the Jain study lasted 2.5 hours (1.5 hours in the morning and 1 hour in the evening).

Fasting blood glucose (healthy). Two studies totaling 30 participants provided data on the effect of Yoga on levels of fasting blood glucose in healthy populations (Figure 44). The study of Manjunatha provided data on the effect of four different sets of two asana techniques. For each of the sets, we pooled the results with the results from the Joseph study. Each of the combined estimates of change in blood glucose level (mg/dL) showed a small, nonsignificant improvement (reduction) favoring Yoga (change from baseline ranged from -3.64 [95\% CI, -7.92 to 0.64] to -3.81 [95\% CI, -7.97 to 0.35]). There was no evidence of heterogeneity for any of the pooled results (p-values range from 0.37 to 0.47; $I^2 = 0\%$).

Breath holding time. Four studies provided data on the effect of Yoga on breath holding time (seconds) in healthy populations. Three studies totaling 112 participants examined breath holding time after inspiration. The combined results of changes indicated a large improvement (increase) after practicing Yoga (change from baseline = -18.85 [95\% CI, -22.64 to -15.05]). The study results were homogeneous ($p = 0.49; I^2 = 0\%$).

The combined results of changes indicated a large improvement (increase) after practicing Yoga (change from baseline = -14.53 [95\% CI, -16.82 to -12.24]). The study results were homogeneous ($p = 0.87, I^2 = 0\%$) (Figure 45).
Figure 45. Meta-analysis of the effect of Yoga (no control) on breath holding time after inspiration and expiration

Auditory reaction time. Two trials, with 27 and 41 participants respectively, provided data on the effect of Yoga on auditory reaction time (milliseconds) (Figure 46). Though both studies found statistically significant results favoring Yoga, the results of the studies were too heterogeneous to report as a combined estimate \((p = 0.0001; I^2 = 94.1\%)\). Possible sources of heterogeneity include characteristics of study participants and duration of the intervention. Madanmohan included men only with an age range from 18 to 21 years. Malathi included men only with an age range from 30 to 45 years. Both studies were short-term; however, the Madanmohan study had a duration of 12 weeks compared to six weeks for the Malathi study. Finally, participants in the Madanmohan study practiced Yoga for 30 minutes per day; those in the Malathi study practiced 1 hour per day.

Figure 46. Meta-analysis of the effect of Yoga (no control) on auditory reaction time

Visual reaction time. Two studies totaling 110 participants provided data on the effect of Yoga on visual reaction time (milliseconds) (Figure 47). The combined estimate of change in visual reaction time (milliseconds) indicated a small, significant improvement (reduction) favoring Yoga (change from baseline = -36.06; 95% CI, -53.65 to -18.57). There was evidence of substantial heterogeneity between the study results \((p = 0.03, I^2 = 79.4\%)\). As noted in the previous section, the observed heterogeneity is possibly accounted for by differences in participant characteristics, study duration, and duration of practice.

Figure 47. Meta-analysis of the effect of Yoga (no control) on visual reaction time

Intraocular pressure. Two studies totaling 67 participants provided data on the effect of Yoga (unilateral nostril breathing [UNB]) on intraocular pressure in healthy populations (Figure 48). The two studies assessed ipsi- and contralateral eye and nostril combinations. We did not pool the results of the studies because the outcomes were measured under different conditions, which may have resulted in the observed heterogeneity. Chen took before and after measures while the study participants were at rest. Kocer took baseline measures while participants were resting; the “after” measures were taken during exercise. Kocer reported a statistically significant change favoring UNB for all eye/nostril combinations. In contrast, Chen reported a nonsignificant change favoring no UNB for left nostril breathing. For right nostril breathing, the results favored UNB; however, only the right nostril/right eye combination was statistically significant.
Yoga versus exercise.

Heart rate. Two trials \(^{280,281}\) totaling 91 participants provided data on the effect of Yoga on heart rate in healthy populations (Figure 49). The combined estimate of changes in heart rate (bpm) indicated a small, nonsignificant improvement (reduction) favoring Yoga (WMD = -1.39; 95% CI, -8.24, 5.47). There was evidence of high heterogeneity between the study results (p = 0.10, I\(^2\) = 62.6%). The heterogeneity is possibly accounted for by the difference in study duration. Blumenthal\(^{280}\) was a short-term study (6 weeks) that found statistically nonsignificant results favoring exercise and Bowman\(^{281}\) was a long-term study (14 months) that found statistically nonsignificant results favoring Yoga.

Oxygen consumption. Two studies\(^{280,281}\) totaling 91 patients provided data on the effect of Yoga on oxygen consumption in healthy populations (Figure 50). The combined estimate of changes in VO\(_2\) max (ml/kg/min) indicated a small, nonsignificant improvement (increase) favoring exercise (WMD = 1.91; 95% CI, -0.48 to 4.31). The study results were homogeneous (p = 0.81, I\(^2\) = 0%).
Spatial ability. Two studies totaling 104 participants (Yoga = 52, free breathing = 52) provided data on the effect of Yoga, specifically (ULNB and URNB) on measures of spatial ability (Figure 52). For ULNB, the combined measures of spatial ability (score) indicated a nonsignificant improvement (increase) favoring free breathing (SMD = 0.05; 95% CI, -0.34 to 0.43). The study results were homogeneous (p = 0.95; I² = 0 percent).

For URNB, the combined estimate of change in measures of spatial ability indicated a nonsignificant improvement (increase) favoring free breathing (SMD = 0.24; 95% CI, -0.15 to 0.63). The study results were homogeneous (p = 0.53; I² = 0 percent).

Yoga versus NT
Blood pressure. Two studies totaling 79 participants (Yoga = 40, NT = 39) provided data on the effect of Yoga (Shavasana) on blood pressure in healthy populations (Figure 53). The combined estimate of change in SBP (mm Hg) indicated a small, nonsignificant improvement (reduction) favoring Yoga (WMD = -8.10; 95% CI, -16.94 to 0.74). The study results were homogeneous (p = 0.88; I² = 0 percent).

The combined estimate of changes in DBP (mm Hg) also indicated a small, nonsignificant improvement (reduction) favoring Yoga (WMD = -6.09; 95% CI, -16.83 to 4.64). The study results were homogeneous (p = 0.98; I² = 0 percent).

Yoga (ULNB) versus Yoga (URNB).
Heart rate. Two studies totaling 74 participants (ULNB = 37, URNB = 37) provided data on the effect of Yoga (ULNB) on heart rate in healthy populations (Figure 55). The combined estimate of changes in heart rate (bpm) showed a small, nonsignificant improvement (reduction) favoring ULNB (WMD = -2.12; 95% CI, -4.41 to 0.17). The study results were homogeneous (p = 0.43; I² = 0 percent).
Tai Chi

Seven studies assessing the physiological and neuropsychological effect of Tai Chi were identified for meta-analysis: four RCTs,285-287,307 one NRCT,290 and two before-and-after studies.296,317 Four studies compared Tai Chi to NT,285,286,290,326 and two compared Tai Chi versus exercise.287,290

Tai Chi versus NT

Heart rate. Two studies,285,290 with 28 (Tai Chi = 18, NT = 10) and 20 (Tai Chi = 10, NT = 10) participants respectively, provided data on the effect of Tai Chi on resting heart rate in healthy, elderly populations (Figure 56). The heterogeneity in the study results was too high to report a combined result (p = 0.002; I² = 89.2 percent). The results of Chen290 indicated a small, nonsignificant change favoring Tai Chi (mean difference = -0.70; 95% CI, -1.50 to 0.09). In contrast, Sun285 showed a larger, significant improvement (reduction) favoring NT (mean difference = 1.26; 95% CI, 0.28 to 2.24).

The opposite direction of effect between the two studies is possibly a result of the study design, frequency of practice, or complexity of the intervention. Chen290 used an NRCT design, while Sun285 conducted an RCT. In addition, the participants in the Chen study practiced a Tai Chi program of 24 forms for 1 hour twice weekly. The participants in the Sun study285 practiced 2 hours once a week and incorporated HE and stress management techniques in addition to a Tai Chi program.

Blood pressure. Three studies,285,286,290 with 28 (Tai Chi = 18, NT = 10), 20 (Tai Chi = 10, NT = 10), and 34 (Tai Chi = 17, NT = 17) participants respectively provided data on the effect of Tai Chi on blood pressure in healthy populations (Figure 57). The results were too heterogeneous to report as a combined estimate (p = 0.001, I² = 94.5%). The results of the Chen290 study showed a small, nonsignificant improvement (reduction) favoring Tai Chi (mean difference = -0.69; 95% CI, -1.72 to 10.34). Sun285 indicated a moderate, significant improvement (reduction) favoring NT (mean difference = 5.20; 95% CI, 3.73 to 6.67), and the results of Thornton290 showed a moderate, significant improvement (reduction) favoring Tai Chi (mean difference = -7.70; 95% CI, -11.65 to -3.75).

The heterogeneity in results for changes in DBP (mm Hg) also precluded reporting a combined estimate (p = 0.0001; I² = 98%). Chen290 reported a small, nonsignificant improvement (reduction) favoring Tai Chi (mean difference = 0.44; 95% CI, -5.03 to 5.91). Sun285 reported a moderate, significant improvement (reduction) favoring NT (mean difference = 5.20; 95% CI, 4.23 to 6.17), and the results of Thornton290 showed a moderate, significant improvement (reduction) favoring Tai Chi (mean difference = -8.50; 95% CI, -11.00 to -6.00).

The possible sources of heterogeneity are the age of the study participants and the frequency of practice. While Thornton290 used healthy volunteers between the ages of 33 to 55 years (mean age 48 years), Sun285 employed healthy elderly participants over 60 years of age. The Chen290 study used participants between the ages of 50 and 74 years. The Sun285 and Thornton290 studies used a similar frequency and form of Tai Chi intervention (two to three times per week, 108 forms), while the Chen290 study employed only one Tai Chi session per week and did not describe the number of forms or Tai Chi style used.

Tai Chi versus exercise

Blood pressure. Two RCTs287,307 totaling 110 participants (Tai Chi = 55, exercise = 55) provided data on the effect of Tai Chi on blood pressure in healthy populations (Figure 58). The combined estimate of changes in SBP (mm Hg) showed a moderate, nonsignificant improvement (reduction) favoring exercise (WMD = 1.79; 95% CI, -0.82 to 4.41). There was evidence of low heterogeneity between the studies regarding the mean change in SBP (p = 0.28; I² = 14.7 percent).

The combined estimate of changes in DBP (mm Hg) showed a small, significant improvement (reduction) favoring exercise (WMD = 0.83; 95% CI, 0.18 to 1.48). There was evidence of low heterogeneity between the studies regarding the mean change in DBP (p = 0.32; I² = 0.8 percent). The heterogeneity is possibly accounted for by the difference in the ages of the participants, and the frequency and duration of the intervention. Jin310 used healthy volunteers with a mean age of 36 years; Young285 used healthy elderly participants with a mean age of 67 years. The Jin study employed two
Tai Chi (no control)

Heart rate. Two studies totaling 74 participants provided data on the effect of Tai Chi on heart rate in healthy populations (Figure 59). The combined estimate of changes in heart rate (bpm) indicated a small, nonsignificant improvement (reduction) favoring Tai Chi (change from baseline = -2.34; 95% CI, -5.29 to 0.60). There was evidence of heterogeneity between the studies (p = 0.09, I² = 65 percent). A possible source of heterogeneity is the difference in the age of study participants. The mean age of participants in Jones was 53 ± 10 years; the mean age of participants in Liu was 22 ± 3 years. Liu did not report the frequency or complexity of the intervention used, so the studies could not be compared for these variables.

Blood pressure. Two studies totaling 74 participants provided data on the effect of Tai Chi on blood pressure in healthy populations (Figure 60). The combined estimate of changes in SBP (mm Hg) indicated a small, nonsignificant improvement (reduction) favoring Tai Chi (change from baseline = -3.35; 95% CI, -7.55 to -0.85). There was evidence of heterogeneity between the studies regarding change from baseline (p = 0.12; I² = 57.7 percent).

Qi Gong

Heart rate. Two before-and-after studies that assessed the effect of Qi Gong on physiological outcomes were identified. Qi Gong (no control)

Two before-and-after studies totaling 29 participants assessed the effect of Qi Gong on heart rate in healthy populations (Figure 61). The combined estimate in changes in heart rate (bpm) indicated a small, nonsignificant improvement (reduction) after practicing Qi Gong (change from baseline = -1.21; 95% CI, -6.18 to 3.76). The study results were homogeneous (p = 0.79, I² = 0 percent).
Summary of the Results

Overall, 311 studies evaluated the physiological and neuropsychological effects of meditation practices. The majority of studies used an RCT design (54 percent) and Yoga was the most common intervention (35 percent) that was studied. The overall methodological quality of all studies was low with only one study\textsuperscript{168} considered high quality. The majority of studies were of short and medium duration.

Data from 53 studies (20 RCTs, 8 NRCTs, 25 before-and-after) were considered for direct meta-analysis to provide an evaluation of the effects of TM\textsuperscript{®}, RR, Yoga, Tai Chi, and Qi Gong. The intervention groups were compared variously against BF, exercise, free breathing, medication, NT, WL, and UNB. Outcomes suitable for meta-analysis included blood pressure (SBP and DBP), heart rate, total cholesterol, respiratory rate, fasting blood glucose, and galvanic skin resistance. The majority of studies used healthy participants (45 studies) as the comparison group; people with type II DM and with essential hypertension comprised the only other study populations (six studies and four studies, respectively). All results below apply to healthy populations unless otherwise indicated.

Transcendental Meditation\textsuperscript{®}

Direct meta-analysis showed that compared to NT, TM\textsuperscript{®} did not produce significantly greater benefits on blood pressure (SBP and DBP). However, there was significant improvement in LDL-C levels and verbal creativity with TM\textsuperscript{®}. When compared to WL, TM\textsuperscript{®} produced significantly greater reduction in SBP and DBP. Before-and-after studies on TM\textsuperscript{®} for patients with essential hypertension indicated a statistically significant reduction in SBP and DBP after practicing TM\textsuperscript{®}. The heterogeneity present for the comparisons evaluating blood pressure changes and cortisol levels suggests that there were important clinical differences among the studies; however, the small number of studies precluded subgroup analyses.

Relaxation Response

The results of meta-analysis showed that compared to BF, RR did not produce significantly greater reduction in muscle tension. When RR was compared to a condition of rest, the rest group showed a significantly greater reduction in heart rate.

Yoga

When compared to NT, Yoga did not show a significantly greater benefit in lowering SBP or DBP. When compared to exercise, Yoga did not significantly lower heart rate or increase oxygen consumption. Compared to UNB, ULNB showed no significantly greater benefit in reducing heart rate.

When compared to free breathing, Yoga (UNB) showed no statistically or clinically significant benefit in improving verbal or spatial ability test scores. Finally, when examined using a before-and-after design, practicing Yoga did not demonstrate a significant benefit decreasing heart rate. There was also no significant benefit for Yoga in increasing galvanic skin resistance, reduction of intraocular pressure, and reduction of fasting blood glucose in healthy populations. There was varied heterogeneity among studies combined for heart rate, respiratory rate, galvanic skin resistance, and intraocular pressure, suggesting important clinical differences among the studies.

Before-and-after studies showed a significantly greater benefit after practicing Yoga in reducing heart rate in hypertensive populations. In healthy populations, practicing Yoga demonstrated a significant benefit in reducing DBP. There was also indication that Yoga has significantly greater benefit in increasing breath holding time after inspiration and expiration, in decreasing visual reaction time, and in the reduction of intraocular pressure (two of four outcomes). There was varied heterogeneity between studies combined for heart rate in hypertensive patients, SBP, and fasting blood glucose in patients with type II DM, suggesting important clinical differences between the studies. The heterogeneity present in the results examining respiratory rate, auditory reaction time, intraocular pressure (two of four outcomes), and fasting blood glucose prevented calculating an overall estimate of effect and suggested important clinical differences between the studies.

Tai Chi

The results of studies that compared Tai Chi to NT were too heterogeneous to provide combined estimates for the effect of Tai Chi on heart rate and blood pressure. In addition, the small number of studies precluded a subgroup analysis.

When compared to exercise, Tai Chi showed no significantly greater reduction in SBP, but did indicate a significant benefit in the reduction of DBP. In before-and-after studies, there was no significant reduction in heart rate, SBP and DBP after practicing Tai Chi than before. Substantial heterogeneity was also present in this comparison and, as with NT, a lack of studies prevented a subgroup analysis.
Qi Gong

Qi Gong did not significantly reduce heart rate in elderly populations, nor did it significantly reduce SBP and DBP in healthy populations. There were 22 outcome measures on the physiological and neuropsychological effects of meditation practices for which a combined estimate could be produced with little or no statistical heterogeneity. The comparisons, overall effect estimate, and statistical and clinical significance of each is outcome is summarized in Table 44.

Statistically and clinically significant changes in healthy participants were produced by TM® for heart rate, DBP, and LDL-C (TM® versus NT), and for SBP and DBP (TM® versus WL). The increase in verbal creativity (SMD = 0.74; TM® versus WL) is also statistically significant, but it is unlikely that this change would be clinically meaningful. In contrast, the change in SBP (TM® versus NT) was not statistically significant; however, the effect estimate suggests a clinically meaningful reduction of 5.24 mm Hg. When compared to rest, RR was more effective at reducing heart rate. However, though statistically significant, the change suggested by the overall effect estimate is unlikely to be clinically meaningful.

Statistically and clinically meaningful changes were produced in healthy participants by the practice of Yoga for breath holding (18 and 14 breaths/minute) and DBP (-6.22 mm Hg). There was a significant reduction in heart rate in hypertensive patients (-7 bpm). However, the clinical significance of this change depends on the baseline measures of the population for which the intervention is being considered. All the changes described above were observed in studies using a before-and-after design, a design that is unable to control for a host of extraneous variables that may bias the study results (e.g., temporal trends, regression to the mean, and sensitivity to design parameters) and potentially overestimate the effect of the intervention. Therefore, any causal claim about the effect of the intervention should be considered in light of these methodological shortcomings and caution should be exercised when interpreting these results.

The overall effects of Yoga based on RCTs and NRCTs indicate that this practice does not produce significant changes in healthy populations in oxygen consumption, spatial ability, SBP, DBP, or fasting glucose. When Tai Chi was compared to exercise, there was a statistically significant reduction in DBP, however, the change was not clinically significant (0.83 mm Hg). No significant change was observed in SBP. Before-and-after studies on Tai Chi did not indicate a clinically significant change in either SDP or DBP; however, these results should be interpreted in light of the stronger evidence available from the two combined RCTs. Likewise, no statistically or clinically significant changes in heart rate were produced by the practice of Qi Gong. Nevertheless, this result is based on before-and-after studies and the result should be considered carefully in light of the methodological difficulties described previously.

Finally, the low methodological quality of all the studies included in the meta-analysis is an additional cause for interpreting all the results described here with caution.

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<td>TM® versus NT</td>
<td>SBP</td>
<td>Medium and long term (WMD = -5.24; 95% CI, -12.85 to 2.37)</td>
<td>Yes</td>
</tr>
<tr>
<td>TM® better than NT</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TM® versus WL</td>
<td>Heart rate (WMD = -5.94; 95% CI, -11.54 to -0.35)</td>
<td>Potentially</td>
<td></td>
</tr>
<tr>
<td>LDL-C levels</td>
<td>Long term (WMD = -23.94; 95% CI, -43.87 to -4.00)</td>
<td>Potentially, depending on initial LDL level and risk factors</td>
<td></td>
</tr>
<tr>
<td>Verbal creativity (SMD = -0.74; 95% CI, -1.12 to -0.36)</td>
<td>No</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DBP</td>
<td>DBP</td>
<td>Medium and long term (WMD = -3.61; 95% CI, -6.62 to -0.59)</td>
<td>No</td>
</tr>
<tr>
<td>LDL-C = low-density lipoprotein cholesterol; NT = no treatment; RR = Relaxation Response; SBP = systolic blood pressure; SMD = standardized mean difference; TM® = Transcendental Meditation®; ULNB = unilateral left nostril breathing; URNB = unilateral right nostril breathing; WL = waiting list; WMD = weighted mean difference</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 44. Summary of statistical and clinical significance of physiological outcomes examined in clinical studies on meditation practices (continued)

<table>
<thead>
<tr>
<th>Comparison</th>
<th>Outcome</th>
<th>Statistical significance</th>
<th>Clinical significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>RR versus rest</td>
<td>Heart rate</td>
<td>WMD = 2.56; 95% CI, 1.32 to 3.80</td>
<td>No</td>
</tr>
<tr>
<td>Yoga versus exercise</td>
<td>Oxygen consumption</td>
<td>WMD = 1.91; 95% CI, -0.48 to 4.31</td>
<td>No</td>
</tr>
<tr>
<td>Yoga versus Free breathing</td>
<td>Spatial ability</td>
<td>Left nostril: SMD = 0.24; 95% CI, -0.34 to 0.43</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Right nostril: SMD = 0.05; 95% CI, -0.34 to 0.43</td>
<td>No</td>
</tr>
<tr>
<td>Yoga versus NT</td>
<td>SBP</td>
<td>WMD = -8.10; 95% CI, -16.94 to 0.74</td>
<td>Yes</td>
</tr>
<tr>
<td>Yoga versus NT</td>
<td>DBP</td>
<td>WMD = -6.09; 95% CI, -16.83 to 4.64</td>
<td>Yes</td>
</tr>
<tr>
<td>Yoga versus NT</td>
<td>Heart rate</td>
<td>WMD = -2.12; 95% CI, -4.41 to 0.17</td>
<td>No</td>
</tr>
<tr>
<td>Yoga (no control)</td>
<td>Breath holding</td>
<td>Change from baseline = -18.85; 95% CI, -22.64 to -15.05</td>
<td>Potentially</td>
</tr>
<tr>
<td>Yoga (no control)</td>
<td>Breath holding</td>
<td>Change from baseline = -14.53; 95% CI, -16.82 to -12.24</td>
<td>Potentially</td>
</tr>
<tr>
<td>Yoga (no control)</td>
<td>Heart rate</td>
<td>Change from baseline = -6.79; 95% CI, -9.97 to -3.60</td>
<td>No</td>
</tr>
<tr>
<td>Fasting blood glucose (healthy)</td>
<td>I: Change from baseline = -3.71; 95% CI, -7.52 to 0.11</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td></td>
<td>II: Change from baseline = -3.77; 95% CI, -7.80 to 0.27</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>III: Change from baseline = -3.64; 95% CI, -7.92 to 0.64</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>IV: Change from baseline = -3.81; 95% CI, -7.97 to -0.35</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>No significant change after practicing Yoga</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>DBP</td>
<td>Change from baseline = -6.22; 95% CI, -7.73 to -4.70</td>
<td>Yes</td>
</tr>
<tr>
<td>Tai Chi versus exercise</td>
<td>SBP</td>
<td>WMD = 1.79; 95% CI, -0.82, 4.41</td>
<td>No</td>
</tr>
<tr>
<td>Tai Chi (no control)</td>
<td>SBP</td>
<td>Change from baseline = -3.35; 95% CI, -7.05 to 0.85</td>
<td>No</td>
</tr>
<tr>
<td>Qi Gong (no control)</td>
<td>Heart rate</td>
<td>Change from baseline = -1.21; 95% CI, -6.18 to 3.76</td>
<td>No</td>
</tr>
</tbody>
</table>

Chapter 4. Discussion

The Practice of Meditation

Five broad categories of meditation practices were identified in the included studies: Mantra meditation (comprising TM®, RR, and CSM), Mindfulness meditation (comprising Vipassana, Zen Buddhist meditation, MBSR, and MBCT), Yoga, Tai Chi, and Qi Gong. One of the objectives of this review was to provide a descriptive overview and synthesis of information on meditation practices in terms of their main components, the role of spirituality, training requirements, and criteria for success. It is important to emphasize that the review on Topic I does not constitute a manual for any meditation practice. A more detailed explanation of any specific meditation practice described in this report should be sought in specialized texts or from master practitioners.

Given the variety of the practices and the fact that some are single entities (TM®, RR, and CSM, Vipassana) while others are broad categories that encompass a variety of different techniques or combination of practices (Yoga, Tai Chi, Qi Gong, MBSR, and MBCT), it is impossible to select components that might be considered universal or supplemental across practices. Though some statement about the use of breathing is universal among practices, this is not a reflection of a common approach toward breathing. The control of attention is putatively universal; however, there are at least two aspects of attention that might be employed and a wide variety of techniques for anchoring attention. The spiritual or belief component of meditation practices is poorly described in the literature and it is unclear in what way and to what extent spirituality and belief play a role in successful practice. The amount of variation in the described frequency and duration of practice make it difficult to draw generalizations about the training requirements for meditation practices. The criteria for successful meditation have also not been described well in the literature, though this may reflect the attitude that meditation is successful if one simply does it. At a clinical level, it might be argued that meditation is successful if it produces positive outcomes.

Demarcation

Providing a comprehensive review and summary of the scientific research on meditation practices requires the development of appropriate criteria by which to distinguish meditation practices from nonmeditation practices (what Ross327 has called a “demarcation criterion”). The development of such criteria is one of the most difficult yet important components of research on meditation practices;12 yet there is currently no consensus on a definition of meditation13 or on a way to classify the variety of meditation practices.12,37 Researchers have attempted to identify the components essential to the practice of meditation and to classify meditation practices in various ways:

- any procedure that uses: (1) a specific, clearly defined technique, i.e., a “recipe” for meditation; (2) muscle relaxation in some moment of the process; (3) “logic relaxation”; (4) a self-induced state; and (5) a “self-focus” skill, or anchor;
a discrete and well defined experience of “thoughtless awareness.” Techniques that fail to provide the key experience of mental silence or thoughtless awareness, including techniques that use constant repetition of syllables, visualizations, or other thought forms are considered “quasi-meditation;”

techniques that seem to restrict awareness to a single, unchanging source of stimulation for a definite period of time;

an exercise in which the individual turns attention or awareness to dwell upon a single object, concept, sound, image, or experience, with the intention of gaining greater spiritual or experiential and existential insight, or of achieving improved psychological well-being; and

a family of self-regulation practices that focus on training attention and awareness in order to bring mental processes under greater voluntary control and thereby foster general mental well-being and development and/or specific capacities such as calm, clarity, and concentration.

Even if most investigators would agree that meditation implies a form of mental training that requires either stilling or emptying the mind to achieve a state of “detached observation,” few seem to consider this a sufficient demarcation criterion. Also, the general definitions offered above appear to be too narrow, excluding awareness-based forms of meditation such as Vipassana, MBSR, MBCT, and Zen Buddhist meditation.

Definitions usually focus on the phenomenological aspects of meditation practice and, with the exception of Cardoso et al., rarely describe the necessary practical and physical components in sufficient detail to be translated into an operational definition of meditation. Further, though some investigators believe that research has shown meditation to be clearly distinguished from relaxation, as Manocha notes, there is sufficient evidence to show that “quasi-meditation,” techniques that do not cultivate a state of mental silence, do not differ from rest in terms of their physiological effects. Such results, if valid, make the development of clear demarcation even more important. This review has not evaluated whether meditation is indeed different from relaxation.

Whether defining meditation by one criterion or more, most investigators have looked for necessary and sufficient conditions with which to demarcate meditation practices from nonmeditation practices. Surprisingly, despite a persistent lack of consensus and the fact that demarcation criteria need not be bound by this approach, no author has examined alternative approaches to defining meditation despite some well-known developments in methods of demarcation in the philosophy of language and cognitive psychology and more recent developments in ethics and evolutionary biology. Applying some of these techniques to meditation may prove fruitful.

Classification

To our knowledge, this is the first systematic examination of the components of and training for individual meditation practices. Classification of meditation practices is frequently based on the direction of attention, e.g., “opening up” versus “turning off,” positive versus negative, mindful versus concentrative, directive versus nondirective, etc. However, it has been suggested that the concentrative forms should not be viewed as opposites to the mindful or negative forms, but as the first step toward a progressive refinement of attention and concentration.

Several practices in Yoga and Qi Gong will fall into both categories. Meditation practices may also be classified according to their historical origins with Indian and Chinese forms constituting two groups and clinically-based practices another.

We employed consensus techniques to develop an extensive, though not exhaustive, list of 32 common meditation practices. The categories of meditation practices we have employed reflect only those practices identified in the English-language scientific literature and that satisfied the inclusion criteria for this review. There is a noticeable gap in the research that has been conducted on meditation practices—of the 32 practices identified in the Delphi process, only the 10 described here (TM®, RR, CSM, Vipassana, Zen Buddhist meditation, MBSR, MBCT, Yoga, Tai Chi, and Qi Gong) have been assessed in trials or using a before-and-after design. It is unlikely that our literature search failed to uncover a broad category of practices, though we may have missed certain practices, for example, techniques purportedly used by indigenous peoples of North America. However, given the comprehensiveness of our literature search strategy, it is unlikely that such practices, if subjected to scientific inquiry, would have been missed.

The categories are only meant to be descriptive and conclusions have not been made on the basis of the broad categories, but at the level of individual practices. Despite this, it may be that we have not sufficiently distinguished between schools of Tai Chi and style of Yoga and that distinct techniques have been subsumed under one category or class of practice. This lack of specificity will have affected the results of our analysis in cases where, for example, two styles of Tai Chi (e.g., Wu and Chang) have been combined. However, this potential limitation should serve to highlight the need for more explicit descriptions of techniques and the need for studies on a wide range of techniques for similar health conditions.

The broad categories we have employed can be criticized as being simplistic and as ignoring subtle differences among practices. However, the categorization of practices is a product of the typological divisions one makes. For example, we have chosen to class together TM® and RR, even though some may argue that there are sufficient differences between these two mantra meditation techniques to keep them separate. In addition, though Benson’s original formulation of RR clearly falls within the category of mantra meditation, contemporary formulations of the technique are multifaceted and incorporate a body scan, which is a mindfulness meditation technique (Dr. Jeffrey Dusek, personal communication, December 2006). Some may contend that RR and TM® should not be classed together because during TM® one does not try to associate the mantra with the breath, or dissociate the breath from the mantra, but rather the mantra is favored. There may be other subtle differences between practices grouped together in the broad categories. The difficulty in categorizing practices and the dearth of detailed descriptions in the literature reinforce the need for more detailed descriptions of all components of the interventions employed in efficacy and effectiveness studies.

Universal Components of Meditation Practices

The results of this review are similar to those of a study by Koshikawa et al. that examined the physical components of 12 different types of meditation practices (excluding Tai Chi and including Christian meditation practices, early Buddhist meditation, Ajikan meditation, and Hotel meditation) in order to determine what similarities, if any, existed among the practices. Using a survey methodology, the investigators questioned 12 experts (one for each type of meditation practice) regarding the environmental conditions required for practice, method of concentration.
Complexity

The complexity of meditation practices makes dissecting components difficult and questionable; components may be synergistic and imperfectly understood if artificially separated from the whole discipline within which they take place. For example, though we have noted that no practice of a meditative technique requires the adoption of a particular belief system, West has questioned the reliance of researchers on clinically standardized forms of meditation practice rather than examining meditation as a practice that may be ineffectively separated from belief systems and expectations and ignoring the use of meditation as a central component of the belief system and of the day-to-day life of the practitioner. Other researchers have noted that the specific components adopted in a given meditation practice depend on the desired outcome, a fact which may make finding the common components across several practices undesirable unless the same outcome can be achieved. In addition, different techniques are reported to have different effects, so even if subjective descriptions of two or more techniques make them appear similar, their similarity must still be rigorously assessed.

In addition, for some of the practices that involve movement (Tai Chi and some yogic and Qi Gong techniques), researchers face additional challenges in designing studies that can separate the effects of exercise from the effects of the meditation practice. As physical activity has been shown to produce beneficial effects in those same physiological and neuropsychological outcomes of interest in trials on meditation practices (e.g., blood pressure, mood, etc.), this type of research is particularly important if the benefits of meditation practices are to be accurately assessed.

Criteria of Successful Meditation Practice

No descriptions of meditation practices provided an explicit statement of the criteria for successful meditation practice beyond reference to the internal states of the practitioner. The criteria have generally been inferred from descriptions of the practice. For example, in TM the practitioner attends a series of checkup meetings in which their technique is examined, implying that the adequacy of the technique is judged by an experienced practitioner. However, there is no statement that individual practitioners cannot assess the correctness of their technique themselves and no list of the components that an experienced teacher may be attending to in assessing the practice. The same is true of Zen Buddhist meditation. Because of this method, there may be some inconsistencies in the criteria for successful practice. However, this does not change the fact that there is a dearth of information on the determination of successful meditation practice and that this is an area in which future studies may improve.

Training

Some overviews of meditation practices have provided descriptions of the training requirements for meditation. However, these descriptions have focused mainly on TM, Zen Buddhist meditation, and some yogic practices, and they fail to capture the wide range of training practices suggested by our literature review. In addition, poor descriptions of the physical aspects of the meditation techniques and the requisite training hinder identifying the components that may be similar across practices and limit the proper construction of and comparison between studies on the effectiveness of specific meditation practices. Without a detailed knowledge of, for example, an adequate training period for a particular Hatha yoga technique versus that for a Tao Chi technique, such studies are already confounded by factors pertaining to the learning of a technique and not the effects of the technique per se. In addition, some investigators have found that if, as Naranjo has observed, the development of the attitude specific to meditation is essential and the hardest part of meditation to attain and this can only be realized through practice, then proper instruction seems paramount and a description of the proper duration and frequency of any given technique is crucial to designing and appraising such studies.

State of Research on the Therapeutic Use of Meditation Practices in Healthcare

We have summarized a vast body of evidence regarding a broad group of practices categorized under the umbrella term “meditation.” Some may argue that addressing a research question regarding the effects of “meditation on healthcare” would be as challenging as reporting on the effects of “medication on healthcare” (Personal communication, David Shannahoff-Khalsa, May 2007). There were substantial variations among the studies in the description of the practices of meditation, the type of controls, the type of populations, and the outcomes reported. The field of scientific research on meditation practices does not appear to be organized under a shared theoretical framework, but instead consists of distinct groups of investigators working within different approaches of treatment theory (e.g., physiological, cognitive, behavioral, and cognitive-behavioral) that fail to engage each other meaningfully.

The majority of studies on meditation practices identified in this review have been conducted in Western countries and published as journal articles within the past 15 years. The majority of research in meditation practices has been conducted as intervention studies (67 percent), with 49 percent being RCTs or NRCTs. A similar bibliometric analysis on the clinical application of Yoga has revealed an increase in publication frequency over the past three decades with a substantial and growing use of RCTs. We identified and excluded from the review a considerable number of multiple publications (n = 108). In some instances, the same study was published in two separate journal articles without full cross reference, a practice of redundant publication that has been considered scientific misconduct. Including redundant publications in systematic reviews and meta-analyses increases the risk of overestimating the effect size. The problem of redundant publications has not yet been sufficiently explored in the scientific literature; therefore, it is unknown how the proportion of redundant publications in meditation research compares to other
areas of scientific inquiry. Authors of future studies on meditation should avoid redundant publications and must adhere to guidelines for good publication practices.  

Quality of the Evidence

Overall, we found the methodological quality of meditation research to be poor, with significant threats to validity in every major category of quality regardless of study design. Observational studies accounted for 33 percent of all the studies in the review. This type of study is open to several forms of systematic error such as selection bias, detection bias, and attrition bias. Intervention studies that used designs with pre-post treatment comparisons within the same group (known as single group before-and-after studies or uncontrolled trials) are not as rigorous as designs that use between-group comparisons because they do not allow investigators to determine whether the results are due to the meditation practice or to other factors. Studies with stronger designs such as RCTs and NRCTs allow a greater sense of confidence in study results; however, we found the quality of reporting to be poor for most of the intervention studies included in the review. This finding is not unique to the area of meditation research, and quality of reporting is a frequent problem in other areas of complementary and alternative medicine (CAM) research.  

The publication of the Consolidated Standards of Reporting Trials (CONSORT) statement in 1996 was aimed at the improvement of the quality of research reports of RCTs. It is unknown how the quality of reporting of RCTs of meditation practices has changed after the dissemination of CONSORT in the CAM community, but it is noteworthy that only 20 percent of the RCTs identified in the review described how the randomization was carried out, 8 percent were described as double-blind, and 4 percent described how they concealed the allocation. The lack of double-blind RCTs has been a controversial topic not only in meditation research, but also in other areas of CAM. Surgical interventions, and behavioral treatments. Some authors have called for a “paradigm shift,” suggesting that the quality of CAM research should be evaluated by other methodological standards. Some commentators have argued that the placebo-controlled trial is not a valid or fair method for evaluating CAM treatments. Specifically, it is claimed that the scientific techniques of treatment protocols, randomization, double-blind conditions, and use of placebo controls distort the “holistic” therapeutic milieu of CAM. However, the notion of “holistic” interventions as opposed to “conventional medicine” may be an artificial misconception. Just as CAM does, traditional interventions provide treatments within a symbolic healing context by using “nonspecific” therapeutic attention and expectations.  

There is little argument against the idea that RCTs provide the least biased method for finding a reliable answer on the effectiveness of any therapeutic intervention, including CAM practices such as meditation. Based on empirical evidence and theoretical considerations, there are some basic characteristics that should always be considered when evaluating the quality of an RCT: randomization, blinding, handling of patient attrition in the analysis, and allocation concealment.  

Some authors have supported the idea that “those who insist that the evidence to support complementary and alternative medicine can legitimately be softer than in mainstream medicine will have to reconsider their position. Double standards in medicine existed for many years; undoubtedly they still exist today, but hopefully their days are numbered.”  

Double-blinding of the instructor and participant to treatment in meditation studies is often infeasible, a consequence of the fact that instructors must apply a specially learned skill in a particular therapeutic context (e.g., with clinically depressed patients). However, double blinding is still possible because the difficulties in blinding the experimenter can be circumvented by blinding the participants using a sham procedure such as similar attention control intervention or a placebo with a different mode of administration (as it has been done in psychotherapy research) and by blinding them to the hypothesis, and by blinding the outcome assessors to the nature of the intervention and the hypothesis. In cases where the comparison is an active treatment and blinding of participants to the treatment is impossible, it may still be possible to blind participants to the research hypothesis to minimize expectancy bias. Therefore, research on CAM should adhere to the same methodological requirements for all clinical research, and randomized, placebo-controlled clinical trials should be used for assessing the efficacy of CAM treatments whenever feasible and ethically justifiable.  

When double blinding was assessed using an individual components approach, we found that, although the vast majority did not use double blinding to hide the identity of the assigned interventions (97 percent), a small but promising percentage reported the use of double-blind procedures. The idea that it is possible to design high-quality trials in meditation and implement double-blind procedures by selecting appropriate control groups is gaining support in meditation research. We agree with other researchers that the implementation of these trials in any area of CAM research, including meditation, require much more preparation than trials of pharmacological interventions, and components such as blinding procedures, selection of credible placebos, and consistency of inherently individualized interventions are challenging issues that need extensive evaluation.  

Our conclusion here is that the idea that “due to the nature of meditation, it is impossible to double blind meditation practices” has been used as an excuse to justify the overall low quality of research that characterizes this body of evidence. However, the over emphasis of the “double-blinding” issue does not hide the fact that 95 percent of the studies failed to describe how they concealed the allocation to the interventions under study or the fact that overall, only 20 percent of the trials described the procedures of randomization, and that only half described study dropouts. Therefore, syntheses of the results from studies included in this review should be interpreted with caution due to the serious threats to the internal validity of the included studies.

Types of Interventions

Although a relatively small group of meditation practices have been studied in the scientific literature, they vary in many therapeutic respects. There was a remarkable heterogeneity across studies regarding the description of the characteristics and implementation of the practice even within the same type of meditation. Differences in theoretical assumptions underlying the practices of meditation may explain why studies conducted on similar meditation practices often differed in the potential benefits that were assessed. Some authors have declared that meditation poses a considerable challenge for the principles of evidence-based medicine. Meditation is a complex and multifaceted intervention, difficult to standardize, and for which specific effects are hard to distinguish. It is important, therefore, that investigators make an effort to avoid the excessive
Types of Control Groups

Control groups are essential for the valid evaluation of the effects of meditation practices; however, the problem of the inadequacy of control groups in meditation research is not new. Almost half of the RCTs and NRCTs have used WL or no treatment approaches for the control group rather than a comparator that would more fully control for the variety of influences that may bias the results including expectancy effects, social interactions, attention given by instructors, and time spent in the practice. Some authors have argued that the use of WL as a control group is clearly inappropriate as no one expects to improve while they are waiting to begin treatment. This situation may create a negative expectation of improvement that may spuriously amplify the difference in treatment effect between the intervention and the control. Therefore, caution should be exercised when interpreting studies comparing the effectiveness of meditation practices to no treatment or WL.

A wide array of active control groups were used in the intervention studies on meditation practices. Active controls included exercise and other physical activities, states of rest and relaxation, educational activities, PMR, cognitive behavioral techniques, pharmacological interventions, psychotherapy, biofeedback techniques, reading, hypnosis, therapeutic massage, acupuncture, and other meditation techniques.

The results of this review show that the control groups employed in meditation research are many and various, and it is unknown how comparable they are across studies. Meditation practices are disparate with regard to specific components, and there is the potential for well-designed studies to employ disparate control groups. Authors of future studies need to design control groups with a clear vision of the research question and the hypothesized mechanism and full consideration of how threats to validity may be best addressed for a given meditation practice.

Types of Study Populations

The vast majority of studies on the effects of meditation practices have been conducted in healthy populations as compared to clinical populations. It can be argued that studies of healthy individuals are useful to assess how meditation practices prevent certain clinical conditions and enhance wellness and well-being. However, studying the therapeutic effects of meditation practices in a healthy population does not provide a clear picture of their effectiveness as therapeutic interventions in healthcare. Clinical studies of meditation practices have addressed conditions with high mortality and morbidity rates, or burden of disease including hypertension, cardiovascular disorders, substance abuse, anxiety disorders, cancer, asthma, chronic pain, type II DM, and fibromyalgia. The first three conditions were among the six leading sources of premature death and disability in the United States in the mid-1990s and are projected to continue to be so to the year 2020, as measured by disability-adjusted life years (DALYs).

Types of Outcome Measures

Studies varied widely in their use of outcome measures. Outcomes of physiological functions, particularly cardiovascular measures, were the most frequently studied. Psychosocial outcomes (i.e., psychiatric and psychological symptoms, measures of personality and positive outcomes) and outcomes related to clinical events were also frequently assessed. Compared to physiological and psychosocial outcomes, little has been explored on cognitive and neuropsychological functions. Some authors have argued that relatively gross outcomes such as physiological measures have taken prominence in meditation research. However, considering that the close interdependence of the mind and body should be taken into account when evaluating the responses to meditation practices, more subjective and experiential variables are paramount to evaluate the effects of these mind-body techniques.
the treatment effect. In some instances, the appropriateness of the comparison group was questionable (e.g., Qi Gong versus WL).

Other reviews have summarized the evidence on the effects of Tai Chi in hypertension, and on TM® for hypertension, cardiovascular diseases, and substance abuse. Differences in selection criteria and review methods preclude a direct comparison of the results among the reviews.

Wang et al.36 assessed the evidence on the effects of Tai Chi in hypertension and concluded that Tai Chi produces benefits in cardiovascular function. chocolat included evidence from two studies published in the non-English literature, and another study in a population of normal elderly, not individuals diagnosed with hypertension. Differences in the selection criteria of study participants and language of publication may explain the differences in the findings between Wang et al.29 and our review.

Walton et al.357 reviewed the literature on the effectiveness of TM® in the treatment or prevention of cardiovascular diseases and concluded that TM® produced reductions in blood pressure, carotid artery intima-media thickness, myocardial ischemia, left ventricular hypertrophy, mortality, and other relevant outcomes. The authors adopted a qualitative approach for the synthesis of the evidence. The Walton review did not report on the use of systematic literature searches or on the assessment of the methodological quality of the evidence, but adopted a methodological approach where significant findings were emphasized within studies. Differences between Walton’s conclusions and the results reported in our review may be due to differences in the methodological approaches to synthesize the evidence. We conducted comprehensive searches of the scientific literature and assessed the methodological quality of the trials. Our synthesis of the evidence combined a qualitative approach with quantitative meta-analytic methods that assessed mean treatment effects in relation to the between-study variability of treatment effects. Furthermore, differences in the selection criteria (i.e., type of participants, diagnostic criteria, publication year) for the inclusion of studies may also explain differences in the conclusions of the reviews.

Canter et al.25 conducted a systematic review on the effects of TM® for blood pressure. Six trials were identified but only one evaluated the effect of TM® in hypertensive individuals, whereas the others were conducted in adults with normal blood pressure and adolescent populations. The authors concluded that there was insufficient good quality evidence to conclude whether or not TM® has a positive effect on blood pressure.

Evidence on the effects of TM® on substance abuse has been summarized in two reviews.29,368 Alexander et al.138 conducted a meta-analysis of 19 studies to provide a single estimate of treatment effect. The review included a variety of study designs such as cross-sectional studies, “retrospective studies,” “longitudinal studies,” and “experiments with random assignment.” The effect sizes across studies were provided for categories of study designs (“well-designed” studies, cross sectional studies, and general population studies). Gelderloos et al.22 conducted a review of 24 studies of TM® for preventing and treating substance abuse. The authors concluded that “taken together”, the studies demonstrate an improvement in psychosocial outcomes. The review did not use a systematic approach to select and appraise the literature and made no distinctions among the variety of study designs that were considered.

Other systematic reviews have synthesized the evidence on the efficacy and effectiveness of meditation practices for conditions other than hypertension, cardiovascular diseases, and substance abuse. However, it was beyond the scope of this report to examine conditions other than hypertension, cardiovascular diseases and substance abuse. Other systematic reviews have examined the effects of Tai Chi for a variety of medical diseases359 chronic conditions, and rheumatoid arthritis, improvement of aerobic capacity, and elderly populations.362 Studies on the effects of Yoga in depression245 and anxiety,363 and MBRS on health status measures36 and a variety of medical conditions have been also reviewed. Finally, other reviews have assessed the effects of a variety of meditation practices such as Qi Gong in Chinese cancer patients, RR in adult patients,365 meditation therapy programs for anxiety disorders,366 and the effects of TM® on cognitive function and psychological health.367 It is expected that systematic reviews have heterogeneity in their results when they bring together studies that are both clinically and methodologically diverse.368 Statistical and clinical heterogeneity constituted a frequent and considerable problem when pooling the results, and, in some cases, it precluded an effort to summarize data across the studies. Clinical heterogeneity was due to differences across the trials in the characteristics of study populations, the implementation of the meditation practice, outcome measurement, and followup period. Clinical heterogeneity may have explained why trials with different types of participants, interventions, or outcomes showed different effects. When statistical heterogeneity exists, pooled results are uncertain or conditional.368

The poor methodological quality of the trials limits the strength of inference regarding the observed treatment effects reported in this review and constitutes a possible shortcoming of the meta-analysis. The lack of description of the methods of allocation concealment, randomization, description of withdrawals and dropouts per treatment group, the absence of double blinding the interventions, and the use of incompatible or inappropriate control groups undermine the results of many clinical studies. Therefore, researchers are advised against making firm statements regarding treatment effects based on the quantitative summaries reported in this review.

Some factors have impeded the scientific progress regarding the efficacy and effectiveness of meditation practices in healthcare. Few studies have described the meditation practices or control procedures in sufficient detail, which prevents a sensible analysis of the observed differences in treatment effects for some classes of meditation practices. Other limitations include insufficient information regarding the characteristics of the trainer’s competence and experience, the lack of an accurate assessment of participants’ expectancy, compliance and motivation, and the paucity of descriptions of the statistical power of the intervention effect.

Evidence on the Role of Effect Modifiers for the Practice of Meditation

The role of effect modifiers in the practice of meditation is a topic that has so far been neglected in the scientific literature. Evidence from RCTs and NRCTs regarding the interaction of meditation practices with other variables in populations of patients with hypertension, cardiovascular disorders, or substance abuse is scarce. A few studies conducted exploratory post hoc analyses (i.e., a subgroup analysis, multiple regression, or analysis of variance) that were intended to be hypothesis generating. Due to the small sample sizes in the studies, there were small numbers of subjects in each of the variable subgroups, lowering the power to detect any relationship with the outcomes produced by the practice of meditation. The lack of evidence on the role of effect modifiers has been pointed out by other authors.154 Variables that may be important for the therapeutic effect of meditation practices include individual characteristics of
Evidence on the Physiological and Neuropsychological Effects of Meditation Practices

We have summarized the evidence from RCTs, NRCTs and before-and-after studies regarding the physiological and neuropsychological effects of meditation practices. Our meta-analysis revealed that the most consistent and strongest physiological effects of meditation practices in healthy populations occur in the reduction of heart rate, blood pressure, and LDL-C. The strongest neuropsychological effect is in the increase of verbal creativity. There is also some evidence from before-and-after studies to support the hypothesis that certain meditation techniques decrease visual reaction time, intraocular pressure, and increase breathing hold time. Though over half of the combined effect estimates are not statistically significant, the potential clinical significance of these estimates must be carefully considered. However, all of the studies included in the meta-analyses were of low methodological quality and, for this reason, the results should be interpreted cautiously.

Of the 311 studies reporting physiological and neuropsychological outcomes, only 53 (17 percent) were eligible for meta-analysis. Though small, this proportion is even smaller when one considers the 813 studies pertaining to research on the therapeutic use of meditation practices included in topic II. Some investigators have claimed that there are many empirical studies that have shown that meditation practices are effective at treating stress-related states, including reducing heart rate, breathing, and blood pressure. In addition, previous literature reviews have shown that meditation practices are effective at treating stress-related states, including reducing heart rate, breathing, and blood pressure. In addition, previous literature reviews have shown that meditation practices are effective at treating stress-related states, including reducing heart rate, breathing, and blood pressure. In addition, previous literature reviews have shown that meditation practices are effective at treating stress-related states, including reducing heart rate, breathing, and blood pressure. In addition, previous literature reviews have shown that meditation practices are effective at treating stress-related states, including reducing heart rate, breathing, and blood pressure.

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The overall low methodological quality of the studies indicates that most suffered from methodological problems that may produce overestimations of the treatment effects or compromise the generalizability of the study results. Empirical evidence has demonstrated that trials “that were not double blinded yielded larger estimates of treatment effects compared with trials in which authors reported double blinding (odds ratios exaggerated, on average, by 17 percent).”48,73 Though difficult to do in studies on meditation practices, appropriate blinding is a special source of concern where an expectation of the efficacy of the practice under study on the part of the subject and assessor may bias outcome measures.

The low rate of reporting of withdrawals and dropouts and the reasons for dropping out are also of concern because this makes the assessment of the comparability between the intervention and control groups difficult. An additional concern is that patients who drop out may differ in important ways from those who complete the meditation regimen (e.g., being favorably predisposed to meditation practice), but, without adequate reporting, these differences remain hidden and their effects on outcomes remain unknown.

Regarding the predominant use of healthy subjects in the included studies, though of benefit for ascertaining the physiological and neuropsychological effects of meditation practices in this group, the use of healthy subjects limits the generalizability of the findings and provides information that is unlikely to be of use to clinicians who normally treat patients with specific health conditions.

Finally, the results of this meta-analysis indicate that research on the effects of meditation practices has been hindered by the use of weak study designs, specifically before-and-after studies (also known as single group pretest-postest designs and uncontrolled trials). Although the before-and-after study is simple and practical, it has been argued that results from such study designs be considered circumstantial evidence, that is, hypothesis generating for further research using more rigorous study designs. The lack of a concurrent control group and the resulting inability to control for temporal trends, regression to the mean, and sensitivity to methodological features make it difficult to ascertain the true causal effect of a meditation practice. Clinical outcomes—whether good or bad—may be a result of factors other than the practice of meditation. For this reason, the estimates of the physiological and neuropsychological effects of meditation practices that are made on the basis of single-group studies should be considered carefully.

Strengths and Limitations

This evidence report is a systematic and comprehensive review of the indexed scientific literature available on the effectiveness of meditation practices supplemented by a search for relevant gray literature, abstracts from scientific meetings, dissertations and theses, reference lists, and trial registries. As noted previously, the need for rigorous meta-analyses of the therapeutic use of meditation practices has been recognized by other researchers. To our knowledge, there has been no other meta-analysis of the effectiveness of meditation practices that covers the range of meditation techniques examined here or the breadth of health outcomes. In addition, the relatively large number of included studies reported in dissertations (10 percent of all studies) may have reduced the potential effects of publication bias (i.e., the tendency for studies with positive outcomes to be published more frequently). We were also able to identify and exclude from the review a significant number of multiple publications that may have also affected the results of our meta-analyses and their conclusions.

The assessment of the methodological quality for all study designs is also a strength of this review. Methodological quality may be defined in various ways. Our approach to the methodological quality of the studies on meditation practices focused on an assessment of the internal validity of the studies, as recommended by several researchers. Various criteria to assess methodological quality of studies are available in the scientific literature, and there is
no consensus on which quality assessment tool can be recommended without reservation. For the assessment of the methodological quality of RCTs, we have chosen two assessment tools that have well-established face validity, and for which a relationship with bias has been proven in empirical studies. The selection of the Jadad scale has relative merit since it uses a simple and easy to understand approach that incorporates the most important individual components of internal validity: randomization, blinding, and handling of patient attrition. Based on empirical evidence and theoretical considerations, these aspects should always be assessed when evaluating the quality of an RCT.

The most important dimension of methodological quality is internal validity, defined as the confidence that the design, performance, and report of a trial prevent or reduce bias in the outcomes. We have not addressed in our approach other important aspects of good research practice—those contributing to studies’ external validity and adherence to ethical procedures. Although such factors are important and help to put study findings in context, they may not be directly related to internal validity, but may contribute indirectly to it. It is unknown how factors related with external validity may bias study results, and, therefore, research syntheses’ findings. Certainly, the external validity of a trial is a very important concept that it is worthy of consideration in future reviews; however, it was not covered in our methodological assessment.

We have adopted a model for quality assessment of research on meditation based on stringent criteria of research methodology. Evaluation of CAM treatments, including meditation, requires a stringent and systematic approach. The Jadad scale is the most commonly used quality scale for RCTs in pharmacological and nonpharmacological reviews. The decision to use both the Jadad scale and the concealment of allocation approach reflects our emphasis on using the same methodological standards to assess the quality of research in meditation as applied to other areas of CAM research.

We did not make any decisions in terms of inclusion or exclusion of studies in the review or in the meta-analyses based on the overall Jadad score. We also analyzed the methodological quality of the RCTs by the individual components of the scale (i.e., percentage of studies that satisfied the Jadad criteria).

Though no reliable and valid instruments have been developed for the assessment of observational studies and before-and-after studies, the instruments used here serve to indicate important potential methodological weaknesses, tempering the conclusions that may be drawn, and highlighting areas in which future research might improve. Despite its strength, the use of nonstandardized quality assessment instruments may be questioned. However, the assessment criteria were not used to produce an overall quality score or to exclude studies from the review, but only to draw out commonalities in potential methodological problems. Because of the potential methodological weaknesses of the studies and the use of weak study designs, the question of how meditation achieves its effects remains almost as open to debate as it did over 25 years ago.

It is unlikely that all of the meditation research meeting our inclusion criteria has been identified and acquired. In particular, a number of Indian journals have not been indexed and are difficult to acquire, particularly Yoga specialty journals. We did not contact any religious/spiritual organization to acquire information regarding unpublished studies. Nevertheless, it is likely that the vast majority of publications that satisfy our inclusion criteria have been examined and that the general trends reported in this review are sufficiently representative of the research on meditation practices.
Peer reviewers have provided references to potentially relevant studies that were not identified during the development of this report. To increase the transparency of this report, we have collated the references of these studies following the “References and Included Studies” section. Despite the comprehensiveness of our search strategies for the literature search, there are inevitable gaps in literature retrieval, especially with respect to gray literature when conducting systematic reviews. The impact of the potentially relevant studies identified by the peer reviewers should be weighed against the number of studies that were actually retrieved and included.

The restriction of included studies to English-language publications is of special concern in this topic because of the origin of many of these techniques in non-English speaking countries. In light of a recent bibliometric study on Yoga that reported that there is a large amount of research by Indian researchers, it is possible that there is a substantial evidence base on Yoga that remains untapped. In addition, it is likely that a significant amount of the research on Tai Chi and Qi Gong has been published in the Chinese language. However, despite this potential weakness, some research has shown that compared to language inclusive meta-analyses, language restricted meta-analyses did not differ with respect to the estimate of benefit of the effectiveness of an intervention, and there is no evidence that language restricted meta-analyses lead to biased estimates of intervention effectiveness.

This review may be also be criticized for ignoring important differences between meditation practices and techniques by using categories for studies using “single entity” practices, e.g., TM®, RR, and CSM, and for those practices that are made up of a broad array of techniques, e.g., Yoga, Tai Chi, and Qi Gong. Thus while the meta-analytic techniques used here may be appropriate for standardized “single entity” practices, such an approach, when used to combine complex interventions, may produce spurious or misleading results. For example, one of the problems of combining the results of studies that use different yogic techniques is that “fine grained” descriptions of many of these techniques are not reported. This lack of reporting increases the possibility of pooling the results for yogic practices that were putatively designed to have different effects.

To address this potential problem, we have used measures of heterogeneity to help identify those groups of studies that may differ in important clinical characteristics as well as examining the descriptions of the techniques employed in the studies. The combining of results was based on these “fine grained” descriptions; however, poor reporting of meditation practices employed in studies leaves open the possibility that such combinations may have occurred. In addition, caution should be taken in concluding that the effects of complex or composite interventions are due to the practice of meditation rather than to other main components of the treatment such as physical exercise.

The approach adopted here of combining the results of only two studies may be considered inappropriate by some researchers because it is unlikely that only two studies provide strong evidence with respect to the general direction or effect size of the intervention. Also, if the results of two studies differ in direction of effect, at least one more study is needed to help strengthen the evidence regarding the true direction of the effect. However, it must be remembered that one of the principal reasons for conducting a meta-analysis is not only for summarizing the discrepant results of a large number of studies but also for overcoming the imprecision resulting from small sample sizes. By combining several studies with small samples, the overall estimate provides a more precise estimate of effect than either of the studies on their own. Thus, combining only two studies can provide an informative picture of the likely effect of an intervention.

Finally, a main weakness of this report is the lack of assessment of the appropriateness of controls. The need for appropriate controls, described by some researchers as the most difficult conundrum for designing research trials in meditation, is closely related to the difficulties in designing rigorous double-blind meditation trials. Though some controls may be adequate to compare the relative effectiveness of two different interventions (e.g., rest meditation versus quiet rest), such controls may not be adequate placebo controls needed to assess the effects of meditation interventions. Though we are unaware of assessment tools developed to specifically address this issue as it pertains to meditation practices, the comprehensive categorization given in this report of the kinds of controls used in meditation research provides future researchers with a starting point for examining the appropriateness of controls for various therapeutic meditation practices.

Future Research

Future research in practices of meditation has several challenges. First, there is a need to develop a consensus on a working definition of meditation applicable to a heterogeneous group of practices. The application of consensus techniques, such as the Delphi method used in this report, is one approach to refine operational criteria and to standardize terms with the goal of achieving consistency among the characterizations of meditation practices. The validity and reliability of any operational definition applied to diverse meditation practices should be thoroughly investigated. Another area of future inquiry consists of systematically comparing the effects of different meditation practices that research shows have promise.

We have assessed the quality of meditation research from studies that have been published between 1956 and 2005. Half of them have been published after 1994. We did not set any restrictions in terms of the year of publication of the included studies, and it is possible that the standard for a rigorous study in the earlier years of research might be different before 1994 than that of the past 15 years. Future reviews should examine how the quality of studies on meditation practices has evolved over time and particularly whether guidelines such as CONSORT have improved the reporting of RCTs.

We have analyzed the evidence of the therapeutic effects of meditation practices for the three most studied conditions identified in the scientific literature. Evidence of the effects of meditation practices for other conditions frequently reported in the scientific literature (i.e., a variety of mental health problems such as anxiety disorders and depression, and musculoskeletal conditions such as fibromyalgia and chronic pain) should be evaluated in systematic reviews in the near future. Further reviews should address the effects of meditation practices as strategies to enhance wellness and well-being in healthy population.

In light of the few intervention studies that provided direct comparisons of meditation practices or that used similar control groups, special attention should be paid to developing studies that provide a more accurate assessment of the efficacy and effectiveness of meditation practices, both against standard therapies and against each other. The appropriate selection of controls is also paramount if progress is to be made with respect to determining the effects of meditation practices. Future research should be directed toward investigating the unique challenges that the studies on meditation practices present in designing appropriate controls.
addition, more research should be done on the “dose response” of meditation practices to determine what may be effective study durations and to help standardize courses of therapeutic meditation.

As noted earlier, blinded allocation to meditation treatments may be difficult, but it is not impossible. There are many ways in which to circumvent the difficulties in blinding the experimenter many of which rely on “creative” (i.e., nonstandard methods). These suggestions follow other proposed modifications of the traditional double-blind methodology such as the “dual-blinding” approach (a methodology where the subject and an external evaluator, but not the practitioner, are blind to treatment) Given the strength of the RCT design in providing estimates of effectiveness, it appears important to develop research in this domain instead of trying to change the instruments with which the quality of research is assessed.

NCCAM is striving to elevate CAM research to a higher standard, and we think that creative solutions to the difficulties of conducting randomized, double-blind controlled trials should be applied to meditation research.

Key methodological issues in the study of meditation using an evidence-based approach should be further explored through the analysis of important factors such as the impact of publication bias in meditation research (e.g., positive outcome bias, time to publication bias, empirical evidence of relationships between study quality and effect estimates in meditation research, the impact of language bias in systematic reviews of meditation practices, the impact of year of publication of primary studies on pooled estimates in meditation research, trends of quality of primary studies and systematic reviews in meditation, and use of quality assessment tools in meditation research). The effect of report of funding and disclosure of conflict of interest and positive outcomes also merits formal evaluation.

Because of the difficulty of determining causation using uncontrolled before-and-after designs, it is recommended that these study designs be avoided in future research on the effectiveness of meditation practices. Researchers should aim to employ designs and analytic strategies that optimize the ability to make causal inferences (in some cases this may require the use of uncontrolled before-and-after designs). Although it is important to suggest conducting more high quality studies based on the standards for RCTs, it is also important to develop alternative study designs and analytic tools that can incorporate the special features of meditation practices to fully investigate the possible effects of these practices. As well, future studies would benefit from having larger samples with concurrent controlled designs, using disease-specific measures and providing clearer descriptions of intervention components. The quality of reporting of meditation research would be improved by a wider dissemination and stricter enforcement of the CONSORT guidelines within the CAM community.

**Conclusions**

The field of research on meditation techniques and their therapeutic applications has been clouded by confusion over what constitutes meditation and by a lack of methodological rigor in much of the research. Further research needs to be directed toward distinguishing the effects and characteristics of the many different techniques falling under the rubric “meditation.” The single and multimodality meditation practices included in this report were categorized for pragmatic reasons, but specific attention must be paid to developing definitions for these techniques that are both conceptually and operationally useful. Such definitions are a prerequisite for scientific research of the highest quality. Research of higher quality is vital to respond appropriately to the many persistent questions in this area. The dearth of high-quality evidence highlights the need for greater care in defining and choosing the interventions and in choosing controls, populations, and outcomes that permit comparison of studies across techniques regarding their therapeutic effects. More care in these choices will allow effects to be estimated with greater reliability and validity. More randomized trials that draw on the experience of investigators or consultants with a strong background in clinical and basic research should be conducted. As a whole, firm conclusions on the effects of meditation practices in healthcare cannot be drawn based on the available evidence. However, the results analyzed from methodologically stronger research include findings sufficiently favorable to emphasize the value of further research in this field. It is imperative that future studies on meditation practices be more rigorous in design, execution, and analysis, and in the reporting of the results. Greater importance should be placed on the reporting of study methods and providing detailed descriptions of the training of the participants, qualifications of meditation instructors, and on reporting the criteria and methods used to determine a successful meditation practice.


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Hankins KM. Comparison of the effects of two relaxation programs on the anxiety of freshmen and sophomore college students [dissertation]. Waco, TX: Baylor University; 1985.


694. Sanderlin MA. The effects of open focus meditation versus progressive muscle relaxation on blood pressure, heart rate, and peripheral skin temperature [dissertation]. Manhattan, KS: Kansas State University; 1991.


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887. Song R, Lee FO, Lam P. Effects of tai chi exercise on pain, balance, muscle strength, and perceived difficulties in physical functioning in older women with osteoarthritis: a randomized clinical trial. J Rheumatol 2003;30(9):2039-44.


List of Studies Potentially Relevant to the Review

The following studies were not retrieved through the formal literature search and were identified by peer reviewers as potentially relevant to this review. (n = 17).

More detailed examination of these studies is required to determine which, if any, of the research topics they may help to address.
# Abbreviations

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
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<tbody>
<tr>
<td>AA</td>
<td>Alcoholics Anonymous</td>
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<tr>
<td>ACF</td>
<td>adrenocortical functioning</td>
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<td>Ach</td>
<td>acetylcholine</td>
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<td>AEI</td>
<td>artery elasticity index</td>
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<td>AHM</td>
<td>antihypertensive medication</td>
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<tr>
<td>AHRQ</td>
<td>Agency for Healthcare Research and Quality</td>
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<tr>
<td>Al</td>
<td>alpha index</td>
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<td>AMI</td>
<td>acute myocardial infarction</td>
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<td>APO-A1</td>
<td>apolipoprotein A1</td>
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<tr>
<td>AT</td>
<td>autogenic training</td>
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<tr>
<td>ATN</td>
<td>attention</td>
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<tr>
<td>BC</td>
<td>blood composition</td>
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<tr>
<td>BDT</td>
<td>bone density test</td>
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<tr>
<td>BE</td>
<td>breathing exercises</td>
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<tr>
<td>BF</td>
<td>biofeedback</td>
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<tr>
<td>BGM</td>
<td>blood gass measurement</td>
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<td>BHT</td>
<td>borderline hypertension</td>
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<tr>
<td>BHt</td>
<td>breath holding time</td>
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<td>BL</td>
<td>blood lactate</td>
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<td>BM</td>
<td>blood measurement</td>
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<td>BMI</td>
<td>body mass index</td>
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<td>BNP</td>
<td>B-type natriuretic peptide</td>
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<td>BP</td>
<td>blood pressure</td>
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<tr>
<td>BR</td>
<td>breathing rate</td>
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<td>bpm</td>
<td>beats per minute</td>
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<td>BS</td>
<td>blood sugar</td>
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<tr>
<td>Ca</td>
<td>calcium</td>
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<tr>
<td>CABs</td>
<td>coronary artery bypass surgery</td>
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<td>cAMP</td>
<td>cyclic adenosine monophosphate</td>
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<td>CF</td>
<td>cognitive function</td>
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<tr>
<td>CHD</td>
<td>chronic heart disease</td>
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<td>ChE</td>
<td>cholinesterase</td>
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<tr>
<td>CIIMT</td>
<td>carotid intima media thickness</td>
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<tr>
<td>CM</td>
<td>carbohydrate metabolism</td>
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<tr>
<td>CMCT</td>
<td>contemplative meditation with breathing techniques</td>
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<tr>
<td>CNS-H</td>
<td>central nervous system hormone</td>
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<td>CO</td>
<td>cardiac output</td>
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<tr>
<td>COG/N</td>
<td>cognitive/neuropsychological</td>
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<tr>
<td>COPD</td>
<td>chronic obstructive pulmonary disease</td>
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<td>CPR</td>
<td>cold pressor response</td>
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<tr>
<td>Cr</td>
<td>creatinine</td>
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<tr>
<td>CRT</td>
<td>cognitive restructuring training</td>
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<td>CSM</td>
<td>Clinically Standardized Meditation</td>
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<td>CTY</td>
<td>creativity</td>
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<td>CV</td>
<td>cardiovascular</td>
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<td>CVF</td>
<td>cardiovascular functioning</td>
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<td>day(s)</td>
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<tr>
<td>DBH</td>
<td>dopamine beta hydroxylase</td>
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<td>DBP</td>
<td>diastolic blood pressure</td>
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<td>DHEAS</td>
<td>dehydroepiandrosterone</td>
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<td>digestive</td>
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<td>diabetes mellitus</td>
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<td>DPH</td>
<td>digital pulse volume</td>
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<td>E/A ratio</td>
<td>early filling divided by atrial constriction</td>
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<td>ECG</td>
<td>electrocardiography</td>
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<td>EEG</td>
<td>electroencephalogram</td>
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<td>EMG</td>
<td>electromyography</td>
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<td>EPC</td>
<td>Evidence-based Practice Center</td>
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<td>EPI</td>
<td>epinephrine</td>
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<td>ESR</td>
<td>erythrocyte sedimentation rate</td>
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<td>FBS</td>
<td>fasting blood sugar</td>
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<tr>
<td>FEV1</td>
<td>forced expiratory volume in one second</td>
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<td>FPA</td>
<td>finger plethysmogram amplitude</td>
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<td>FVC</td>
<td>forced vital capacity</td>
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<td>GH</td>
<td>growth hormone</td>
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<td>Glc</td>
<td>glucose</td>
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<td>GLH</td>
<td>glycosylated hemoglobin</td>
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<td>glutathione</td>
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<td>GSR</td>
<td>galvanic skin response</td>
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<td>HR</td>
<td>heart rate</td>
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<td>HRQL</td>
<td>heart rate variability</td>
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<td>HRV</td>
<td>hypertension</td>
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<td>homovanillic acid</td>
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<tr>
<td>HVA</td>
<td>interquartile range</td>
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<td>IQR</td>
<td>intention-to-treat</td>
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<tr>
<td>IVST</td>
<td>intraventricular septal thickness</td>
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<td>JNC 7</td>
<td>Joint National Committee 7</td>
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<tr>
<td>K</td>
<td>potassium</td>
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<td>LDL-C</td>
<td>low-density lipoprotein cholesterol</td>
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<td>LDH</td>
<td>lactate dehydrogenase</td>
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LFPMF low frequency pulsed magnetic field
LIP lipoproteins
LLM lowering lipid medication
LSD lysergic acid diethylamide
Lt left
LV DIS left ventricular internal dimension at systole
LV DDI left ventricular end diastolic volume index
LVEF left ventricular ejection fraction
LV DDI left ventricular internal dimension at diastole
LVMi left ventricular mass index
MBCT mindfulness-based cognitive therapy
MBSR mindfulness-based stress reduction
MEM memory
MEP maximum expiratory volume
Mg magnesium
MHPG 3-methoxy-4-hydroxyphenylglycol
MI myocardial infarction
MIP maximum inspiratory pressure
MM mindfulness meditation
mo. month(s)
MSK musculoskeletal
MVV maximal voluntary ventilation
Na sodium
NA not applicable
NCCAM National Center for Complementary and Alternative Medicine
ND not described
NE norepinephrine
NER nervous
NHS National Health System
NIDDM noninsulin dependent diabetes mellitus
N/M nutrition/metabolism
NOS Newcastle-Ottawa Scales
NR not reported
NRCT nonrandomized controlled clinical trial
NS not specified
NT no treatment
NYHA New York Heart Association
OGTT oral glucose tolerance test
OH-DOC hydroxydeoxycorticosterone
OR odds ratio
PAA peak aortic acceleration
PaO2 pressure of oxygen
PBI protein bound iodine
PEF (25-75) peak expiratory flow at middle portion of expiration
PEFR peak expiratory flow rate
PER perception
PFT pulmonary function test
PIFR peak inspiratory flow rate
PLB placebo
P-MDA plasma malondialdehyde
PMR progressive muscle relaxation
PO2 pressure of oxygen
PP pulse pressure
PPT physical performance test
PRA plasma renin activity
PR pulse rate
PWT posterior wall thickness
RA renin activity
RCT randomized controlled clinical trial
RER respiratory exchange ratio
RES respiratory rate
R-V respiratory variability
RFT renal function test
RPP rate pressure product
RR relaxation response
RS-G reasoning
RT reaction time
S right
SA spatial ability
S-AO2 saturated oxygen
SBP systolic blood pressure
S-Ca serum calcium
SCL skin conductance level
SD standard deviation
SE se
SEN sensory
SI serum insulin
SM-D standardized mean difference
S-Mg serum magnesium
SMF sensory motor function
SPSS Statistical Package for the Social Sciences
SRL skin resistance level
SRS Systematic Review Software
SVR systemic vascular resistance
TC total cholesterol
total energy expenditure
TG triglycerides
TEP technical expert panel
THR thermoregulatory
TM Transcendental Meditation®
TOO Task Order Officer
TS-H thyroid stimulating hormone
Appendix A. Technical Experts and Peer Reviewers

Technical Expert Panel

In designing the study questions and methodology at the outset of this report, the EPC consulted several technical and content experts. Broad expertise and perspectives are sought. Divergent and conflicted opinions are common and perceived as health scientific discourse that results in a thoughtful, relevant systematic review. Therefore, in the end, study questions, design and/or methodologic approaches do not necessarily represent the views of individual technical and content experts.

Name Institution
John Astin, Ph.D. California Pacific Medical Center, San Francisco, CA, United States
Ruth Baer, Ph.D. University of Kentucky, Lexington, KT, United States
Vernon Barnes, Ph.D. Medical College of Georgia, Augusta, GA, United States
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Jeffery Dusek, Ph.D. Harvard Medical School, Boston, MA, United States
Thierry Lacaze-Masmonteil, M.D., Ph.D., F.R.C.P.C. University of Alberta, Edmonton, AB, Canada
Badri Rickhi, M.D., Ph.D. Canadian Institute of Natural and Integrative Medicine (CINIM), Calgary, AB, Canada
David Shannahoff-Khalsa, B.A. University of California at San Diego, San Diego, CA, United States

Peer Reviewers

Peer reviewer comments on a preliminary draft of this report were considered by the EPC in preparation of this final report. Synthesis of the scientific literature presented here does not necessarily represent the views of individual reviewers.

Name Institution
Kirk Warren Brown, Ph.D. Virginia Commonwealth University, Richmond, VA, United States
Bei-Hung Chang, Sc.D. Boston University School of Public Health, Boston, MA, United States
Thawatchai Krisanaprakornkit, M.D. Khon Kaen University, Khon Kaen, Thailand
T. M. Srinivasan, Ph.D. The International Society for the Study of Subtle Energies and Energy Medicine, Madras (Chennai), India
Harald Walach, Ph.D. The University of Northampton, Northampton, United Kingdom
Ken Walton, Ph.D. Maharishi University of Management, Fairfield, IA, United States
Gloria Yeh, M.D., M.P.H. Osher Institute at Harvard Medical School, Boston, MA, United States
Appendix B. Development of Consensus on a Set of Criteria for an Operational Definition of Meditation

A consensus definition of meditation has not been established. The rationale for developing a consensus definition for meditation was to guide an unbiased selection of studies to be included in the review. We sought to develop consensus among a panel of experts on a set of criteria for a working definition of meditation; the relative importance of these criteria in defining a practice as meditation; and on a classification of practices as meditation or not meditation.

Methods

Study Design

A five-round modified Delphi study was conducted from August to December 2006. The Delphi technique is a research tool designed to address complex problems with a high level of uncertainty that are not suited to statistical methods or open deliberation. Its goal is to obtain the most reliable consensus among a group of experts on a particular topic. The technique involves recruiting a group of experts to participate in an iterative process of answering a questionnaire, receiving feedback regarding group responses, and revising their opinions in light of this feedback. The distinguishing characteristics of the Delphi technique are anonymity, iteration (processes occur in rounds), controlled feedback, (showing the distribution of the group’s response) and statistical group response (expressing judgment using summary measures of the full group response). This method was chosen over other consensus techniques due to its ability to allow all group members equal participation and influence, even when separated geographically.

Study Participants

Participants were seven individuals who acted as members of the Technical Expert Panel (TEP) for a report on the state of the research of meditation practices in healthcare. Each member lived in the United States or Canada and had expertise and training in meditation practices.

Development of Questionnaires

An initial list of potential criteria for an operational definition of meditation was generated from a preliminary list of key articles. Similarly, a list of potential meditation practices was developed based on an initial review of the literature. The items were refined through an iterative review process, until a set of nine criteria to define meditation was found. The first-round questionnaire consisted of two parts. In the first part of the survey, participants were asked to rate the importance of the nine criteria as “not important at all,” “important but not essential,” or “essential.” They were also asked to suggest any other criteria that they felt were essential for a working definition of meditation. In the second part of the questionnaire, participants were given a list of 41 interventions and were asked to indicate which interventions qualified as meditation practices based on the essential criteria rated in the first part of the questionnaire. The participants were also asked to indicate any other intervention that they believed involved meditation but that was not represented in the list.

In round two, feedback was provided on the group responses from round one. The participants were asked to reflect on their responses from the first round in light of the peer responses and to either confirm or change their responses accordingly. Based on round one comments, the wording of some criteria was modified, and three practices were added to the list of interventions. The second-round process was repeated until consensus was reached in round five. Round three helped to establish consensus on items for which disagreement persisted. Round four aimed to determine if the criteria considered “essential” to meditation in previous rounds were, in fact, a necessary part of the practices. Participants were asked to indicate which of the “essential” and “important but not essential” criteria applied to each potential intervention. The list of potential meditation practices was refined until consensus was reached.

Study Procedures

The TEP members received a personalized letter describing the Delphi process, and the expectations regarding their participation. The questionnaires were sent electronically. Participants were given up to 1 week to respond to each questionnaire, and nonresponders were sent one reminder. Although participants were aware of the identity of other responders, they were blind to individual responses, ensuring anonymity throughout the process.

Data Analysis

Data from electronic questionnaires were exported into Microsoft Excel (Microsoft Corporation, Redmond, WA) spreadsheets and analyzed with Statistical Package for the Social Sciences for Windows (SPSS™ version 14.1, SPSS, Inc., Chicago, IL). Categorical data were collected from each survey round and expressed as frequencies. The frequency of endorsement was tabulated for each criteria and practice. A priori, it was established that a frequency of endorsement of five out of seven would be considered consensus.

Results

The response rate in all rounds of the survey was 100 percent. Table B1 shows the experts’ final-round responses regarding the importance of various criteria for a working definition of meditation. Participants in the Delphi study agreed that a meditation practice (1) uses a defined technique, (2) involves logic relaxation, and (3) involves a self-induced state/mode. These criteria were considered essential. Participants also agreed that a meditation practice may (1) involve a state of psychophysical relaxation somewhere in the process; (2) use a self-focus skill or anchor; (3) involve an altered state/mode of consciousness, mystic experience, enlightenment or suspension of logical thought processes; (4) be embedded in a religious/spiritual/philosophical context; or (5) involve an experience of mental silence. After round four, participants did not reach consensus on whether bringing about mental calmness and physical relaxation by suspending the stream of thoughts would be essential or important to define an intervention as meditation.
This study was undertaken to develop a working definition of meditation that could be used to clearly differentiate meditation practices from those that are not meditation. These criteria formed part of a multicomponent approach to study selection in the report on the state of research of meditation practices for healthcare. The results of this study provide valuable insight into the problem of defining meditation and contribute with a preliminary set of criteria with which to judge potential meditation practices.
Appendix C. Exact Search Strings

Table C1. MEDLINE®—Ovid version (continued)

<table>
<thead>
<tr>
<th>Search String</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>100. (observational adj5 (study or studies or design)) .ti,ab.</td>
<td></td>
</tr>
<tr>
<td>101. Longitudinal .mp.</td>
<td></td>
</tr>
<tr>
<td>102. Retrospective .ti,ab.</td>
<td></td>
</tr>
<tr>
<td>103. Relative risk .ti,ab.</td>
<td></td>
</tr>
<tr>
<td>104. Odds ratio .ti,ab.</td>
<td></td>
</tr>
<tr>
<td>105. (case adj (comparison or referent)) .ti,ab.</td>
<td></td>
</tr>
<tr>
<td>106. (Causation or causal$) .ti,ab.</td>
<td></td>
</tr>
<tr>
<td>107. (Analytic adj (study or studies)) .ti,ab.</td>
<td></td>
</tr>
<tr>
<td>108. or/78-107</td>
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</tr>
<tr>
<td>109. 108 not 65</td>
<td></td>
</tr>
<tr>
<td>110. 109 not (66 or 77)</td>
<td></td>
</tr>
<tr>
<td>111. 66 or 77 or 109</td>
<td></td>
</tr>
<tr>
<td>112. 57 and 111</td>
<td></td>
</tr>
<tr>
<td>113. limit 112 to (humans and english language)</td>
<td></td>
</tr>
<tr>
<td>114. limit 113 to &quot;all adult(19 plus years)&quot;</td>
<td></td>
</tr>
<tr>
<td>115. 113 not 114</td>
<td></td>
</tr>
<tr>
<td>116. limit 115 to &quot;all child (0 to 18 years)&quot;</td>
<td></td>
</tr>
<tr>
<td>117. 115 not 116</td>
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<tr>
<td>118. 114 or 117</td>
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<tr>
<td>119. remove duplicates from 118</td>
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<tr>
<td>120. systematic review$ .mp.</td>
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</tr>
<tr>
<td>121. systematic literature review$ .mp.</td>
<td></td>
</tr>
<tr>
<td>122. meta-analysis .sh.</td>
<td></td>
</tr>
<tr>
<td>123. (meta-analysis$ or metaanalysis$) .ti,ab.</td>
<td></td>
</tr>
<tr>
<td>124. evidence-based medicine .mp.</td>
<td></td>
</tr>
<tr>
<td>125. quantitative review$ .ti,ab.</td>
<td></td>
</tr>
<tr>
<td>126. quantitative overview$ .ti,ab.</td>
<td></td>
</tr>
<tr>
<td>127. quantitative synthesis$ .ti,ab.</td>
<td></td>
</tr>
<tr>
<td>128. quantitative analysis$ .ti,ab.</td>
<td></td>
</tr>
<tr>
<td>129. (evidence-based adj (guideline$ or recommendation$)) .mp.</td>
<td></td>
</tr>
<tr>
<td>130. health planning guideline$ .mp.</td>
<td></td>
</tr>
<tr>
<td>131. (cochrane database of systematic reviews).mp.</td>
<td></td>
</tr>
<tr>
<td>132. cochrane .mp.</td>
<td></td>
</tr>
<tr>
<td>133. (ech journal club).mp.</td>
<td></td>
</tr>
<tr>
<td>134. (health tech$ assessment or hla).mp.</td>
<td></td>
</tr>
<tr>
<td>135. technology$ .mp.</td>
<td></td>
</tr>
<tr>
<td>136. evidence based nursing .mp.</td>
<td></td>
</tr>
<tr>
<td>137. evidence based mental health .mp.</td>
<td></td>
</tr>
<tr>
<td>138. clinical evidence .mp.</td>
<td></td>
</tr>
<tr>
<td>139. (biomedical technology assessment.sh).</td>
<td></td>
</tr>
<tr>
<td>140. evidence based medicine .mp.</td>
<td></td>
</tr>
<tr>
<td>141. (clinical and studies).mp.</td>
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<tr>
<td>142. drilling .mp.</td>
<td></td>
</tr>
<tr>
<td>143. core .mp.</td>
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</tr>
<tr>
<td>144. (ech journal club.mp. or (health tech$ assessment or hla).mp.).</td>
<td></td>
</tr>
<tr>
<td>145. technology$ .mp.</td>
<td></td>
</tr>
<tr>
<td>146. evidence based nursing .mp.</td>
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</tr>
<tr>
<td>147. evidence based mental health .mp.</td>
<td></td>
</tr>
<tr>
<td>148. clinical evidence .mp.</td>
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<tr>
<td>149. (biomedical technology assessment.sh).</td>
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</tr>
<tr>
<td>150. evidence based medicine .mp.</td>
<td></td>
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<tr>
<td>151. (clinical and studies).mp.</td>
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</tr>
<tr>
<td>152. evidence based medicine .mp.</td>
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</tr>
<tr>
<td>153. (clinical and studies).mp.</td>
<td></td>
</tr>
<tr>
<td>154. evidence based medicine .mp.</td>
<td></td>
</tr>
<tr>
<td>155. (clinical and studies).mp.</td>
<td></td>
</tr>
<tr>
<td>156. (medline or medlars or pubmed or index medicus or cochrace or science web of science or psychinfo or psychinfo or experta medica or science citation index or sciences citation index or biological abstracts).mp.</td>
<td></td>
</tr>
<tr>
<td>157. (clinical and studies).mp.</td>
<td></td>
</tr>
<tr>
<td>158. (treatment outcome or combination or combining or peto or der simonian or dersimonian or fixed effect$ or pooled or pooling or mantel haenszel).mp.</td>
<td></td>
</tr>
<tr>
<td>159. or/154-157</td>
<td></td>
</tr>
<tr>
<td>160. 149 and 153 and 159</td>
<td></td>
</tr>
<tr>
<td>161. 141 or 160</td>
<td></td>
</tr>
<tr>
<td>162. case report .ti,sh.</td>
<td></td>
</tr>
<tr>
<td>163. editorial .ti,sh.</td>
<td></td>
</tr>
<tr>
<td>164. letter .pt.</td>
<td></td>
</tr>
<tr>
<td>165. note .pt.</td>
<td></td>
</tr>
<tr>
<td>166. or/162-165</td>
<td></td>
</tr>
<tr>
<td>167. 161 not 166</td>
<td></td>
</tr>
<tr>
<td>168. 167 and 57</td>
<td></td>
</tr>
<tr>
<td>169. 168 not 119</td>
<td></td>
</tr>
<tr>
<td>170. meta-analysis .pt.</td>
<td></td>
</tr>
<tr>
<td>171. or/169-170</td>
<td></td>
</tr>
<tr>
<td>172. ((quantitativ$ adj review$1) or quantitativ$) .mp.</td>
<td></td>
</tr>
<tr>
<td>173. (systematic adj review$1) or systematic adj .mp.</td>
<td></td>
</tr>
<tr>
<td>174. (methodologic adj review$1) or methodologic adj .mp.</td>
<td></td>
</tr>
<tr>
<td>175. (integrat$ adj research).mp.</td>
<td></td>
</tr>
<tr>
<td>176. (quantitativ$ adj3 synth$).mp.</td>
<td></td>
</tr>
<tr>
<td>177. or/170-176</td>
<td></td>
</tr>
<tr>
<td>178. review .pt.</td>
<td></td>
</tr>
<tr>
<td>179. (medline or medlars or pubmed or index medicus or embase or cochrace).mp.</td>
<td></td>
</tr>
<tr>
<td>180. (science web of science or psychinfo or psychinfo or clinical or clinhal).mp.</td>
<td></td>
</tr>
<tr>
<td>181. (excerpta medica or psychi or psychi or current developments or science citation index or sciences citation index).mp.</td>
<td></td>
</tr>
<tr>
<td>182. (hand search or manual search).mp.</td>
<td></td>
</tr>
<tr>
<td>183. (electronic adj database$) or bibliographic adj database$ or periodical index$ .mp.</td>
<td></td>
</tr>
<tr>
<td>184. (postdoc or mantel haenszel).mp.</td>
<td></td>
</tr>
<tr>
<td>185. (peto or der simonian or dersimonian or fixed effect$).mp.</td>
<td></td>
</tr>
<tr>
<td>186. (combined or combining) adj (data or trial or trials or study or result or results).mp.</td>
<td></td>
</tr>
<tr>
<td>187. or/179-186</td>
<td></td>
</tr>
<tr>
<td>188. 178 and 187</td>
<td></td>
</tr>
<tr>
<td>189. 177 or 188</td>
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</tr>
</tbody>
</table>

Note: The search strings are designed to capture the relevant literature from MEDLINE, focusing on studies that involve meditation, stress reduction techniques, and related methodologies.
Table C1. MEDLINE®—Ovid version (continued)

190. (hta$ or health technology assessment$ or biomedical technology assessment$).mp.
191. technology assessment, biomedical/ or biomedical technology assessment/ 192. 190 or 191
193. 189 or 192
194. 119 and 193
195. 57 and 193
196. 119 or 195

Table C2. EMBASE—Ovid version

Years/issue searched: 1988 to 2005, week 36
Search date: September 8, 2005

1. exp meditation/
2. Transcendental meditation/
3. exp yoga/
4. meditat$.mp.
5. cogit$.ti,ab.
6. Pranayam$.mp.
7. kapalabhati.ti,ab.
8. (yoga or yogic$).mp.
9. mindf$.mp.
10. zen.ti,ab.sh.
11. transcendental.ti,ab.
12. TM-Sidhi.mp.
13. mahayana.ti,ab.
14. hinj$i$.ti,ab.
15. theravada$ti,ab.
16. vajrayana.ti,ab.
17. (vipissana or vipashyana$).ti,ab.
18. (dhyan$ or dyana$).ti,ab.
19. dharana.ti,ab.
20. zazen.ti,ab.
21. (kinema$ or KM).ti,ab.
22. (mani$ or mantras).mp.
23. (samadhi or sama$ha$).ti,ab.
24. pratyahara.ti,ab.
25. purusha.ti,ab.
26. prakruti.ti,ab.
27. ((Visual or guided) adj5 imagery).mp.
28. ((guided or creative or vivid) adj visualization$).ti,ab.
29. pray$.mp.
30. Hesychasm.ti,ab.
31. lectio divina.ti,ab.
32. bonadona.ti,ab.
33. (qigong or qi gong$).mp.
34. ch'i kung.ti,ab.
35. "Tae Eul Ju".ti,ab.
36. relaxation training$ and (Psychophysiology/ or Breathing Exercise$)
37. "Mental Concentration" and (Breathing Exercise$ or relaxation training$)
38. (mind adj body$).ti,ab.
39. brain mind relationship$.
40. exp Tai Chi/
41. (tai $ or tai ji$).mp.
42. Taijiquan$ti,ab.
43. "open awareness$".mp.
44. "focused awareness$".mp.
45. "relaxation response".mp.
46. "progressive muscle relaxation$".ti,ab.
47. progressive relaxation$ti,ab.
48. "forced nostril breathing$".ti,ab.
49. "Unin$tr$ breathing$".ti,ab.
50. "unilateral breathing$".ti,ab.
51. (Kundalini or Kundalini$).mp.
52. raja.ti,ab.
53. hatha.ti,ab.
54. "sudarshan kriya$".ti,ab.
55. RRMM$ti,ab.
56. MBSR.ti,ab.
57. MBCT.ti,ab.
58. "zoom lens attention$".ti,ab.
59. "Wide-angle lens attention$".ti,ab.
60. ("Anapan$ Sat$" or anapanasati$).mp.
61. khus-khus$.
62. cr1-61
63. Randomized Controlled Trial/
64. exp Randomization$.
65. Double Blind Procedure/
66. Single Blind Procedure/
67. on63-66
68. Clinical Trial/
69. (clin$ adj25 (trial$ or study or studies or design$)).mp.
70. (singl$ or double$ or trebl$ or tripl$) adj25 (blind$ or mask$).mp.
71. exp Placebo/
72. placebo$ or random$).mp.
73. exp Methodology/
74. exp Comparative Study/
75. exp Evaluation/
76. exp Follow Up/
77. exp Prospective Study/
78. clinical study$.
79. case control study$.
80. family study$.
81. longitudinal study$.
82. retrospective study$.
83. cohort analysis$.
84. exp Risk$.
85. (allocat$ or compar$ or assign$ or treatme$ or control$ or interven$ or experiment$) and (group or groups$).mp.
86. (group or groups$).ti,ab.
87. (control$ or prospective$ or retrospective$ or volunteer$ or participant$ or compar$) and (trial$ or study or studies or design$).ti,ab,sh.
88. cohort$ti,ab.
89. (case-control$).ti,ab.
90. "Cross sectional$".ti,ab.
91. (observational adj35 (study or studies or design$)).ti,ab.
92. Longitudinal$.
93. Retrospective$ti,ab.
94. "Relative risk$".ti,ab.
95. "Odds ratio$".ti,ab.
96. (Follow up adj35 (study or studies or design$)).ti,ab.
97. (case adj (comparison or referent$)).ti,ab.
98. (Causation or cause$).ti,ab.
99. (Analytic adj (study or studies$)).ti,ab.
100. (epidemiologic$ adj (study or studies$)).ti,ab.
101. cr68-99
102. 67 or 101
### Table C2. EMBASE—Ovid version (continued)

<table>
<thead>
<tr>
<th>103</th>
<th>limit 102 to human</th>
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</thead>
<tbody>
<tr>
<td>104</td>
<td>Nonhuman</td>
</tr>
<tr>
<td>105</td>
<td>103 not 104</td>
</tr>
<tr>
<td>106</td>
<td>62 and 105</td>
</tr>
<tr>
<td>107</td>
<td>limit 106 to english language</td>
</tr>
<tr>
<td>108</td>
<td>limit 107 to (adult &lt;18 to 64 years&gt; or aged &lt;65+ years&gt;)</td>
</tr>
<tr>
<td>109</td>
<td>107 not 108</td>
</tr>
<tr>
<td>110</td>
<td>limit 109 to (embryo or infant or child or preschool child &lt;1 to 6 years&gt; or school child &lt;7 to 12 years&gt;)</td>
</tr>
<tr>
<td>111</td>
<td>109 not 110</td>
</tr>
<tr>
<td>112</td>
<td>108 or 111</td>
</tr>
<tr>
<td>113</td>
<td>remove duplicates from 112</td>
</tr>
<tr>
<td>114</td>
<td>systematic review$</td>
</tr>
<tr>
<td>115</td>
<td>systematic literature review$</td>
</tr>
<tr>
<td>116</td>
<td>meta-analysis sh.</td>
</tr>
<tr>
<td>117</td>
<td>(meta-analysis1 or metaanaly$1).ti,ab.</td>
</tr>
<tr>
<td>118</td>
<td>evidence-based medicine mp.</td>
</tr>
<tr>
<td>119</td>
<td>quantitative review$</td>
</tr>
<tr>
<td>120</td>
<td>quantitative overview$</td>
</tr>
<tr>
<td>121</td>
<td>quantitative synthesis$</td>
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<td>quantitative analysis$</td>
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<td>123</td>
<td>evidence-based adj (guideline$ or recommendation$)</td>
</tr>
<tr>
<td>124</td>
<td>health planning guideline$</td>
</tr>
<tr>
<td>125</td>
<td>cochrane database of systematic reviews mp.</td>
</tr>
<tr>
<td>126</td>
<td>csdr.mp.</td>
</tr>
<tr>
<td>127</td>
<td>acp journal club mp.</td>
</tr>
<tr>
<td>128</td>
<td>(health tech$ assess$ or hta).mp.</td>
</tr>
<tr>
<td>129</td>
<td>technology$ assess$.mp.</td>
</tr>
<tr>
<td>130</td>
<td>evidence based nursing mp.</td>
</tr>
<tr>
<td>131</td>
<td>evidence based mental health mp.</td>
</tr>
<tr>
<td>132</td>
<td>clinical evidence mp.</td>
</tr>
<tr>
<td>133</td>
<td>biomedical technology assessment sh.</td>
</tr>
<tr>
<td>134</td>
<td>evidence report$</td>
</tr>
<tr>
<td>135</td>
<td>or/114-134</td>
</tr>
<tr>
<td>136</td>
<td>systematic$</td>
</tr>
<tr>
<td>137</td>
<td>critical mp.</td>
</tr>
<tr>
<td>138</td>
<td>(study and selection).ti,ab.</td>
</tr>
<tr>
<td>139</td>
<td>(predetermined or inclusion) and criteri$</td>
</tr>
<tr>
<td>140</td>
<td>exclusion criteri$</td>
</tr>
<tr>
<td>141</td>
<td>main outcome measure$</td>
</tr>
<tr>
<td>142</td>
<td><em>standard$ of care</em></td>
</tr>
<tr>
<td>143</td>
<td>or/130-142</td>
</tr>
<tr>
<td>144</td>
<td>(survey$ or overview$ or review or reviews or search$ or handsearch$).mp.</td>
</tr>
<tr>
<td>145</td>
<td>(analy$ or critique or appraisalal).mp.</td>
</tr>
<tr>
<td>146</td>
<td>(reduction and risk or death or occurrence$).mp.</td>
</tr>
<tr>
<td>147</td>
<td>or/144-146</td>
</tr>
<tr>
<td>148</td>
<td>(literature or article$ or publication$ or bibliograph$ or published or unpublished or citation$ or database$ or internet or reference$ or textbook$ or trial$).mp.</td>
</tr>
<tr>
<td>149</td>
<td>meta-analysis sh.</td>
</tr>
<tr>
<td>150</td>
<td>(medline or medlars or pubmed or index medicus or cochrane or scisearch or web of science or psychinfo or psychlit or crain$ or experta medic$ or medscience citation index or sciences citation index or biological abstracts).mp.</td>
</tr>
</tbody>
</table>

### Table C2. EMBASE—Ovid version (continued)

| 151 | (clinical and studies).mp. |
| 152 | (treatment or outcome or combined or combining or peto or der simonian or dersimonian or fixed effect$ or pooled or pooling or mantel haenszel).mp. |
| 153 | or/148-151 |
| 154 | 143 and 147 and 153 |
| 155 | 135 or 154 |
| 156 | case report ti,sh. |
| 157 | editorial ti,pt. |
| 158 | letter pt. |
| 159 | note pt. |
| 160 | or/156-159 |
| 161 | 155 not 160 |
| 162 | meta-analysis pt. |
| 163 | (meta-analysis or metaanal$1).mp. |
| 164 | ((quantitative or adj3 review$1 or quantitative$) adj3 overview$).mp. |
| 165 | (((systematic adj3 review$1 or systematic) adj3 overview$1).mp. |
| 166 | (((methodologic adj3 review$1 or methodologic) adj3 overview$).mp. |
| 167 | (integrat$ adj5 research).mp. |
| 168 | (quantitativ$ adj3 synthesis$).mp. |
| 169 | or/162-168 |
| 170 | review pt. or (review or overview$).mp. |
| 171 | (medline or medlars or pubmed or index medicus or cochrane).mp. |
| 172 | (scisearch or web of science or psychinfo or psychlit or crain$ or experta).mp. |
| 173 | (excerpta medic$ or psychlit or psyclit or current contents or science citation index or sciences citation index).mp. |
| 174 | (hand search$ or manual search$).mp. |
| 175 | (electronic adj3 database$) or bibliographic).mp |
| 176 | (pooling or pooling or mantel haenszel).mp. |
| 177 | (peto or der simonian or dersimonian or fixed effect$).mp. |
| 178 | (combine$ or combining) adj5 (data or trial or trials or studies or study or result or results).mp. |
| 179 | or/171-178 |
| 180 | 170 and 179 |
| 181 | 169 or 180 |
| 182 | (hta$ or health technology assessment$ or biomedical technology assessment$).mp |
| 183 | technology assessment, biomedical$ or biomedical technology assessment/ |
| 184 | 182 or 183 |
| 185 | 181 or 184 |
| 186 | 180 or 185 |
| 187 | 186 and 62 |
| 188 | limit 187 to (human and english language) |
| 189 | limit 188 to (adult <18 to 64 years> or aged <65+ years>) |
| 190 | 188 not 189 |
| 191 | limit 190 to (embryo or infant or child or preschool child <1 to 6 years> or school child <7 to 12 years> or adolescent <13 to 17 years>) |
| 192 | 190 not 191 |
| 193 | 189 or 192 |
| 194 | remove duplicates from 193 |
The first sport study with the Quantum XRay technology was on members of the Cleveland Browns football team in 1998. The results were amazing and all of the participants went all Pro over the next five years. Having worked with the power lifting team of Hungary in 1991 they went from moderate to gold medal performance.

AC Milan bought some systems and their injury level dropped 91%. This was because the system can stimulate and accelerate healing of injured tissue. They asked for us to develop the device to sharpen the athletic skills of the clients. With this in mind we developed a way to sharpen coordination endurance and strength. AC Milan won the European championship the next two years. We worked with Dennis Johnson ex twice NBA MVP in the San Antonio Spurs system. The results were amazing.

The Chinese Olympic team had us do a study. Out of their 467 athletes in the 2008 Olympic Games, they assigned 150 of the sick, old, weak, and tired to us. The study was to see if we could repair injured tissue and get an athlete back onto the field. The results were astounding. Out of the hundred medals won by the Chinese our 30% of the injured performers won 33% of the medals. Our athletes were not supposed to win. And because of this Desire was awarded an honorary Gold medal.

Sports medicine has entered the energetic arena. There are those who want to win and they differ from those who want to conform.

Some of the best cyclists in the world have used the SCIO to win championships.
is THE Medical Concern

Table C3. Central (EBM Reviews–Cochrane Central Register of Controlled Trials)—Ovid version (continued)

<table>
<thead>
<tr>
<th>Page</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>110.</td>
<td>paediatriX.jw.</td>
</tr>
<tr>
<td>111.</td>
<td>adolescencX.jw.</td>
</tr>
<tr>
<td>112.</td>
<td>youth.jw.</td>
</tr>
<tr>
<td>113.</td>
<td>school.jw.</td>
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<td>114.</td>
<td>or/100-113</td>
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<td>115.</td>
<td>or/105,114</td>
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<td>116.</td>
<td>65 and 115</td>
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<td>117.</td>
<td>65 not 115</td>
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<td>118.</td>
<td>65 not 115</td>
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<td>119.</td>
<td>118 or 64</td>
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<tr>
<td>120.</td>
<td>exp meditation/</td>
</tr>
<tr>
<td>121.</td>
<td>Transcendental meditation/</td>
</tr>
<tr>
<td>122.</td>
<td>exp yoga/</td>
</tr>
<tr>
<td>123.</td>
<td>meditatiX.mp.</td>
</tr>
<tr>
<td>124.</td>
<td>cogitatX.ti,ab.</td>
</tr>
<tr>
<td>125.</td>
<td>PranayamX.mp.</td>
</tr>
<tr>
<td>126.</td>
<td>kapalabhati.ti,ab.</td>
</tr>
<tr>
<td>127.</td>
<td>(yoga or yogicX).mp.</td>
</tr>
<tr>
<td>128.</td>
<td>mindtX.mp.</td>
</tr>
<tr>
<td>129.</td>
<td>zen.ti,ab,sh.</td>
</tr>
<tr>
<td>130.</td>
<td>transcendentalti,ab.</td>
</tr>
<tr>
<td>131.</td>
<td>TM-Sidhi.mp.</td>
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<tr>
<td>132.</td>
<td>mahayana.ti,ab.</td>
</tr>
<tr>
<td>133.</td>
<td>hiniyana.ti,ab.</td>
</tr>
<tr>
<td>134.</td>
<td>theraVadatX.ti,ab.</td>
</tr>
<tr>
<td>135.</td>
<td>vajrayanta.ti,ab.</td>
</tr>
<tr>
<td>136.</td>
<td>Evaluation/ti,ab.</td>
</tr>
<tr>
<td>137.</td>
<td>(dhyanat or dyanaX).ti,ab.</td>
</tr>
<tr>
<td>138.</td>
<td>dhana.ti,ab.</td>
</tr>
<tr>
<td>139.</td>
<td>zazen.ti,ab.</td>
</tr>
<tr>
<td>140.</td>
<td>(kinemantra or KM).ti,ab.</td>
</tr>
<tr>
<td>141.</td>
<td>(mantra or mantras).ti,ab.</td>
</tr>
<tr>
<td>142.</td>
<td>(samaX or samatha).ti,ab.</td>
</tr>
<tr>
<td>143.</td>
<td>pratyahara.ti,ab.</td>
</tr>
<tr>
<td>144.</td>
<td>pranushaX.ti,ab.</td>
</tr>
<tr>
<td>145.</td>
<td>prakrutitX.ti,ab.</td>
</tr>
<tr>
<td>146.</td>
<td>((Visual or guided) adj imagery).mp.</td>
</tr>
<tr>
<td>147.</td>
<td>(guided or creative or vivid) adj visualization).ti,ab.</td>
</tr>
<tr>
<td>148.</td>
<td>praytX.mp.</td>
</tr>
<tr>
<td>149.</td>
<td>hesychasmtX.ti,ab.</td>
</tr>
<tr>
<td>150.</td>
<td>lectio divinatX.ti,ab.</td>
</tr>
<tr>
<td>151.</td>
<td>bonadonatX.ti,ab.</td>
</tr>
<tr>
<td>152.</td>
<td>(qigong or qi gong).mp.</td>
</tr>
<tr>
<td>153.</td>
<td>chi.kung.ti,ab.</td>
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<tr>
<td>155.</td>
<td>relaxation training/ and (Psychophysiology/ or Breathing Exercise/).mp.</td>
</tr>
<tr>
<td>156.</td>
<td>&quot;Mental Concentration&quot;/ and (Breathing Exercise/ or relaxation training/).mp.</td>
</tr>
<tr>
<td>157.</td>
<td>(mind adj body).ti,ab.</td>
</tr>
<tr>
<td>158.</td>
<td>brain mind relationship/</td>
</tr>
<tr>
<td>159.</td>
<td>exp Tai Chi</td>
</tr>
<tr>
<td>160.</td>
<td>(tai chi or tai ji).mp.</td>
</tr>
<tr>
<td>161.</td>
<td>taijiquan.ti,ab.</td>
</tr>
<tr>
<td>162.</td>
<td>&quot;open awareness&quot;.mp.</td>
</tr>
<tr>
<td>163.</td>
<td>focused awareness&quot;.mp.</td>
</tr>
<tr>
<td>164.</td>
<td>&quot;relaxation response&quot;.mp.</td>
</tr>
<tr>
<td>165.</td>
<td>&quot;progressive muscle relaxation&quot;.ti,ab.</td>
</tr>
<tr>
<td>166.</td>
<td>progressive relaxation ti,ab.</td>
</tr>
<tr>
<td>167.</td>
<td>&quot;forced nostril breathing&quot;.ti,ab.</td>
</tr>
<tr>
<td>168.</td>
<td>&quot;Uninoster breathing&quot;.ti,ab.</td>
</tr>
<tr>
<td>169.</td>
<td>&quot;unilateral breathing&quot;.ti,ab.</td>
</tr>
<tr>
<td>170.</td>
<td>(Khundalini or Kundalini).mp.</td>
</tr>
<tr>
<td>171.</td>
<td>raja.ti,ab.</td>
</tr>
<tr>
<td>172.</td>
<td>hatha.ti,ab.</td>
</tr>
<tr>
<td>173.</td>
<td>&quot;sudarshan kriya&quot;.ti,ab.</td>
</tr>
<tr>
<td>174.</td>
<td>(Anapana SatX or anapanasati).mp.</td>
</tr>
<tr>
<td>175.</td>
<td>kabat-zinn.ab.</td>
</tr>
<tr>
<td>176.</td>
<td>MBCT.ti,ab.</td>
</tr>
<tr>
<td>177.</td>
<td>&quot;Wide-angle lens attention&quot;.ti,ab.</td>
</tr>
<tr>
<td>178.</td>
<td>&quot;Wide-angle lens attention&quot;.ti,ab.</td>
</tr>
<tr>
<td>179.</td>
<td>MBMT.ti,ab.</td>
</tr>
<tr>
<td>180.</td>
<td>&quot;forced nostril breathing&quot;.ti,ab.</td>
</tr>
<tr>
<td>181.</td>
<td>progressive relaxation.ti,ab.</td>
</tr>
<tr>
<td>182.</td>
<td>progressive muscle relaxation&quot;.ti,ab.</td>
</tr>
<tr>
<td>183.</td>
<td>&quot;relaxation response&quot;.mp.</td>
</tr>
<tr>
<td>184.</td>
<td>&quot;focused awareness&quot;.mp.</td>
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<tr>
<td>185.</td>
<td>&quot;open awareness&quot;.mp.</td>
</tr>
<tr>
<td>186.</td>
<td>(tai chi or tai ji).mp.</td>
</tr>
<tr>
<td>187.</td>
<td>(mind adj body) and (therap$ or treat$ or interven$)).mp.</td>
</tr>
<tr>
<td>188.</td>
<td>(control$ or multicenter or prospectiv$ or retrospective or therapi$) adj10 (blind$ or mask$).mp.</td>
</tr>
<tr>
<td>189.</td>
<td>&quot;sampling (experimental)&quot;/ or Biased Sampling/ or Random Sampling/</td>
</tr>
<tr>
<td>190.</td>
<td>((singl$ or doubl$ or trebl$ or tripl$) adj25 (blind$ or mask$)).mp.</td>
</tr>
<tr>
<td>191.</td>
<td>double dummy.mp.</td>
</tr>
<tr>
<td>192.</td>
<td>((controlled or intervention$ or compar$ or experimen$ or both$ or placebo$ or control$ or factorial or sham$)).mp.</td>
</tr>
<tr>
<td>193.</td>
<td>Experimental Subjects/ or Experiment volunteers/ or Experiment controls/ or Experimental Replication/</td>
</tr>
<tr>
<td>194.</td>
<td>clinical research.mp.</td>
</tr>
<tr>
<td>195.</td>
<td>exp Treatment Effectiveness Evaluation/</td>
</tr>
<tr>
<td>196.</td>
<td>Treatment Outcomes/ or Psychotherapeutic outcomes/</td>
</tr>
<tr>
<td>197.</td>
<td>(outcome$ or adj assessment).mp.</td>
</tr>
<tr>
<td>198.</td>
<td>(longitudinal study or meta analysis or program evaluation or retrospective study or descriptive study or outcome study or empirical study or experimental replication or followup study).fc.</td>
</tr>
<tr>
<td>199.</td>
<td>clinical case report.fc.</td>
</tr>
<tr>
<td>200.</td>
<td>(singl$ or doubl$ or trebl$ or tripl$) adj25 (blind$ or mask$).ti,ab.</td>
</tr>
<tr>
<td>201.</td>
<td>(efficacy or effectiveness or findings or results).mp.</td>
</tr>
<tr>
<td>202.</td>
<td>RESEARCH DESIGN/</td>
</tr>
<tr>
<td>203.</td>
<td>FOLLOW-UP STUDIES/</td>
</tr>
<tr>
<td>204.</td>
<td>PROSPECTIVE STUDIES/</td>
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<tr>
<td>205.</td>
<td>LONGITUDINAL STUDIES/</td>
</tr>
<tr>
<td>206.</td>
<td>Comorbidity/</td>
</tr>
<tr>
<td>207.</td>
<td>exp Probability/</td>
</tr>
<tr>
<td>208.</td>
<td>((Allocat$ or control$ or assign$ or treatment or compar$ or interven$ or experimental$) and (group or groups)).mp.</td>
</tr>
<tr>
<td>209.</td>
<td>(group or groups).ti,ab.</td>
</tr>
<tr>
<td>210.</td>
<td>((control$ or multicenter or prospectiv$ or evaluat$ or outcome$ or volunteers$ or subjects or participant$ or compar$) and (trial$ or study or studies or design)).mp.</td>
</tr>
<tr>
<td>211.</td>
<td>Ss.ab.</td>
</tr>
<tr>
<td>212.</td>
<td>cohortX.ti,ab.</td>
</tr>
<tr>
<td>213.</td>
<td>case-controlX.ti,ab.</td>
</tr>
</tbody>
</table>
Table C5. AMED (Allied and Complementary Medicine)—Ovid version

Years/issue searched: 1985 to September 2005
Search date: September 30, 2005

1. exp meditation/
2. exp yoga/
3. medita$ or meditat$.
4. cogitat$.
5. Pranayama/s.
6. kapalabhati, t.ab.
7. (yoga or yogi$).mp.
8. mind$t$.
9. zen, t.ab.
10. transcendent$al, t.ab.
11. TM-Sidhi.
12. mahayana, t.ab.
13. hinyana, t.ab.
14. theravada$.
15. vajrayana, t.ab.
16. (vipassana or vipashyana), t.ab.
17. dharma, t.ab.
18. zazen, t.ab.
19. (kinema$ or KMI), t.ab.
20. (mantra or mantras), mp.
21. (samadhi or samatha), t.ab.
22. pratyahara.
23. (samadhi or samadhi$).
24. dhyan$.
25. prakruti.
26. pratyahara.
27. (sama$ or samatha$).
28. dharana.
29. (dhyana or dhyana$).
30. (vipassana or vipassana$).
31. (meditation or meditations$).
32. (vipassana or vipassana$).
33. (meditation or meditations$).
34. (meditation or meditations$).
35. (meditation or meditations$).
36. (mantra or mantras$).
37. (mantra or mantras$).
38. (mantra or mantras$).
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98. (mantra or mantras$).
99. (mantra or mantras$).
100. (mantra or mantras$).
101. (mantra or mantras$).
102. double blind method.
103. single blind method.
104. clinical trial.
105. comparative study.
106. exp cohort study.
107. age factors.
108. comorbidity.
109. exp risk.
110. therapy or treatment.$.
111. (epidemiologic adj (study or studies)).t.ab.
112. clinical research.
113. or/81-112
114. 113 and 80
115. meta-analysis.
116. (meta-analytic or metaanalytic).mp.
117. ((methodologic adj (review$1) or methodologic).mp.
118. (meta-analysis or metaanalytic).mp.
119. (methodologic adj (review$1) or methodologic).mp.
120. (meta-analysis or metaanalytic).mp.
121. (methodologic adj (review$1) or methodologic).mp.
122. (methodologic adj (review$1) or methodologic).mp.
123. review.
124. (medicines or medici$ or plumbed or index medicus or embase or cochrane).mp.
125. (science or web of science or psycinfo or psychinfo or cinahl or cinhal).mp.
126. (experimen$ or psych$ or psy$ or current contents or science citation index or sciences citation index).mp.
127. (hand search$ or manual search$).mp.
128. ((electronic adj (database$) or bibliographic).mp.
129. (section or pooled or mantel haenszel).mp.
130. (meta$ or der simonian).mp.
131. (meta-analysis or metaanalytic).mp.
132. (meta-analysis or metaanalytic).mp.
133. (meta-analysis or metaanalytic).mp.
134. (meta-analysis or metaanalytic).mp.
135. (meta-analysis or metaanalytic).mp.
136. (meta-analysis or metaanalytic).mp.
137. (meta-analysis or metaanalytic).mp.
138. (meta-analysis or metaanalytic).mp.
139. (meta-analysis or metaanalytic).mp.
140. (meta-analysis or metaanalytic).mp.

Table C5. AMED (Allied and Complementary Medicine)—Ovid version (continued)
Table C6. CINAHL® (Cumulative Index to Nursing and Allied Health Literature)—Ovid Version

Years/issue searched: 1982 to September 2005, week 5
Search date: October 4, 2005

1. exp MEDITATION (IOWA NIC)? or exp MEDITATION/
2. yoga or mind body techniques/
3. exp Guided Imagery/
4. exp Prayer/
5. exp Tai Chi/
6. exp Relaxation Techniques/
7. exp "progressive muscle relaxation (iowa nic)?"/
8. exp "AUTOGENIC TRAINING (IOWA NIC)?"/
9. medit$.
10. cogitat$.
11. kapalabhati.
13. (yoga or yogi$) [.mp.]
14. mindful$.
15. zen.
16. transcendental.$
17. TM-Sidhi.
18. mahayana.
19. hiniyana.
20. theravada.$
21. vajrayana.
22. (vipissana or vipasshaya)[$].
23. dhana.
24. dhamma.
25. abhaya.
26. (kinema$ or KM)[$].
27. zazen.
28. (mantra or mantras)[$].
29. (dhyana or dyana)[$].
30. (samadhi or samatha)[$].
31. prakruti.
32. purusha.
33. ((visual or guided) adj imagery).[$].
34. pray$.
35. Hesychasm.
36. "techo divina"[$].
37. bonadona.$.
38. (qo$ or qo qong)[.mp.]
39. chi kung.$.
40. "Tai Eul Ju"[$].
41. (tai chi or tai ji)[$].
42. Taijiquan.$.
43. "open awareness"[$].
44. "focused awareness"[$].
45. "relaxation response"[$].
46. "progressive muscle relaxation"[$].
47. progressive relaxation.$.
48. "forced nostril breathing"[$].
49. "Unnostril breathing"[$].
50. (unilateral breathing)[$].
51. (Khundalini or Kundalini).[$]. (mp=title, subject heading word, abstract, instrumentation)
52. raja.$.
53. hatha.$.
54. "sudarshan kriya"[$].
55. RRMM.$.
56. MBSR.$.

Table C6. CINAHL® (Cumulative Index to Nursing and Allied Health Literature)—Ovid version (continued)

98. Age factors/
99. Comorbidity/
100. Odds ratio/
101. Relative Risk or Risk Assessment/
102. Probability/
103. Patient Selection/
104. ((Allocat$ or control$ or assign$ or treatment or compar$ or interven$ or experiment$) and (group or groups)).[mp=title, subject heading word, abstract, instrumentation]
105. (group or groups).[$].
106. (control$ or prospectiv$ or retrospectiv$ or volunteer$ or participant$ or compar$).[$]. and (train$ or study or studies or design).[$].
107. cohorts.$.
108. case-control.$
110. (observational adj5 (study or studies or design)).[$].
111. Longitudinal.$.
112. Retrospective.$.
113. Relative risk.$.
114. Odds ratio.$.
115. (case adj (comparison or referent)).[$].
116. (Causation or caus$).[$].
117. (Analytic adj (study or studies)).[$].
118. or/117-111.
119. 60 and 118.
120. limit 119 to english.
121. limit 120 to (adult <19 to 44 years> or middle age <45 to 64 years> or aged <65 to 79 years> or *aged <80 and over*>)
122. 151 not 152.
123. limit 153 to (fetus or newborn infant or infant <1 to 23 months> or preschool child <2 to 5 years> or child <6 to 12 years> or adolescence <13 to 18 years> or "aged <45 to 64 years>
124. 152 not 155.
125. 155 not 154.
126. 154 or 152.
127. 153 or 151.
128. 151 and 127.
129. ([(electronic adj) database$] or bibliographic adj database$ or periodical index$).[mp.]
130. (pooling or pooled or mantel haenszel$).[mp.]
131. (gcpo or der simonian or dersonian or fixed effect$).[mp.]
132. (combine5 or combining) (adj (data or trial or trials or study or studies or result or results)).[mp.]
133. or/132-143.
134. 142 and 143.
135. 141 and 135.
136. (hand search$ or manual search$).[$].
137. (excerpta medica or psychlit or psyclit or current contents or scienced citation index or sciences citation index).[$].
138. (hand search$ or manual search$).[$].
Table C7. Web of Science®—Institute for Scientific Information—The Thomson Corporation

<table>
<thead>
<tr>
<th>Years/issue searched: 1900 to 2005</th>
</tr>
</thead>
<tbody>
<tr>
<td>Search date: September 21, 2005</td>
</tr>
<tr>
<td>#1 TS=meditat* OR TS=yoga OR TS=yogic OR TS=(tai chi) OR TS=(tai ji) OR TS=(qi gong) OR TS=qigong OR TS=pranay* OR TS=mantra* OR TS=(progressive muscle relaxation) OR TS=relaxation response OR TS=unilateral W/1 breath* OR TS=(guided imagery) OR TS=transcendental OR TS=zen OR TS=mmb OR TS=mb or TS=mbct OR TS=(unilateral forced) OR TS=(forced nostril) OR TS=(progressive relaxation) OR TS=mindful*</td>
</tr>
<tr>
<td>#2 TS=psychotherap* OR TS=symp* OR TS=clinic* OR TS=illness* OR TS=heal* OR TS=healing OR TS=medicin* OR TS=medical* OR TS=therap* OR TS=therapy* OR TS=interven* OR TS=physiol* OR TS=heart* OR TS=cardiac OR TS=stress* OR TS=anxiety OR TS=stress* OR TS=analoges OR TS=ana</td>
</tr>
</tbody>
</table>
| Table C8. CSA Neurosciences Abstracts—CSA Illumina

<table>
<thead>
<tr>
<th>Years/issue searched: 1982 to 2005</th>
</tr>
</thead>
<tbody>
<tr>
<td>Search date: August 4, 2005</td>
</tr>
<tr>
<td>(((meditat* or yoga or yogic) or ((tai chi) or (tai ji) or (qi gong)) or (qigong or pray* or mantra*) or ((progressive muscle relaxation) or (relaxation response) or (unilateral breath*)) or ((guided imagery) or transcendental or zen) or AB=(rrmm or mbsr or mbct) or ((forced nostril breath*) or (progressive relaxation) or mindful*) or AB=(pmr or cogitat*))(PT=bibliography or PT=(book monograph) or PT=conference or PT=dissertation or PT=journal article) or PT=report or PT=review or PT=(training manual)) not ((rat or rats or mantis* or pigeon*) or (mice or mouse) or sheep or pig or pigs)</td>
</tr>
<tr>
<td>#3 SO=psychotherap* OR SO=symp* OR SO=clinic* OR SO=illness* OR SO=heal* OR SO=healing OR SO=medicin* OR SO=medical* OR SO=therap* OR SO=therapy* OR SO=interven* OR SO=physiol* OR SO=heart* OR SO=cardiac OR SO=stress* OR SO=analoges OR SO=ana</td>
</tr>
</tbody>
</table>
| Table C9. Cochrane Complementary Medicine Trials Register and CAMPAIN (Complementary and Alternative Medicine and Pain Database)

<table>
<thead>
<tr>
<th>Years/issue searched: 1983 to 2003</th>
</tr>
</thead>
<tbody>
<tr>
<td>Search date: October 25, 2005</td>
</tr>
<tr>
<td>Meditation or meditate or meditating or mindful or mindfulness or qigong or q gong or tai chi or taiji or yoga or yogic or relaxation response or autogenic or kundalini or pranayama or pranayam or samadhi or imagery or visualization or mantra or cogitation or mbsr or kinemana or dyana or dhyana or naam or anapanasati or mbct or hatha or raja or vipashyana or vipassana</td>
</tr>
</tbody>
</table>
is THE Medical Concern

stress

Table C10.  CDSR: (EBM Reviews–Cochrane Database of Systematic Reviews)—Ovid version
Years/issue searched: 3rd Quarter 2005
Search date: September 9, 2005
1. exp meditation/
2. exp yoga/
3. meditat$.mp.
4. cogitat$.ti,ab.
5. Pranayam$.mp.
6. kapalabhati.ti,ab.
7. (yoga or yogic$).mp.
8. mindfull$.mp.
9. zen.ti,ab.
10. transcendental.ti,ab.
11. TM-Sidhi.mp.
12. mahayana.ti,ab.
13. hiniyana.ti,ab.
14. thetavada.ti,ab.
15. vajrayana.ti,ab.
16. (vipissana or vipashyana).ti,ab.
17. (dhyana or dhyana).ti,ab.
18. dharana.ti,ab.
19. zazen.ti,ab.
20. (kinemantra or KM).ti,ab.
21. (mantra or mantras).mp.
22. (samadhi or samatha).ti,ab.
23. pray$.mp.
24. Hesychasm.ti,ab.
25. "lectio divina".ti,ab.
26. bonadona.ti,ab.
27. (qigong or qi gong).mp.
29. "mind-body and relaxation techniques" or "mind-body relations (metaphysics)"/ or "zoom lens attention" or "Wide-angle lens attention" or ((kw: psychotherap* OR kw: symptom OR kw: illness OR kw: heal OR kw: healing) or (kw: heart OR kw: cardiac OR kw: stress OR kw: stress* OR kw: stress+ OR kw: cancer OR kw: psycho*) or (kw: metabolism OR kw: respiratory*) or (kw: neurosci OR kw: neuro* OR kw: neuron*) or (kw: participant OR kw: patient OR kw: control w group*)).
Appendix D. Review Forms

D1. Title and abstract screening form

For screening, the criteria will be suitably broad to exclude only those articles that are obviously irrelevant to the descriptive overview (topic I); the review of evidence on the state of the research literature (topic II); and the effects, efficacy and effectiveness of meditation (topics III to V).

For each title/abstract, go through the five rejection criteria R1 to R5, in any order. Any article must clearly satisfy one of the criteria below in order to be considered clearly irrelevant. Stop at the first "Yes" and classify the study as "Do not retrieve article". Otherwise, classify it as "Retrieve article". If it is unclear whether an article meets any of the criteria below, the article will be considered eligible for retrieval and further review.

Reference ID #:  
Reviewer ID #:  
Author(s):  
Year of Publication:  

Criteria of Irrelevance:

<table>
<thead>
<tr>
<th>Criteria of Irrelevance</th>
<th>Yes</th>
<th>No</th>
<th>Unsure</th>
</tr>
</thead>
<tbody>
<tr>
<td>R1: Non-English study</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>R2: Study participants clearly &lt; 18 years old</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>R3: Clearly not on meditation</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>R4: Case report/case series/editorial/letter/lay press</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>R5: Total study population clearly &lt; 10</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
</tbody>
</table>

Decisions:
- Retrieve article
- Do not retrieve article

Specific instructions:
- R2: Primary studies that clearly indicate that only pediatric populations (<18 years) were studied will be considered irrelevant.
- R3: An article will be considered irrelevant if: 1) the main topic of the article does not include the word meditation or a synonym, 2) the article does not include any of the specific terms listed in the list of potentially relevant techniques, or 3) it is clear that the topic is not related to meditation or any of the meditation practices.
## Intervention Studies

### Jadad scale—RCTs

<table>
<thead>
<tr>
<th>ITEMS</th>
<th>YES</th>
<th>NO</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Was the study described as randomized (this includes the use of words such as random, randomization)?</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>2. Was the study described as double-blind?</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>3. Was there a description of withdrawals and drop-outs?</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>4. Method to generate the sequence of randomization was described and was appropriate (e.g. table of random numbers, computer generated, coin tossing, etc.)</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>5. Method of double-blindness described and appropriate (identical placebo, active placebo, or dummy)?</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>6. Method of randomization described and it was inappropriate (allocated alternately, according to date of birth, hospital number, etc.)?</td>
<td>-1</td>
<td>0</td>
</tr>
<tr>
<td>7. Method of double-blindness described but it was inappropriate (comparison of tablet vs. injection with no double dummy)?</td>
<td>-1</td>
<td>0</td>
</tr>
</tbody>
</table>

**OVERALL SCORE (Maximum 5)**

### Schultz concealment of treatment allocation—RCTs

**Concealment of treatment allocation**

- **Adequate:** Central randomization; numbered/coded containers; drugs prepared by pharmacy; serially numbered, opaque, sealed envelopes
- **Inadequate:** Alternation, use of case record numbers, dates of birth or day of week; open lists
- **Unclear:** Allocation concealment approach not reported or fits neither above category

### Jadad Scale (modified)—NRCTs

<table>
<thead>
<tr>
<th>ITEMS</th>
<th>YES</th>
<th>NO</th>
</tr>
</thead>
<tbody>
<tr>
<td>2. Was the study described as double-blind?</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>3. Was there a description of withdrawals and drop-outs?</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>5. Method of double-blindness described and appropriate (identical placebo, active placebo, dummy)?</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>6. Method of randomization described and it was inappropriate (allocated alternately, according to date of birth, hospital number, etc.)?</td>
<td>-1</td>
<td>0</td>
</tr>
<tr>
<td>7. Method of double-blindness described but it was inappropriate (comparison of tablet vs. injection with no double dummy)?</td>
<td>-1</td>
<td>0</td>
</tr>
</tbody>
</table>

**OVERALL SCORE (Maximum 3)**

### Questions for quality assessment for before-and-after studies

<table>
<thead>
<tr>
<th>ITEMS</th>
<th>YES</th>
<th>NO</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Was the study population representative of the target population?</td>
<td>YES</td>
<td>NO</td>
</tr>
<tr>
<td>2. Was the method of outcome assessment the same for the pre- and post- intervention periods for all participants?</td>
<td>YES</td>
<td>NO</td>
</tr>
<tr>
<td>3. Were outcome assessors blind to intervention and assessment period?</td>
<td>YES</td>
<td>NO</td>
</tr>
<tr>
<td>4. Did the study report the number of and reasons for study withdrawals?</td>
<td>YES</td>
<td>NO</td>
</tr>
</tbody>
</table>
### Newcastle-Ottawa Scale for case-control studies

**Selection**
1. Is the case definition adequate?
   - a) Yes, with independent validation * (1)
   - b) Yes, e.g. record linkage or based on self reports (0)
   - c) No description (0)
2. Representativeness of the cases
   - a) Consecutive or obviously representative series of cases * (1)
   - b) Potential for selection biases or not stated (0)
3. Selection of Controls
   - a) Community controls * (1)
   - b) Hospital controls (0)
   - c) No description (0)
4. Definition of Controls
   - a) No history of disease (endpoint) * (1)
   - b) No description of source (0)

**Comparability**
1. Comparability of cases and controls on the basis of the design or analysis
   - a) Study controls for _____________ (select the most important factor.) * (1)
   - b) Study controls for any additional factor * (this criteria could be modified to indicate specific control for a second important factor) (1)

**Exposure**
1. Ascertainment of exposure
   - a) Secure record (e.g. surgical records) * (1)
   - b) Structured interview where blind to case/control status * (1)
   - c) Written self report or medical record only (0)
   - d) No description (0)
2. Same method of ascertainment for cases and controls
   - a) Yes * (1)
   - b) No (0)
3. Nonresponse rate
   - a) Same rate for both groups * (1)
   - b) Non respondents described (0)
   - c) Rate different and no designation (0)

### Newcastle-Ottawa Scale for cohort studies

**Selection**
1. Representativeness of the exposed cohort
   - a) Truly representative of the average _____________ (describe) in the community * (1)
   - b) Somewhat representative of the average _____________ in the community * (1)
   - c) Selected group of users e.g. nurses, volunteers
   - d) No description of the derivation of the cohort
2. Selection of the non exposed cohort
   - a) Drawn from the same community as the exposed cohort * (1)
   - b) Drawn from a different source
   - c) No description of the derivation of the non exposed cohort
3. Ascertainment of exposure
   - a) Secure record (e.g. surgical records) * (1)
   - b) Structured interview
   - c) Written self report
   - d) No description
4. Demonstration that outcome of interest was not present at start of study
   - a) Yes * (1)
   - b) No

**Comparability**
5. Comparability of cohorts on the basis of the design or analysis
   - a) Study controls for _____________ (select the most important factor) * (1)
   - b) Study controls for any additional factor * (this criteria could be modified to indicate specific control for a second important factor) (1)

**Outcome**
6. Assessment of outcome
   - a) Independent blind assessment * (1)
   - b) Record linkage * (1)
   - c) Self report
   - d) No description
7. Was follow-up long enough for outcomes to occur
   - a) Yes (select an adequate follow up period for outcome of interest) * (1)
   - b) No
8. Adequacy of followup of cohorts
   - a) Complete follow up - all subjects accounted for * (1)
   - b) Subjects lost to follow up unlikely to introduce bias - small number lost - > ____ % (select an adequate %) follow up, or description provided of those lost) * (1)
   - c) Follow up rate < ____ % (select an adequate %) and no description of those lost
   - d) No statement
D.3. Methodological quality assessment forms (continued)

Newcastle-Ottawa Scale (modified) for cross-sectional studies

Note: A study can be awarded a maximum of one star for each numbered item within the Selection and Outcome categories. A maximum of two stars can be given for Comparability.

<table>
<thead>
<tr>
<th>Selection</th>
<th>1) Representativeness of the study group</th>
</tr>
</thead>
<tbody>
<tr>
<td>a)</td>
<td>Truly representative of the average ________ (describe) in the community * (1)</td>
</tr>
<tr>
<td>b)</td>
<td>Somewhat representative of the average ________ in the community * (1)</td>
</tr>
<tr>
<td>c)</td>
<td>Selected group of users e.g. nurses, volunteers</td>
</tr>
<tr>
<td>d)</td>
<td>No description of the derivation of the cohort</td>
</tr>
<tr>
<td>2) Selection of the comparison group</td>
<td></td>
</tr>
<tr>
<td>a)</td>
<td>Drawn from the same community as the study group * (1)</td>
</tr>
<tr>
<td>b)</td>
<td>Drawn from a different source</td>
</tr>
<tr>
<td>c)</td>
<td>No description of the derivation of the comparison group</td>
</tr>
<tr>
<td>3) Ascertainment of exposure</td>
<td></td>
</tr>
<tr>
<td>a)</td>
<td>Secure record (e.g., surgical records) * (1)</td>
</tr>
<tr>
<td>b)</td>
<td>Structured interview</td>
</tr>
<tr>
<td>c)</td>
<td>Written self report</td>
</tr>
<tr>
<td>d)</td>
<td>No description</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Comparability</th>
<th>5) Comparability of cohorts on the basis of the design or analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td>a)</td>
<td>Study controls for __________ (select the most important factor) * (1)</td>
</tr>
<tr>
<td>b)</td>
<td>Study controls for any additional factor * (this criteria could be modified to indicate specific control for a second important factor) (1)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Outcome</th>
<th>6) Assessment of outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>a)</td>
<td>Independent blind assessment * (1)</td>
</tr>
<tr>
<td>b)</td>
<td>Record linkage * (1)</td>
</tr>
<tr>
<td>c)</td>
<td>Self report</td>
</tr>
<tr>
<td>d)</td>
<td>No description</td>
</tr>
</tbody>
</table>

---

D.4. Data extraction form

1. GENERAL INFORMATION

<table>
<thead>
<tr>
<th>Reference ID:</th>
<th>Reviewer ID</th>
<th>Verifier ID</th>
</tr>
</thead>
<tbody>
<tr>
<td>First author</td>
<td>Year</td>
<td></td>
</tr>
<tr>
<td>Country</td>
<td>Publication type</td>
<td></td>
</tr>
</tbody>
</table>

Specify source of funding: (Check all that apply)
- Pharmaceutical industry
- Industry, other than pharmaceutical
- Government agency
- Foundation/charity
- Internal funds
- Professional organizations
- Other
- Specify:

2. SPECIFIC INFORMATION

Study characteristics

<table>
<thead>
<tr>
<th>Study Setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acute care hospital</td>
</tr>
<tr>
<td>University</td>
</tr>
<tr>
<td>Other</td>
</tr>
</tbody>
</table>

Study design

- RCT
- NRCT
- Cross-sectional
- Cohort
- Case-control
- Before-and-after

Aim(s) of the study:

Population characteristics:

<table>
<thead>
<tr>
<th>Target population</th>
<th>Type of primary health problem/condition/population (describe)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clinical population only</td>
<td>Normals only</td>
</tr>
<tr>
<td>If health problem, specify body system/problem involved (Check all that apply):</td>
<td>Inclusion</td>
</tr>
<tr>
<td>Circulatory/Cardio-vascular</td>
<td>Musculoskeletal</td>
</tr>
<tr>
<td>Dermatological</td>
<td>Oncology</td>
</tr>
<tr>
<td>Endocrine</td>
<td>Respiratory/Pulmonary</td>
</tr>
<tr>
<td>Gastrointestinal</td>
<td>Rheumatologic</td>
</tr>
<tr>
<td>Genitourinary</td>
<td>Other</td>
</tr>
<tr>
<td>Gynecological</td>
<td>Head/eyes/ears/nose/throat</td>
</tr>
<tr>
<td>Hematological</td>
<td></td>
</tr>
</tbody>
</table>
## D4. Data extraction form (continued)

### Number of patients recruited:

**Note:** Add as many columns as study groups

<table>
<thead>
<tr>
<th></th>
<th>Group 1:</th>
<th>Group 2:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total enrolled (or randomized, if applicable):</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total analyzed:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Losses to follow up:</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Characteristics of participants:

**Note:** Add as many columns as study groups

<table>
<thead>
<tr>
<th>GROUP 1 (n = )</th>
<th>GROUP 2 (n = )</th>
<th>TOTAL (N = )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female n =</td>
<td>Male n =</td>
<td>Female n =</td>
</tr>
<tr>
<td>Age Mean =</td>
<td>SD =</td>
<td>Mean =</td>
</tr>
<tr>
<td>Ethnicity (n)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Education (n)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Principal health problem, condition or diagnosis (n)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stage/severity of problem/illness (n)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Duration of disease described (time)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Comorbidities/other health problem(s) (if relevant) (specify) (n)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other relevant social/demographic info</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Intervention characteristics:

**Note:** Add as many columns as study groups

<table>
<thead>
<tr>
<th></th>
<th>Intervention (Group 1)</th>
<th>Control (Group 2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Description of intervention</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Frequency (how many times per week/day?)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Duration (total time = # sessions x length of time in min)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intensity (time per session)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Details of the trainers (a) Who delivered the intervention? b) number of providers; c) training of providers</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Details of the trainees</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Co-interventions (list)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Outcomes

#### Outcome characteristics

|   | Timing of outcome assessment |
|---|---|---|
| Outcome | Instrument/units | < 3 months | 3 to 6 months | > 6 months |
| 1. | | | | |
| 2. | | | | |
| 3. | | | | |
| 4. | | | | |
| 5. | | | | |
| 6. | | | | |
| 7. | | | | |
| 8. | | | | |
| 9. | | | | |
| 10. | | | | |

### Results

For continuous outcomes

**Note:** Add as many columns as study groups

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Intervention (Group 1)</th>
<th>Control (Group 2)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Baseline</td>
<td>Final</td>
</tr>
<tr>
<td>1.</td>
<td>Mean</td>
<td>SD</td>
</tr>
<tr>
<td>2.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td></td>
<td></td>
</tr>
<tr>
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D4. Data extraction form (continued)

For categorical outcomes

Note: Add as many columns as study groups

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<tr>
<th>Outcome</th>
<th>Intervention (Group 1)</th>
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n = # events; N = total # subjects per group

D5. Guidelines for data extraction

GENERAL GUIDELINES:
- Please, do not leave empty spaces. Enter either NA (not applicable) or NR (not reported), as required.
- Double check with a senior member of the research team if you have any doubts about the correct data that should be extracted.

1. GENERAL INFORMATION

# 1. Data extracted by:
- Choose your name from the available list.

# 2. Data verified by:
- Complete this field ONLY if you are doing data verification. You do not have to answer this question if you are doing data extraction.
- Choose your name from the available list.

# 3. Country:
- Enter country where the study took place.
- If not reported, enter NR (not reported).

Note: If the article does not specify in the background/method sections where the study took place, enter the corresponding author’s country (and specify this in brackets: “CAC”).

# 4. Study source:
- Abstract: The study is reported only in abstract form.
- Journal article: The study is published as full text in a journal.
- Conference proceeding: The study comes from a conference book.
- Other, specify: Click here if the study is reported in any other form. Describe the source (book chapter, web-info).

# 5. Source of funding:
- Check all that apply if more than one option is applicable. Check “None reported” if no source of funding is reported.
- If the source of funding is “academic/from university”, report it under “Other” and specify as “Academic”.

2. SPECIFIC INFORMATION

Study characteristics

# 6. Population source:
- It refers to where the study population comes from.
- Check all that applies if more than one population source is cited in the study (i.e. cases from hospitals, controls from community).

# 7. Number of centres:
- Single centre: If study was conducted in ONE centre.
- Multicentre: If the study was conducted in MORE THAN ONE centre.
- Unclear/unreported: If no information is provided regarding the number of centres, or if it is hard to identify how many centres participated in the study.
- For studies other than RCTs and NRCTs, a multicenter study is a study where more than one source of population is used. For example: cases come from more than one facility/hospital, and controls come from more than one community. Therefore, a single center study collects cases from ONE hospital/facility, and controls from ONE community.
D5. Guidelines for data extraction (continued)

# 8. Study design:
- **RCT**: A planned experiment or research study in which subjects are allocated to intervention or control groups using a random method, and between-group comparisons are made for the outcomes of interest.
- **NRCT**: Subjects are allocated to intervention or control groups using a quasi-random or nonrandom method and the outcomes are compared.
- **Prospective cohort study with concurrent control group**: A type of analytical observational study where a group of subjects with a specific characteristic or exposure (e.g., being meditators) are followed over a period of time to assess outcomes. Comparisons are made with a concurrent control group. No interventions are normally applied to the participants. It is important to note that: 1) They are longitudinal and go forward over time. 2) It is important to identify the study design.
- **Case-control study**: A case-control study is an observational investigation in which people with a condition (“cases”) are identified, suitable comparison subjects (“controls”) are identified, and the two groups are compared with respect to prior exposure to certain factors (e.g., meditation). Thus, subjects are sampled by disease status. It is important to note that: 1) They are generally retrospective. 2) Start with disease of interest (cases). 3) Compare people with a condition to people without the condition. 4) Compare frequency of the exposure of interest between cases and controls.
- **Cross-sectional study with controls**: A study where a group of individuals defined by a characteristic of interest (e.g., being meditators) are compared at a single point in time cross-sectionally with a control group without that characteristic (nonmeditators) on certain characteristics/outcomes of interest.
- **Before-and-after study**: A nonexperimental study design where data are collected before and after the intervention is implemented. Participants act as their own controls based on previous baseline data.

# 9. Design source:
- **Reported by authors**: The authors clearly report the type of study design (and the designation is correct). Use this category when you agree with what the author’s report.
- **Classified by reviewer**: The reviewer used the criteria in #8 to classify the study design. Use this category when you disagree with the author’s design classification, or when the authors failed to provide a clear statement regarding the study design.
- **Unclear**: It is hard to identify the study design.

# 10. Arms of study:
- Enter as reported in the study.
- Enter either **NA** (not applicable) or **NR** (not reported), as required.

Population characteristics

# 11. Target population: Clinical population only: The study population consists ENTIRELY of participants with a clinical condition/disorder.
- Normal population only: The study population consists ENTIRELY of “healthy”/normal participants (e.g., students, community members, and/or people without clinical conditions/disorders).
- Both normal and clinical population: The study combines both participants with a clinical condition/disorder and “healthy”/normal participants.
- Not reported: The study does not provide a description of the participants in terms of the type of population.

# 12. Type of primary health problem/condition/population:
- Enter the type of health problem/condition/population as reported in the study.
- If the study participants are **normals**, enter the specific type of population, if available (e.g., university students, workers, etc).
- Enter either **NA** (not applicable) or **NR** (not reported), if required.

D5. Guidelines for data extraction (continued)
### D5. Guidelines for data extraction (continued)

#### # 22. Median age:
- Enter the median age of study participants in years (per group and total), when reported. Ex: 26.3 years.
- Enter either **NA** (not applicable) or **NR** (not reported), as required.

#### # 23. Standard deviation:
- Enter the standard deviation of mean age of study participants (per group and total), when reported. Ex: SD = 3.
- Enter either **NA** (not applicable) or **NR** (not reported), as required.

#### # 24. Standard error of the mean:
- Enter the standard error of the mean age of study participants (per group and total), when reported. Ex: SEM = 3.
- Enter either **NA** (not applicable) or **NR** (not reported), as required.

#### # 25. Age groups (%) as reported:
- Enter the distribution of study participants (n and % per group and total) according to age groups (% report).
- Enter either **NA** (not applicable) or **NR** (not reported), as required.

#### # 26. Ethnicity:
- Enter the distribution of study participants (n and % per group and total) according to ethnicity, if reported.
- Enter either **NA** (not applicable) or **NR** (not reported), as required.

#### # 27. Education:
- Enter the distribution of study participants (n and % per group and total) according to education level, if reported.
- Enter either **NA** (not applicable) or **NR** (not reported), as required.

#### # 28. Social problems/demographic:
- Enter as described in the study. Enter the distribution of study participants (n and % per group and total) according to this variable.
- Enter either **NA** (not applicable) or **NR** (not reported), as required.

### Other Characteristics of Participants:

#### # 29. Stage/severity of problem/illness:
- Enter as reported in the study.
- Enter the distribution of study participants (n and % per group and total) according to severity of the problem, if reported.
- Enter either **NA** (not applicable) or **NR** (not reported), as required.

#### # 30. Duration of disease:
- Enter as reported in the study (in years or months).
- Enter the distribution of study participants (n and % per group and total) according to duration of the problem, if reported.
- Enter either **NA** (not applicable) or **NR** (not reported), as required.
D5. Guidelines for data extraction (continued)

# 42. Trainee details:
- Enter as reported in the study.
- Enter either NA (not applicable) or NR (not reported), as required.

# 43. Co-interventions:
- List any intervention that was co-administered for any of the groups.
- Enter “None” if no interventions were co-administered.
- Enter either NA (not applicable) or NR (not reported), as required.

**Outcome characteristics (#44 and others)**

The following information should be completed for each reported outcome. Enter either NA (not applicable) or NR (not reported), as required.

- **NAME:** Name of the outcome, as reported in the study.
- **CATEGORY OF OUTCOME:** Classify according to:
  1. Physiological markers (e.g., cardiovascular, respiratory, brain, immune, etc).
  2. Disease/functional outcomes (any outcome reporting the incidence of discrete events or scores on questionnaires/tests other than physiological).
  3. Health care utilization (e.g., frequency and type of healthcare visits, use of medication, cost-effectiveness data).
  4. Other outcomes (e.g., outcomes difficult to classify in any of the categories above).

- **MEASUREMENT TOOL/UNITS:** Enter the name of the assessment tool (if scales or questionnaires) that was used to evaluate the outcome. Report the measurement units, if applicable.
- **METHODS OF ASSESSING OUTCOME MEASURES:** Enter
  - P = Patient (if the measure is self-rated).
  - A = assessor (if the measure is assessed by a second person: clinician, family).
  - L = laboratory rated (if the measure is assessed using instruments/lab equipment).
  - NR = Not reported.
- **VALIDITY and/or RELIABILITY:** (Applicable for scales and questionnaires)
  - Yes: Validity and/or reliability of measurement tool known or described.
  - No: Validity and/or reliability of measurement tool unknown.
  - NA = Not applicable.
  - NR = Not reported.

**Note:** The important issue here is whether the scale properties have been published, not the quality of reporting of these characteristics. If the study reports that a “checklist” was developed for the study purposes, it is likely that the instrument has not been validated. In that case, enter “No”. On the other hand, if the study uses for example, a scale that it is likely to have reliability and/or validity data available from other sources (e.g. Beck questionnaire for depression), but the study does not mention this, enter “NR”. What is important is to know whether the scale properties have been published, or are known, not the reporting of specific details on validity and reliability.

- **TIMING OF OUTCOME ASSESSMENT/FOLLOWUP MEASURES:** Enter
  1. Short term: outcome is assessed in the period less or equal to 3 months.
  2. Medium term: outcome is assessed in the period greater than three but equal to 6 months.
  3. Long-term: outcome is assessed for more than 6 months.
  4. If timing of outcome assessment is not reported.

**Note:** Baseline measures are not included for timing of outcome assessment.

D6. Structured format for peer reviewer comments

Thank you for agreeing to review the draft of this evidence-based report. We are relying on your expertise to address the questions below and provide insight that will assist us in improving the content and format of the report. This is still in the draft stages and a thorough copy edit will take place before the publication of the final report. Please remember that the information in this manuscript is confidential.

When assessing the report, please consider the following points:

### Problem Formulation
- Are the review questions well formulated with specified key components?

### Study Identification
- Is there a comprehensive search for relevant data using appropriate resources?
- Are there unbiased explicit searching strategies that are appropriately matched to the research question?

### Study Selection
- Are appropriate inclusion and exclusion criteria used to select articles?
- Are selection criteria applied in a manner that limits bias?
- Are efforts made to identify unpublished data, if this is appropriate?
- Are major changes in selection criteria avoided during the review process?
- Are reasons for excluding studies from the report stated?

### Appraisal of Studies
- Is the validity of individual studies addressed in a reliable manner?
- Are important parameters (e.g., setting, study population, study design) that could affect study results systematically addressed?

### Data Collection
- Is there a minimal amount of missing information regarding outcomes and other variables considered key to interpretation of results?
- Are efforts made to reduce bias in the data collection process?

### Data Synthesis
- Are important parameters, such as study designs, considered in the synthesis?
- Are reasonable decisions made concerning whether and how to combine the data?
- Are results sensitive to changes in the way the analysis was done?
- Is precision of results reported?
- Are important parameters (e.g., setting, study population, study design) that could affect study results systematically addressed?

### Discussion
- Are the discussion and conclusions well balanced and adequately supported by the data?
- Are limitations and inconsistencies of studies stated?
- Are limitations of the review process stated?
- Are review findings integrated within the context of relevant indirect evidence?
- Are implications for research discussed?
- Are implications for practice discussed?

### Conclusions
- Are conclusions supported by the data reviewed?
- Are plausible competing explanations of observed effects addressed?
- Is evidence appropriately interpreted as inconclusive (no evidence of effect) or as showing a particular strategy did not work (evidence of no effect)?
Appendix E. Excluded Studies and Nonobtained Studies

For the questions on the state of research on the therapeutic use of meditation in healthcare (topic II), 1,374 studies were excluded. The reasons for exclusion are as follows: (1) the study was not primary research on meditation (n = 909); (2) the study did not have a control group (n = 280); (3) the study did not report adequately on any measurable data for health related outcomes relevant to the review (n = 170); (4) the study did not examine an adult population (n = 9); and (5) the study sample included less than 10 participants (n = 6).

Excluded: Not Primary Research on Meditation (N = 909)

The following studies were excluded because they were not relevant to the review topic.


812


255. Freeman MT. Enlivening veda in consciousness and physiology by reading the vedic literature in conjunction with the experience of the transcendental meditation (TM) and TM-Sidhis [dissertation]. Fairfield, IA: Maharishi International University, 1997.


259. Friedman M, Enlivening veda in consciousness and physiology by reading the vedic literature in conjunction with the experience of the transcendental meditation (TM) and TM-Sidhis [dissertation]. Fairfield, IA: Maharishi International University, 1997.

260. Friedman H, Enlivening veda in consciousness and physiology by reading the vedic literature in conjunction with the experience of the transcendental meditation (TM) and TM-Sidhis [dissertation]. Fairfield, IA: Maharishi International University, 1997.

261. Friedman M, Enlivening veda in consciousness and physiology by reading the vedic literature in conjunction with the experience of the transcendental meditation (TM) and TM-Sidhis [dissertation]. Fairfield, IA: Maharishi International University, 1997.


Mindfulness-based stress reduction and health benefits
A meta-analysis
Paul Grossman,a,⁎ Luder Niemann,b Stefan Schmidt,c Harald Walach,c,d

Abstract
Objective: Mindfulness-based stress reduction (MBSR) is a structured group program that employs mindfulness meditation to alleviate suffering associated with physical, psychosomatic and psychiatric disorders. The program, nonreligious and nonesoteric, is based upon a systematic procedure to develop enhanced awareness of moment-to-moment experience of perceptible mental processes. The approach assumes that greater awareness will provide more veridical perception, reduce negative affect and improve vitality and coping. In the last two decades, a number of research reports appeared that seem to support many of these claims. We performed a comprehensive review and meta-analysis of published and unpublished studies of health-related studies related to MBSR. Methods: Sixty-four empirical studies were found, but only 20 reports met criteria of acceptable quality or relevance to be included in the meta-analysis. Reports were excluded due to (1) insufficient information about interventions, (2) poor quantitative health evaluation, (3) inadequate statistical analysis, (4) mindfulness not being the central component of intervention, or (5) the setting of intervention or sample composition deviating too widely from the health-related MBSR program. Acceptable studies covered a wide spectrum of clinical populations (e.g., pain, cancer, heart disease, depression, and anxiety), as well as stressed nonclinical groups. Both controlled and observational investigations were included. Standardized measures of physical and mental well-being constituted the dependent variables of the analysis. Results: Overall, both controlled and uncontrolled studies showed similar effect sizes of approximately 0.5 (P < .0001) with homogeneity of distribution. Conclusion: Although derived from a relatively small number of studies, these results suggest that MBSR may help a broad range of individuals to cope with their clinical and nonclinical problems.

Keywords: Chronic disease; Coping; Meta-analysis; Mindfulness; Psychosomatic disorders; Stress

Introduction
Coping with the symptoms, disability, and uncertain perspectives of chronic disease is a harrowing challenge for a significant proportion of the population. However, addressing the biopsychosocial adjustment of chronically ill individuals is an area that continues to tax the resources and limits of modern conventional medicine and one for which few professionals have adequate time or training. Programs that do exist to improve the well-being and health status of the chronically ill are often still in their infancy and typically directed toward a specific illness and limited range of symptoms. A single, relatively brief and cost-effective program that can potentially be applied to a range of chronic illnesses and is able to effect a positive shift in fundamental perspectives toward health and disease should be of great interest. During the last two decades, a group-intervention program known as mindfulness-based stress reduction (MBSR) has been proposed as just such an approach. This procedure has been employed among patients with a wide variety of chronic clinical ailments, as well among groups of relatively healthy individuals who have hoped to improve their abilities to cope with the normal but often significant stresses of daily life. Preliminary reports have suggested substantial benefits for individuals suffering from chronic pain, stress, and depression.

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cancer, anxiety disorders, depression and the stresses of contexts as diverse as medical school and prison life (e.g., Refs. [2–4]). However, many of the published studies remain critically unexamined and may be of questionable scientific rigor or too limited in scope to confirm such claims. A recently published paper provided a valuable critique of mind-body treatments, but without providing a quantitative assessment of existing studies [5]. In this report, we provide a meta-analytic review of all accessible published and unpublished investigations purporting health-related benefits of MBSR. Our aim is to provide an empirical basis for evaluating whether or not evidence exists that MBSR systematically improves health-related dimensions among the chronically ill and others, what and how large the specific benefits may be, and whether more extensive evaluation of MBSR may be warranted. MBSR is a group program that focuses upon the progressive and systematic cultivation of moment-awareness, or mindfulness. The construct of mindfulness awareness originated in earliest Buddhist documents but is neither religious nor esoteric in nature [6]. Several Buddhist treatises detail an elaborate psychological theory of mind, in which mindfulness consistently plays a central role [7]. Mindfulness is characterized by dispassionate, nonevaluative and sustained moment-to-moment awareness of perceptible mental states and processes. This includes continuous, immediate awareness of physical sensations, perceptions, affective states, thoughts, and imagery. Mindfulness is nondeflating: It merely implies sustained paying attention to ongoing mental content without thinking about, comparing or in other ways evaluating the ongoing mental phenomena that arise during periods of practice. Thus, mindfulness may be seen as a form of nonreflective observation, or participant-observation, in which the objects of observation are the perceptible mental phenomena that normally arise during waking consciousness. Underlying this concept and approach are the following assumptions: (1) Humans are ordinarily largely unaware of their moment-to-moment experience, often operating in an “automatic pilot” mode; (2) we are capable of developing the ability to sustain attention to mental content; (3) development of this ability is gradual, progressive and requires regular practice; (4) moment-to-moment awareness of experience will provide a richer and more meaningful experience of life, as experience becomes more vivid and active mindfulness participation replaces unconscious reactivity; (5) such persistent, nonevaluative observation of mental content will gradually give rise to greater veridicality of perceptions; and (6) because more accurate perception of one’s own mental responses to external and internal stimuli is achieved, additional information is gained that will enhance effective action in the world, and lead to a greater sense of control (e.g., Refs. [1,6,7]).

Inclusion criteria
Criteria for the inclusion of studies included the following:
1. Studies were published before 12/2002 or, in the case of unpublished material, relevant information obtained before 12/2001.
2. Published, as well as unpublished, investigations were included. A minimum requirement for inclusion was the availability of an abstract in the English language.
3. Programs emphasized a mindfulness-based intervention, with mindfulness operationalized as the following:
   3.1. Moment to moment awareness to be cultivated with a nonjudgmental attitude.
   3.2. Teaching of formal meditation techniques.
   3.3. Stressing the importance of daily and systematic practice.
4. Interventions were group taught, i.e., no individual training.
5. Courses were based on a length of 6–12 weeks with approximately 2.5 h per week; intensive meditation retreats were not included.
6. Quantitative outcome measures were available.
7. Outcome measures could be subsumed under dimensions of physical or mental health.
8. Outcome measures were derived from standardized and validated scales.
9. Available data of each study allowed for the calculation of effect sizes.
10. Controlled studies were required to have a control group procedure that was either inactive (wait-list) or active in the sense that they were oriented to controlling for nonspecific effects of the mindfulness group (e.g., social support, demand characteristics and expectancy effects).

Postintervention, and not necessarily follow-up, data were provided and assessed.

The aim of our meta-analysis was to assess the effect of a mindfulness-based intervention on health status measures. We considered the concept of health to include both physical and mental health. All outcome measures were either subsumed under “physical health”, “mental health” or were excluded from the analysis. We only included data from standardized and validated scales with established internal consistency (e.g., the Global Severity Inventory of Symptom Check List—R, Hospital Anxiety and Depression Scale, Beck Depression Inventory, Profile of Mood States, McGill-Melzack Pain Rating Scale, Short Form 36 Health Survey, and Medical Symptom Checklist; a full list is available upon request). Also a conservative procedure was chosen to exclude relatively ambiguous or noncontrolled, small, unreplicated, unvalidated, or unconventional measures, e.g., spiritual experience, empathy, neuropsychological performance, quality of social support, and egocentrism.

Mindfulness constructs comprised scales such as psychological wellbeing and symptomatology, depression, anxiety, sleep, psychological components of quality of life, or affective perception of pain. “Physical health” constructs comprised bodily symptoms, physical pain, physical impairment, and physical component of quality of life questionnaires.
All decisions on the inclusion and allocation of outcome measures were based on consensus discussions among LN, PG and HW (last author). Relevant data for every measure included into the analysis were extracted and entered into an Excel spreadsheet.
We examined immediate, pre to postintervention change to assess effects of mindfulness training—and not longer term effects—due to lack of follow-up data in several studies and because follow-up periods vary substantially in postintervention duration. Our results, therefore, merely indicate the presence or absence of short-term responses and do not directly address any long-term effects.

Effect size calculation
We calculated Cohen’s d effect sizes by dividing the mean difference by their pooled standard deviation. Two types of mean differences were employed: (i) treatment-control difference (between-group), and (ii) posttreatment difference (within-group). We included the latter, within-group analyses because there were a relatively small number of controlled studies that met criteria, and several rather carefully conducted uncontrolled observationsthat did not adhere to criteria. We believed that it might be informative to compare effect sizes between observation studies, and both randomized and quasi-experimental controlled investigations.
In the case of (i), posttreatment values are usually entered into the equation assuming no baseline difference between groups before the intervention. As this assumption could not always be maintained, we calculated two effect sizes, one based on the pretreatment values (baseline difference) and one on the posttreatment values. The final effect size was the meta-analysis output on health status measures. We considered the concept of health to include both physical and mental health. All outcome measures were
For the calculation of the (ii) pre–post effect sizes, the correlation between pre- and postintervention measures is needed. As this correlation could not be obtained from the study reports, we entered a global estimate of r = 0.7 into the formula [8]. All effect sizes were corrected for small sample bias by a simple formula provided by Hedges [9].

Data aggregation

We first integrated all effect sizes within a single study by the calculation of means into two effect sizes, one for mental and one for physical health. If the sample size varied between scales of one study, we weighted them for N. Effect sizes obtained in this manner were aggregated across studies by the computation of a weighted mean, where the inverse of the estimated standard deviation for each investigation served as a weight [8]. Confidence intervals (CI) were based on the mean effect size’s standard error calculated by the formula

\[ SE_{d} = \sqrt{\frac{1}{n_{1} + n_{2}} - \frac{2}{n_{1} n_{2}}} \]

with \( \bar{w} \) being the single study’s weight [8]. Two-tailed P values were calculated by the computation of a z score with \( z = d/SE_{d} \). Homogeneity of treatment effects across studies was tested by computing a formula that provides a value, which is \( \chi^{2} \) distributed with \( df = k - 1 \), with \( df \) standing for the number of studies entering the test [9].

Overall and sensitivity analyses

We calculated two separate meta-analyses. The first included all studies with the effect size based on the comparison between the experimental and the control groups. The second analysis used data from both controlled studies (employing only results from the mindfulness intervention) and observational studies (i.e., in which no control group existed). Regarding the latter set of analyses, we aggregated all effect sizes based on a pre–post difference for groups undergoing mindfulness training. For both analyses, we calculated separate mean effect sizes for mental and physical health. Sensitivity analyses were calculated for several subgroups by splitting the data set and by calculation of separate analyses for each subgroup.

Results

We retrieved 64 studies but only 20 reports, comprising a total of 1605 subjects, met the inclusion criteria (noted in References with an asterisk and in Further Reading; note that some studies were presented in more than one publication). A list of all retrieved studies is included in Appendix A. Most of the excluded studies did not operationalize mindfulness training in the specified manner or reported insufficient statistical details for effect size calculation.

Studies investigating mindfulness training among medical patients in order to investigate whether the variable mental health variables (all controlled studies) data of a total of 771 individuals are shown, with 388 of them receiving a mindfulness training. The table also shows the results for the subsamples obtained by splitting the data set for the factors subject population (patients vs. nonpatients allocation (randomization vs. quasi-experimental control). Only five of the controlled studies applied physical health variables as outcome measures. For the mental health variables the data set proved to be homogeneous (\( \chi^{2} = 0.89, df = 9, P = .999 \)). It yielded a significant medium strength effect size [13] of \( d = 0.54 \) (95%-CI: 0.39–0.69, \( P < .0001 \)), two-tailed). Sensitivity analyses of the subgroups showed no significant differences for the variables subject population or group allocation.

Only five of the controlled studies reported data that could be subsumed under physical health results. For 203 individuals are included, 122 of whom received mindfulness instruction. This reduced data set also proved to be homogeneous (\( \chi^{2} = 4.97, df = 4, P = .29 \)). The summary results are also presented in Table 2. The mean effect size of \( d = 0.53 \) (95%-CI: 0.26–0.79, \( P < .0004 \)) is similar to that of the mental health variables.

Observational studies

Table 3 shows the results for pre–to postintervention comparisons for both sets of outcome measures (physical A. Most of the excluded studies did not operationalize mindfulness training in the specified manner or reported insufficient statistical details for effect size calculation.

Discussion

Our findings suggest the usefulness of MBSR as an intervention for a broad range of chronic disorders and problems. In fact, the consistent and relatively strong level of effect sizes across very different types of sample indicates that mindfulness training might enhance general coping with distress and disability in everyday life, as well as under more extraordinary conditions of serious disorder or stress. Another recently published study employing different inclusion criteria and including what

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<th>Table 3</th>
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<td>Effect of mindfulness training based on a pre–post comparison for mental and physical health variables (k, number of analyses; n, number of subjects; d, mean effect size; P, two-tailed)</td>
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<td>Nonpatients 5 353 0.53 0.36–0.70 &lt;.0001</td>
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<tr>
<td>Randomized 7 434 0.54 0.35–0.74 &lt;.0001</td>
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<tr>
<td>Quasi-experimental 3 337 0.34 0.12–0.76 &lt;.0001</td>
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<tr>
<td>Table 2</td>
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<td>Effect size, d, 95% confidence intervals (CI) and P value (two-tailed) calculated for the difference between mindfulness meditation and control group on mental health and physical health variables for all controlled studies</td>
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<td>Our findings suggest the usefulness of MBSR as an intervention for a broad range of chronic disorders and problems. In fact, the consistent and relatively strong level of effect sizes across very different types of sample indicates that mindfulness training might enhance general features of coping with distress and disability in everyday life, as well as under more extraordinary conditions of serious disorder or stress. Another recently published study employing different inclusion criteria and including what</td>
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divergent strategy also provides additional support for the effectiveness of mindfulness interventions [28]. In both investigations, improvements were consistently seen across a spectrum of standardized mental health measures including psychological dimensions of quality of life scales, depression, anxiety, coping style and other affective dimensions. Visualization of the effects of mindfulness therapy was also found for health parameters of physical well-being, such as medical symptoms, sensory pain, physical impairment, and functional quality-of-life estimates, although measures of physical function (e.g., strength) were less frequently assessed in the studies as a whole.

Results of other carefully performed trials that did not conform to our criteria of timeframe, dependent measures, or control procedures also point to the efficacy of mindfulness training [3,10]. For example, a recent randomized study of depressives in remission found one-year relapse rates of major depressive disorder when conventional treatment was supplemented by a mindfulness program [3]. Another investigation of mindfulness training among anxiety and mood disorder patients showed pre-to-postintervention improvements in mental health outcomes with an effect size of 0.7 [10].

In our meta-analysis, the similarity of effect sizes across types of study (e.g., controlled vs. observational) and within the controlled-study analysis (active control vs. wait list) provides some support for the specificity of the mindfulness intervention. Particularly relevant here are those six controlled investigations that employed forms of active control intervention to account for general or nonspecific effects of treatment. These studies show a mean effect size of almost 0.49, not far removed and not significantly different from the mean effect size observed in the four wait-list groups (d=0.58) that lacked control of most nonspecific effects of intervention. Nevertheless, such infer- ences must be made with regard to the modest number of total, and partially of randomized, studies, the diversity of types of sample diagnoses, and the inclusion of unpublished investigations.

Several other caveats must also be addressed regarding these mindfulness studies and our analyses: Due to the limited number of investigations with comparable follow-up data or with follow-up data at all, the meta-analysis was restricted to the more direct estimates of effects postintervention. Whereas several investigations do point to long-term benefits of mindfulness training [3,14–17], much additional research is required to confirm such benefits. Secondly, most studies reviewed suffered from methodological deficiencies beyond merely the type of design used, quasiexperimental or observational. Insuffi- cient consideration or information was typically given about participant dropout rate, other concurrent interventions during the mindfulness training period, therapist adherence to and interpretation of therapeutic training and competence, description of interventions, adequacy of power to calculate intervention effects, or the clinical relevance of results. Additionally, the con- struct of mindfulness itself, although central to all inter- ventions, was neither operationalized nor evaluated for change in any study. Inasmuch as it is assumed that the primary effects are achieved by acquisition of mindful awareness, characterization of alterations in mindfulness would seem to be essential, and there have been recent attempts to operationalize the concept of mindfulness [6,27].

Only large-scale and sound research in the future will be able to resolve whether interventions between methodological deficiencies, on the one hand, and the potential promises of mindfulness training, on the other, as consistently revealed by a number of positive studies (varying widely in scientific rigor). Thus far, the literature seems to clearly slant toward support for basic hypotheses concerning the effects of mindfulness on mental and physical well-being. However, the research conducted to date is not large enough with potential for helping many to learn to deal with chronic disease and stress. Nevertheless, we now need to test these claims more thoroughly by using well-defined patient populations, applying more stringent methodological procedures, and assessing objective disease markers in additional to self-reported psychosocial and functional indicators of distress.

Acknowledgments

This investigation was supported by grants to the first author from the YeDaTel Foundation, (Corrato. AZ, USA), and the Research and Training Institute of the Hebrew Rehabilitation Center for the Aged (Boston, MA, USA) and grants to the last two authors from the Samuelli Institute (Corona del Mar, CA, USA). We would also like to thank the anonymous reviewers for their critical comments and those responsible to our inquiries and providing us with unpublished data. Finally, we also wish to express appreciation to the two anonymous reviewers for their careful and constructive comments.

Appendix A. All retrieved studies related to mindfulness


43. Tate DB. Mindfulness meditation group training: effects on mood, psychological symptoms and positive psychological characteristics. Dissertation, Brigham Young University, 1994.


The NIDS Network
Volume I, Issue 1

What is THE Medical Concern

...and many more of the more than 2.5 million with attention deficit disorder (ADD), attention deficit/hyperactivity disorder (ADHD) or chronic fatigue syndrome (CFS).

By treating these and other diseases as neuro-immune dysfunction syndromes (NIDS) and looking upon them as medical rather than developmental disorders, Michael Goldberg, M.D., F.A.A.P., and his colleagues at the Neuro-Immune Dysfunction Syndrome Research Institute (NIDS-R) have seen dramatic improvement and normalization in children previously deemed medically untreatable. During more than 20 years of evaluation and research, Dr. Goldberg has reduced or eliminated symptoms in numerous children throughout the United States and helped return cognitive function to normal and near normal in many.

The NIDS Network

Vol 1, Issue 1

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2. How does NIDS work?
3. What is the epidemic?
4. How does NIDS help children?
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6. How is NIDS treated?
7. What is the future of NIDS research?

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About Michael Goldberg, M.D., F.A.A.P.

Dr. Goldberg has more than 20 years of experience evaluating and treating children with disorders that fall within the evolving spectrum of neuro-immune dysfunction syndromes (NIDS), including autism, attention deficit disorder, attention deficit/hyperactivity disorder, pervasive developmental disorder and chronic fatigue syndrome.

Dr. Goldberg received his medical degree from the University of California Los Angeles (UCLA) and his pediatric training at the LACU-LA School of Medicine. He serves as the Director of the NIDS Medical Advisory Board and a fellow of the American Academy of Pediatrics. Dr. Goldberg is a member of the clinical teaching staff at both UCLA and Cedars Sinai Hospital.

Dr. Goldberg began to focus on NIDS in 1983, after his wife developed an undefined illness, marked by recurrent flu symptoms, fatigue, sore throat, swollen lymph glands and cognitive dysfunction including short-term memory loss and a decline in academic performance.

Dr. Goldberg noted that many of the children he was seeing had a blood work profile like his wife's. When he looked at advanced work on neurocognitive dysfunction, neuroinflammation and the complex multi-dimensional interactions between the immune and central nervous systems, it became clear that the underlying cause of all of these illnesses was immune dysfunction. This has been supported and verified extensively by clinical work, peer review and the evolving research.

The NIDS Scientific Board and Research Institute were formed by Dr. Goldberg and colleagues in 1998. They have been monitoring the emerging body of evidence relating to the neuro-immune system. The groups seek to demonstrate that NIDS is a real disease under which supposedly “innoculate” conditions such as autism must be urgently reclassified (rather than currently classified as “mental disorders”), and therefore open to medical treatment.

Dr. Goldberg’s passion lies in developing a treatment pipeline that uses the large body of existing science and clinical evidence to help the current generation of affected children. He believes this can only be done by focusing on treatment options now, built on the large body of existing science and clinical evidence and not by adding additional years and millions of dollars researching and analyzing old ideas or concepts that cannot apply to these children.

Dr. Goldberg has a busy practice in Tarrytown, California, and travels extensively to attend and speak at medical conferences worldwide.

NIDS Research Institute Scientific Board Members & Specialists

(Available for Interviews by Appointment Only)

Michael Goldberg, M.D. Pediatrician Teaching staff Cedars Sinai / UCLA Medical Centers

President - Neuro-immune Dysfunction Syndrome (NIDS) Research Institute Scientific Board

Dr. Goldberg pioneered the use of neuro-immune agents to treat children diagnosed with autism, attention deficit, attention deficit/hyperactivity disorder and other similar diseases. In his 20 years of treating patients, many have shown dramatic improvement to the point that the symptoms for which they first sought medical treatment have been significantly reduced or have disappeared. Dr. Goldberg is an expert in NIDS, the NIDS-RI protocol and the successful treatment of children with NIDS.

Jeffrey Galpa, M.D. Clinical Associate Professor of Medicine University of Southern California

An internationally recognized researcher and physician, Dr. Galpa’s career accomplishments include developing the first gene therapy for AIDS and co-developing a drug for AIDS. He is currently working with the NIDS board to prove that immune modulating therapies are a viable treatment option for the autistic population and other connected adult neuro-immune disorders.

Julie Griffith, M.D. Pediatric Neurologist/Northern California

Dr. Griffith is a pediatric neurologist in Northern California. She provides neuro-cognitive insights and assists the NIDS-RI with the selection of cognitive evaluation tools to support therapeutic and clinical trials.

Byron Hyde, M.D. Director of Nightingale Research Foundation Ottawa, Canada

Dr. Hyde specializes in the treatment of chronic fatigue syndrome (CFS) or myalgic encephalomyelitis. He has written one of the leading textbooks on this often misunderstood condition. He provides the NIDS-RI with critical input regarding protocols and immune profiles currently in development.

Nancy Klimas, M.D. Professor of Medicine, Psychology, Microbiology and Immunology / University of Miami School of Medicine and the Miami VA Medical Center

Dr. Klimas is a clinical immunologist whose work in associating the degree of immune activation with severity of cognitive dysfunction has led to several new treatments. She is a leader in the field of fatigue.

Ismael Menia, M.D. Professor Emeritus/University of California – Los Angeles/Director of Nuclear Medicine/Las Condes Clinic – Santiago, Chile

A professor of radiology services at UCLA for more than 20 years, Dr. Menia has published a host of articles related to neuro-inflammation in both autism and chronic fatigue syndrome. Long considered a leader in this field, he possesses one of the most comprehensive pediatric Neuro-CEPT scan databases, with controls, in the world. This scan is critical in the diagnosis and treatment of neuro-delay disorders.

James Oleke, M.D. Chairman of Immunology/Department of Pediatrics at the University Medicine & Dentistry of New Jersey

A specialist in autism, ADHD and chronic fatigue syndrome, Dr. Oleke offers NIDS-RI clinical and research resources, and a significant experience base with these afflictions.

Vijendra Singh, Ph.D. Professor/Biotechnology Center at Utah State University

Dr. Singh is working on autoimmune theories for autism at the Biotechnology Center at Utah State University. With more than 20 years experience in neurobiology and immunology research, he serves on the Scientific Board of the Autism Immunotaxis Project.

Letter from NIDS Executive Board

Welcome new readers and those just becoming aware of the NIDS effort! To those of you whose children I take care of and/or who have become aware of and have helped with this grass-roots effort called NIDS and/or NFND.

For the first time we are reaching a point where the number of patients receiving support from their physicians and expressing the desire of other patients for help is now too many for our current capacity. More about the neuro-immune connection, has changed dramatically. Prominent, academic based pediatric--developmentalists have seen children change “in ways they never anticipated” such that they are interested in “replicating” our protocol in a trial manner.

As represented by the media clippings in this newsletter, NIDS has become a viable concept, and most important, a logical, viable option to the “doubt and gloom” and “hysteria” called Autism.

But problems still exist. NIDS awareness is still in it’s infancy… we must grow rapidly if we are going to change things fast enough to help those already affected. While the issue is no longer will this happen, but rather when, the difference could sadly be now vs. ANOTHER 10 – 15 years.

For while literally EVERY “Autism” group is discussing autism, neuro-immune, and even some of them “vaccines”, they have not yet made the connection (or remain unwilling to do so) that this is a disease process that can be treated now, not some strange developmental disorder called “Autism”. This can be changed, but I must confess, I never imagined there would be a need to keep fighting the kind of obstacles that still exist, when ALL logic and data says the old ideas cannot, do not make sense.

Many parents, often having seen many renowned experts, are told to expect little. What objective evaluation, measurement, or test, gives them hope that their child “was damaged good” and could not be fixed. “That as mothers they foolishly believed otherwise.”

Herein lies another part of the problem. We are condemning you and your children’s blackbook, with the study of the supportive affect of any kind that this is even what the experts think it is. Hasn’t it? This hasn’t become at least a little ludicrous, suspicious to many by now?

But there is another problem facing all of you. With all the other groups holding on to the idea of “Autism,” NIDS has yet to receive the funding and focus it needs. While one can now say, this effort will ultimately succeed, I probably should not hold to that line in the key of all researchers ready to move for your children, and that all researchers ready to place your children first for new ideas, NEW therapies, not years away from you and the child, that the knowledge and experience to increase significantly the odds of expedient success. This newsletter, the media releases, the efforts of so many of you are aimed at trying to push this over the push, to create a real chance this now for your selves, your children, and so many others.

Together, this can be done. We all need to distribute NIDS information to “push” through every means that once NIDS is seen as a viable treatment option for the child, that finally the end can start to be seen. In turn, we can try to point as many as possible to a pathway of logical, science, and appropriate medical care and help for their children.

Again, to all of you reading this, welcome and thank you. Thanks to the efforts of many already, there is a real chance to make the future NOW. We must all make this happen, or a lot of today’s children will never have the chance they deserve. Michael J. Goldberg, MD

NIDS Mission Statement

The NIDS Research Institute, consisting of the NIDS Patients Coalition and the NIDS Scientific Board, is dedicated to increasing the public’s awareness of the likely connection between neuro-immune and/or auto-immune dysfunction and conditions such as Autism, ADHD, Alzheimer’s, ALS, CFS/FMIDS, MS and other immune mediated diseases. The Institute is committed to facilitating access to treatment options and research studies for families suffering from these disease processes. It will strive to fulfill this mission by working in cooperation with Neuro-Immunology, Inc., a research integration company dedicated to the development of new treatments for these diseases.

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• Question and Answer Session video
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The NIDS Research Institute and Parent Coalition is a 501(c) (3) Non Profit Organization
"NIDS KIDS" - Success Stories

"Nicholas was born healthy. Other than problems with GER reflux and occasional ear infections, his first 2 years were on track developmentally. At his 2 year well child check, it was confirmed that he was delayed in speech and was showing social disengagement from family and friends. He was diagnosed with autism at 3 1/2. His prognosis was bad; we were told by his pediatrician that he would pray for our family. Most of his day was spent in solitude. He would scream to be put down whenever he was picked up. He would spin himself (and objects) constantly and spent much of his day running down the hallway looking peripherally at the wall. After several months searching for answers, I located Dr. Goldberg's article on Autism and the Immune Connection. Finally a theory made sense. We made an appointment the next day. After 1 1/2 years on the protocol, Nicky is becoming verbal, he is self sufficient, and has entered Kindergarten near the top of the class academically. We expect his "Special Needs" designation in school will be removed within the next 1 1/2 years."

Suzanne Roelski/arizona

"We have been seeing Dr. Goldberg for 5 years. We now have a well adjusted 7 year old boy in typical first grade. He is in the highest reading and math groups and is the best speller in the class. He has a terrific vocabulary and wonderful conversations. He still has an aide to help him when the teacher has "too much language" because his auditory processing is a little slow. But otherwise he is happy and healthy and has friends. He takes piano and horse back riding lessons, and does gymnastics without an aide and with other children age..."

Lori Dell/Pennsylvania

"My son, Reid, was officially diagnosed as autistic when he was three. My husband and I went from doctor to doctor trying to help our child. Most of these doctors did not even perform a cursory exam because they didn't believe autistic kids could get better. They had nothing to give us, not even hope. He is now recovered because of the work because of the doctors from the NIDS (Neuro-Immune Dysfunction Syndrome) Research Institute. When Reid entered kindergarten, he was in the third percentile for speech. By that time, we had been seeing Dr. Goldberg for about a year. By the third grade, my son tested in the 85th percentile for speech and by fifth grade no longer received any assistance at all at school. Dr. Goldberg has been treating my child and others like him successfully for the last decade. On my son's current seventh grade report card, he earned all "A's" and a "B" in art. He is in all the accelerated classes with no assistance. None of his teachers or friends even knows he was ever diagnosed with autism. But more importantly, he is well liked and doing all the things the doctors said would never be possible. He will grow up to be a productive working citizen for whom the government does not have to provide."

Marcia Ryan/Minnesota

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Suggestions
Do you have an area of interest regarding NIDS or Autism itself? Please forward all requests for future newsletter articles to: snielkin@hotmail.com or ssjimith@rools.com

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ADD/ADHD,
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Prospective Effect of Job Strain on General and Central Obesity in the Whitehall II Study

Eric J. Brunner, Tarani Chandola, and Michael G. Marmot

From the Department of Epidemiology and Public Health, Royal Free and University College London Medical School, London, England.

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Positive energy balance is the major cause of obesity, and chronic stress may be a contributory factor. The authors examined cumulative work stress, using the Job Strain Questionnaire on four occasions, as a predictor of obesity in a prospective 19-year study of 6,889 men and 3,413 women (aged 35–55 years) in the Whitehall II cohort in London, United Kingdom (baseline: 1985–1988). A dose-response relationship was found between work stress and risk of general obesity (body mass index (BMI) ≥ 30 kg/m²) and central obesity (waist circumference ≥ 102 cm in men, ≥ 88 cm in women) that was largely independent of covariates. The imputed odds ratios of BMI obesity for one, two, and three or more reports of work stress adjusted for age, sex, and social position were 1.17, 1.24, and 1.35 (p < 0.01), respectively. For the cumulative findings, the corresponding ORs were 1.17, 1.41, and 1.61 (p < 0.01). Work stress effect was modestly attenuated after exclusion of obese individuals at baseline and further adjustments for smoking; intakes of dietary fiber, fruits and vegetables, and alcohol; and levels of physical activity during follow-up. This study provides prospective, population-based evidence that chronic work stress predicts general and central obesity.

body mass index; employment; obesity; prospective studies; stress

Abbreviations: BMI, body mass index; MET, metabolic equivalent.

Oesity is an important cause of excess mortality and morbidity (1, 2). The increase in risk for obese persons compared with those of normal weight is modest, but, because obesity has become highly prevalent among adults in many countries (30 percent in the United States, 22 percent in England and Wales in 2001), the attributable burden is substantial (3, 4). Although weight gain is principally the result of dietary overconsumption, the role of physical activity has been recognized (5). In fact, a systematic review of 16 studies in 1998 suggested that physical activity explained 10–12 percent of the excess risk for obesity (6). This indicates that, in adults, physical activity reduces the risk of obesity (7). The MRFIT study, for instance, provided evidence that vigorous physical activity was associated with a 40 percent reduction in the risk of obesity (8). Obesity is a chronic disease, and long-term behavioral change is needed to achieve and maintain weight loss (9). Biological factors, lifestyle choices, and psychosocial conditions (10) contribute to the high prevalence of obesity in the adult population (11, 12). The problem is that obesity is a chronic disease, and long-term behavioral change is needed to achieve and maintain weight loss (9). Biological factors, lifestyle choices, and psychosocial conditions (10) contribute to the high prevalence of obesity in the adult population (11, 12).

MATERIALS AND METHODS

Participants

Prospective Effect of Job Strain on General and Central Obesity 829

1985–1988 (phase 1) from 20 civil servants in London, United Kingdom. After the initial clinical examination, a further postal questionnaire was carried out in 1989 (phase 2), 1991–1993 (phase 3), including a clinical examination, 1995 (phase 4), 1997–1999 (phase 5, including a clinical examination), 2001 (phase 6), and 2003–2004 (phase 7). Details of the screening examinations are reported elsewhere (15). The screening examination of the composite health examination was a clinical examination, such as death, housing tenure, social support, and whether the participant’s mother was still alive at baseline.

Analyses

The MRFIT study, for instance, provided evidence that vigorous physical activity was associated with a 40 percent reduction in the risk of obesity (8). Obesity is a chronic disease, and long-term behavioral change is needed to achieve and maintain weight loss (9). Biological factors, lifestyle choices, and psychosocial conditions (10) contribute to the high prevalence of obesity in the adult population (11, 12). There were 10,308 civil servants who participated in the first phase of the Whitehall II Study (1985–1988). By phase 7 of the study (1997), the participation rate was 71 percent, taking into account 605 deaths plus 6,914 participants at phase 7. Missing-data-analysis procedures used the multi-variate imputation by chained equations (MICE) method of multiple multivariate imputation (19) in State software (20) with missing-at-random assumptions. Five copies of the data, each with a different cluster of variables, were independently assessed in the multivariate logistic regression analyses. Estimates of parameters of interest were averaged across the copies to give a single mean estimate, and standard errors were adjusted according to Rubin’s rules. Apart from all the variables in the imputed analyses (age, sex, employment grade; education; height; weight at phases 1, 2, 3, and 5; and employment status at phases 2, 3, and 5; health behaviors at phases 1 and 3; obesity at phases 1 and 7; and waist circumference) the imputation process also included baseline predictors of dropout from the cohort, such as death, housing tenure, social support, and whether the participant’s mother was still alive at baseline. This step was included to meet the requirement of missing-at-random analysis that missingness does not depend on the value of any explanatory variable, after controlling for other variables.

The result of the study is that women who were employed at phases 1, 2, 3, and 5 were employed at phases 1, 2, 3, and 5. The imputation process also included baseline predictors of dropout from the cohort, such as death, housing tenure, social support, and whether the participant’s mother was still alive at baseline. This step was included to meet the requirement of missing-at-random analysis that missingness does not depend on the value of any explanatory variable, after controlling for other variables.

A missing value on the work stress measure could indicate that the data were not available at a particular phase, or that the participant dropped out of the cohort, or that the participant was employed at phases 1, 2, 3, and 5 (imputed n = 4,895 of 10,308 recruited at baseline). The MRFIT study, for instance, provided evidence that vigorous physical activity was associated with a 40 percent reduction in the risk of obesity (8). The imputation process also included baseline predictors of dropout from the cohort, such as death, housing tenure, social support, and whether the participant’s mother was still alive at baseline. This step was included to meet the requirement of missing-at-random analysis that missingness does not depend on the value of any explanatory variable, after controlling for other variables.

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The Medical Concern

Increasing age (at phase 7) and each of the explanatory variables are shown in the table below. The association between BMI obesity and age among women was higher when adjusted for age. Among men, the association was stronger with other obesity measures, such as smoking and alcohol consumption.

**Table 1.** Body mass index obesity at follow-up (phase 7) by age, employment grade, job strain, and other measures, Whitehall II Study, London, United Kingdom, 1985-2004.*

<table>
<thead>
<tr>
<th>Explanatory variable</th>
<th>Men (OR 95% CI)</th>
<th>Women (OR 95% CI)</th>
<th>Cases/N</th>
<th>Men (OR 95% CI)</th>
<th>Women (OR 95% CI)</th>
<th>Cases/N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age group (years)</td>
<td></td>
<td></td>
<td></td>
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<td></td>
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</tr>
<tr>
<td>35-39</td>
<td>1.00</td>
<td>0.97</td>
<td>2481/360</td>
<td>1.00</td>
<td>0.94</td>
<td>119496</td>
</tr>
<tr>
<td>40-44</td>
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<td>0.86</td>
<td>2141/249</td>
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<td>0.82</td>
<td>115500</td>
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<tr>
<td>45-49</td>
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<td>0.84</td>
<td>1410/139</td>
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<td>0.81</td>
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<td>≥50</td>
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<td>143/101</td>
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<td>0.55</td>
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<tr>
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<td>Over 4 phases</td>
<td></td>
<td></td>
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</tr>
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<td>0.88</td>
<td>66/40</td>
<td>1.33</td>
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<td>43183</td>
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<tr>
<td>3 episodes</td>
<td>1.13</td>
<td>1.13</td>
<td>108/56</td>
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<td>0.98</td>
<td>45162</td>
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<td>4 episodes</td>
<td>1.22</td>
<td>1.22</td>
<td>98/52</td>
<td>1.39</td>
<td>0.82</td>
<td>48198</td>
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<tr>
<td>Low job decision latitude: over 4 phases</td>
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<td>1.00</td>
<td>68/42</td>
<td>1.00</td>
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<td>0.96</td>
<td>0.96</td>
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<td>1.39</td>
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<td>0.88</td>
<td>0.88</td>
<td>66/40</td>
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<td>1.13</td>
<td>1.13</td>
<td>108/56</td>
<td>1.68</td>
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<td>1.22</td>
<td>1.22</td>
<td>98/52</td>
<td>1.39</td>
<td>0.82</td>
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<td>Low work social support: over 4 phases</td>
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<tr>
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<td>108/62</td>
<td>1.00</td>
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<td>0.96</td>
<td>74/14</td>
<td>1.39</td>
<td>0.78</td>
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<tr>
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<td>0.88</td>
<td>0.88</td>
<td>66/40</td>
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<td>98/52</td>
<td>1.39</td>
<td>0.82</td>
<td>48198</td>
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</tbody>
</table>

**Results**

Bivariate analyses, based on “complete cases” logistic regression models, of the association between BMI obesity (at phase 7) and each of the explanatory variables are shown separately for men and women in table 1. Increasing age was associated with a lower risk of BMI obesity for men (trend p < 0.01), but not for women (p = 0.12). Men and women in lower employment grades were more likely to be obese. Fewer years of education was associated with higher odds of BMI obesity among women. A greater number of reports of iso-strain was associated with higher odds of obesity among men (p < 0.01). Among women, only those who reported chronic iso-strain (three or more exposures) had significantly higher odds compared with women who did not report any iso-strain over the study period. There were some gender differences in the effect of iso-strain, with men more clearly with level of social support (trend for men, p < 0.01; women, p < 0.05).

Smoking and BMI obesity were unrelated among women; however, among men, heavy smoking was clearly associated with obesity at phase 1. Low fruit and vegetable consumption and low fiber intake were associated with BMI obesity among men (p < 0.01). Among women, only those who reported chronic iso-strain (three or more exposures) had significantly higher odds compared with women who did not report any iso-strain over the study period. There were some gender differences in the effect of iso-strain, with men more clearly with level of social support (trend for men, p < 0.01; women, p < 0.05).

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### TABLE 2. Multivariate multiple imputation logistic regression models of incident body mass index obesity among nonretired men and women at study phase 5, London, United Kingdom, 1985–2004

<table>
<thead>
<tr>
<th>Variable</th>
<th>1 phase</th>
<th>2 phases</th>
<th>3 phases</th>
<th>All phases</th>
<th>1 phase</th>
<th>2 phases</th>
<th>3 phases</th>
<th>All phases</th>
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<td>Age and employment grade</td>
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<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
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<tr>
<td>Education and health behaviors at phase 1</td>
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<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>421/594</td>
<td>1.00</td>
<td>333/2/494</td>
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<tr>
<td>Age and employment grade</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
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<td>1.00</td>
<td>1.00</td>
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</tr>
<tr>
<td>Education and health behaviors at phase 1</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>421/594</td>
<td>1.00</td>
<td>333/2/494</td>
<td></td>
</tr>
</tbody>
</table>

**Adjusted for**: age, employment grade, education, health behaviors. **Cases/N**: 584/109, 551/109, 3654/109, 3471/109.
highlight the importance of workplace organization (47) as well as the wider experience of social inequality. This study is limited in its generalizability to non-European ethnic groups. Whitehall II Study participants are predominantly White and European, although South Asian participants in the study report more depression and lower levels of decision latitude and social support at work (48). These differences may contribute to the higher coronary risk experienced by those of South Asian origin in the United Kingdom, but it remains to be established whether the work stress–obesity effect demonstrated here is part of the explanation for this health disparity.

<table>
<thead>
<tr>
<th>Explanatory variable</th>
<th>OR (95% CI)</th>
<th>Cases/N</th>
<th>p for gender interaction</th>
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<td>Age group (years): phase 1</td>
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<td>35–39</td>
<td>1.00</td>
<td>273/1,361</td>
<td>1.00 156/496</td>
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<td>0.88, 1.29</td>
<td>270/1,252</td>
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<td>45–49</td>
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<td>0.81, 1.23</td>
<td>187/1015</td>
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<td>0.87, 1.29</td>
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<td>1.00 174/567</td>
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<td>1.02, 1.87</td>
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<td>1.14, 1.87</td>
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<td>0.52, 1.06</td>
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<td>4 episodes</td>
<td>0.86</td>
<td>0.65, 1.14</td>
<td>116/627</td>
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<td>1.00 79/259</td>
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<td>1.00 352/1,078</td>
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<td>1.37, 1.87</td>
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<td>Light smoker (1-10 cigarettes/day)</td>
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<td>Medium smoker (11-20 cigarettes/day)</td>
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<td>1.24, 2.41</td>
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<tr>
<td>Heavy smoker (&gt;20 cigarettes/day)</td>
<td>2.61</td>
<td>1.80, 3.79</td>
<td>47/135</td>
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</table>

Table continues
This prospective study shows a dose-response association between exposure to work stress and risk of obesity at follow-up. Employees experiencing chronic work stress have higher risks of obesity than those without work stress, after taking into account socioeconomic position and variation in adverse health behaviors. The study provides evidence that, in addition to the known effects of excess calorie intake and physical inactivity, stressors from everyday life may contribute to the problem of adult obesity.

ACKNOWLEDGMENTS

The Whitehall II Study has been supported by grants from the Medical Research Council; British Heart Foundation; Health and Safety Executive; Department of Health; National Heart, Lung, and Blood Institute (HL36310); United States, National Institutes of Health; National Institute on Aging (AG13196); United States, National Institutes of Health; Agency for Health Care Policy Research (HS09516); and the John D. and Catherine T. MacArthur Foundation Research Networks on Successful Midlife Development and Socioeconomic Status and Health. M. G. M. is supported by an MRC Research Professorship.

The authors thank all participating civil service departments and their welfare, personnel, and establishment offices; the Occupational Health and Safety Agency; the Council of Civil Service Unions; and all members of the Whitehall II Study team.

Conflict of interest: none declared.

REFERENCES

We agree that stress is an ill-defined concept and psycho-
ological distress would have been a more appropriate term to
use. We would also like to emphasise that our study was the
first to show an association between high levels of psycho-
ological distress and stillbirth and that the results from our
study should be tested in new studies before the association
is considered causal. We adjusted our results for a number of
potential confounders, but the influence of unmeasured fac-
 tors may still be ruled out. However, we believe that the use of
illicit drugs among pregnant women with high levels of dis-
tress during pregnancy does not explain our results due to
the fact that in our population, few pregnant women used illicit
drugs and hardly any of these completed our questionnaires.

Table 1. Maternal psychological stress during pregnancy and
stillbirth in 19 282 pregnancies, Aarhus Denmark, 1989–98

<table>
<thead>
<tr>
<th>Level of psychological</th>
<th>n Stillbirth, n(%)</th>
<th>OR (95% CI)</th>
</tr>
</thead>
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<tr>
<td>Low</td>
<td>17 232</td>
<td>53 (3.1)</td>
</tr>
<tr>
<td>High</td>
<td>2050</td>
<td>13 (6.3)</td>
</tr>
</tbody>
</table>

More stress, more stillbirth—more than a simple relationship

Author’s Reply

Sir,

We appreciate the comments by Drs Lam and Lee.1 In their
letter, Drs Lam and Lee question our conclusion as we ana-
lyzed only the association between psychological distress in
the third trimester and stillbirth and did not consider psycho-
ological distress at the beginning of the pregnancy.2 Because
of financial restrictions at the end of the study period, we were
able only to collect information about psychological distress
in the third trimester and therefore, we had no possibility of
evaluating the association between psychological distress dur-
ing the first trimester and stillbirth.

We used the 12-item General Health Questionnaire to
measure psychological distress and generated a score by the
sum of all the answers, each contributing a value between
0 (low psychological stress) and 3 (high psychological stress).
When a dichotomous scoring was used and the 10% of
women with the highest score were compared with those with
a lower score, our results were essentially unchanged (Table 1).

References

1 Lam SK, Lee AM. More stress, more stillbirth—more than a simple

2 Wisborg K, Barklin A, Hedegaard M, Henriksen TB. Psychological stress

K Wisborg, A Barklin, M Hedegaard & T Henriksen
Personal Epidemiology Research Unit, Aarhus University Hospital, Skjelby, Denmark.

Accepted 22 November 2009.

DOI: 10.1111/j.1471-0528.2008.01827.x

More stress, more stillbirth—more than a simple relationship

Molecular Adaptations Underlying Susceptibility and Resistance to Social Defeat in Brain Reward Regions

Vaishnav Krishnan,1,5 Ming-Hu Han,1,6 Danielle L. Graham,1 Olivier Berton,1 William Renthal,1 Scott J. Russo,1 Quincy LaPlant,1 Ali Graham,1 Michael Lutter,1 Diane C. Lagace,1 Subrotto Ghosh,1 Jena Trulin Reister,1 Paul Tamouso,1 Thomas A. Green,1 Rachel M. Siegel,1 Anvind Kumar,1 Amelia J. Eisich,1 David W. Self,1 Francis S. Lee,1 Carol A. Tammainga,1 Donald C. Cooper,1 Howard K. Gerrshenfeld,1 and Eric J. Nestler1

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2Department of Molecular Biology
3Department of Genetics and McLean Hospital, Harvard University, Cambridge, MA 02478, USA
4Department of Psychiatry and Pharmacology, Weill Medical College of Cornell University, New York, NY 10021, USA
5These authors contributed equally.

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DOI 10.1016/j.cell.2007.09.018

SUMMARY

While stressful life events are an important cause of psychopathology, most individuals exposed to adversity maintain normal psychological functioning. The molecular mechanisms underlying such resilience are poorly understood. Here, we demonstrate that an inbred population of mice subjected to social defeat can be separated into susceptible and unsusceptible subpopulations that differ along several psychopathologically relevant dimensions. By a combination of molecular and electrophysiological techniques, we identify signature adaptations within the mesolimbic dopamine circuit that are uniquely associated with vulnerability or insusceptibility. We show that molecular recapitulations of three prototypical adaptations associated with the susceptible phenotype are each sufficient to promote resistant behavioral and physiological domains, and is mediated by specific molecular neuroadaptations within the brain’s mesolimbic dopamine reward circuit. We propose that our findings may model resilience, operationally defined as “the process of adapting well in the face of adversity” (Charny, 2004).

RESULTS

Segregation of Defeated Mice into Susceptible and Unsusceptible Populations

An episode of social defeat is accomplished by forcing a mouse to intrude into the space territorialized by a larger mouse of a more aggressive genetic strain, leading to an agonistic encounter that ultimately results in intruder subordination. We have previously shown that c57bl/6 mice subjected to social chronic stress (15 such defeats over 10 days) display a long-lasting reduction in social interaction (Berton et al., 2006; Tsankova et al., 2006), which is measured by comparing the time a mouse spends in an intruder-challenged territory to a social target compared to the time in that zone in the absence of a social target. By analyzing a large number of chronically defeated mice, we found a wide distribution of responses, when examined 24 hr after the last defeat (Figure 1 “day 1”), 40%-50% of defeated mice displayed social avoidance generalizes to other behavioral measures, we recently showed that socially defeated mice demonstrated a long-lasting social avoidance that is reversed by a mouse to intrude into the space territorialized by a larger mouse of a more aggressive genetic strain, leading to an agonistic encounter that ultimately results in intruder subordination. We have previously shown that c57bl/6 mice subjected to social chronic stress (15 such defeats over 10 days) display a long-lasting reduction in social interaction (Berton et al., 2006; Tsankova et al., 2006), which is measured by comparing the time a mouse spends in an intruder-challenged territory to a social target compared to the time in that zone in the absence of a social target. By analyzing a large number of chronically defeated mice, we found a wide distribution of responses, when examined 24 hr after the last defeat (Figure 1 “day 1”), 40%-50% of defeated mice displayed social avoidance generalizes to other behavioral measures, we recently showed that socially defeated mice demonstrated a long-lasting social avoidance that is reversed by

INTRODUCTION

An individual’s emotional response to severe, acute stress (e.g., trauma, terrorist act) or more prolonged chronic stress (e.g., divorce, war-time torture) is determined by complex and poorly understood ways (Charny and Marij, 2004; Nestler et al., 2002), while a vast literature describes the effects of several kinds of acute and chronic stress on an individual’s physiology and behavior, much less is known about the biological basis of individual differences in stress responses (Yehuda et al., 2006). A majority of human and animal studies do not show signs of psychopathology such as posttraumatic stress disorder (PTSD) or depression (Charny, 2004; Kessler et al., 1995; Yehuda et al., 2006), display traits such as cognitive flexibility (Yehuda et al., 2006) and optimism (Charny, 2004), however, the mechanisms underlying individual susceptibility or resistance to the deleterious effects of stress remain unknown.

Insight into the biology of variations in susceptibility can be gained by understanding models of individual differences in response to stress (Rutter, 2006). One such rodent model is social defeat, which has the ethological relevance of examining social subordination (Malatynska and Knapp, 2005), as well as face validity in its ability to model the symptomatology of stress-related disorders such as PTSD and depression (Augustinovitch et al., 2005; Martinez et al., 1998). The development of social defeat in mice has also enabled the examination of the effects of specific genetic manipulations (McLaughlin et al., 2006). By employing a novel measure of social interaction, we recently showed that socially defeated mice demonstrate a long-lasting social avoidance that is reversed by chronic (but not acute) treatment with antidepressants (Berton et al., 2006; Tsankova et al., 2006), social avoidance induced by chronic social defeat was dependent on brain-derived neurotrophic factor (BDNF) signaling in the mesolimbic dopamine circuit, which is composed of dopamine neurons in the ventral tegmental area (VTA) and their forebrain projection regions, in particular the nucleus accumbens (NAc). This VTA-NAc circuit plays a critical integrative role in reward and emotion-related behaviors (Nestler and Carlezon, 2004).

Here, we take advantage of a large variance in behavioral outcomes across defeated c57bl/6 mice to study the molecular basis of susceptibility and resistance to emotional stress. We show that resistance to social defeat is a qualitative trait, long lasting, extends across several behavioral and physiological domains, and is mediated by specific molecular neuroadaptations within the brain’s mesolimbic dopamine reward circuit. We propose that our findings may model resilience, operationally defined as “the process of adapting well in the face of adversity” (Charny, 2004).

Susceptible and Unsusceptible Mice Display Distinct Syndromes

To examine whether resistance to defeat-induced social avoidance generalizes to other behavioral measures, we performed an extensive phenotypic characterization of Susceptible and Unsusceptible mice (summarized in Table 1 and Table S2). On day 11, only Susceptible mice displayed a significant decrease in social interaction (Figure 2B) and sucrose preference (F50,50 = 5.70, p < 0.01; Figure 1E), both consistent with increased depression-like behavior. In contrast, Unsusceptible mice showed an increase in anxiety-like behavior, spending significantly less time in the open arms of the elevated maze (Figure 2B). Furthermore, similarly, both subgroups of mice demonstrated a sensitized corticosterone (CORT) response to a 6 min swim stress (F50,50 = 12.34, p < 0.0001; Figure 1G). To evaluate autonomic arousal and circadian function, we implanted a set of mice with subcutaneous temperature transponders (Ji et al., 2003). Both Susceptible and Unsusceptible mice showed an anticipatory form of autonomic arousal during the course of social defeat: a significant elevation of body temperature in the 30 min prior to the onset of an expected defeat episode (Figure 2C). In contrast, only Susceptible mice displayed a significant reduction in the circadian amplitude of body temperature (F50,50 = 3.31, p < 0.05; Figure 1H) and a significantly elevated hyperthermic response to the social avoidance test (F50,50 = 5.39, p < 0.01; Figure 1F). Interestingly, only Susceptible mice displayed significantly conditioned place preference to a low dose of cocaine (Figure 2D), demonstrating sensitization to psychostimulant reward. Collectively, these data show that the development of social avoidance in Susceptible mice is associated with a syndrome of hedonic changes, weight loss, and circadian abnormalities. In contrast, increases in anxiety and corticosterone reactivity are seen in both subgroups of mice.
Increased BDNF Signaling within the NAc Mediates Susceptibility

Because chronic social defeat increases BDNF protein levels in the NAc on days 11 and 39 (Berton et al., 2006), we tested whether this response differs between Susceptible and Unsusceptible mice. Western blot analysis of NAc tissue 24 hr after avoidance testing revealed that only Susceptible mice demonstrated this BDNF increase, namely a 80% elevation in BDNF levels over controls (F(2,28) = 3.88, p < 0.05), with no change in BDNF seen in the NAc of Unsusceptible mice (Figure 2A). We found no changes in levels of the full-length or truncated isoforms of the BDNF receptor, tropomyosin-related kinase B (TrkB.F or TrkB.T) or in levels of phospho-TrkB (Figure 2B). Consistent with an increase in NAc BDNF protein, we also observed a robust activation of signaling molecules downstream of TrkB (Chao et al., 2006). Susceptible mice displayed increased levels of the phosphorylated akt thymoma viral oncogene (AKT), glycogen synthase kinase 3β (Gsk-3β), and extracellular signal regulated kinase (ERK1/2) (Figure 2C), with no significant changes in total levels of these proteins. Unsusceptible mice did not show these changes, although there was a strong trend for increased phospho-ERK levels, suggesting the possibility that ERK activation could stem partly from nonneurotrophic pathways.

We next tested the involvement of increased BDNF signaling in the development of the Susceptible versus Unsusceptible phenotype. Bilateral intra-NAc infusions of BDNF enhanced susceptibility in response to a submaximal exposure to defeat stress (Figure 2D), without modifying locomotor activity (Figure S2E). Conversely, a blockade of increased ERK signaling in the NAc, via overexpression of a dominant-negative form of ERK2 using a herpes simplex virus (HSV-dnERK), promoted insusceptibility (Figure 2E), again with no effect on general locomotor activity (Figure SSD). These data strongly implicate BDNF induction and downstream signaling within the NAc as a mediator of defeat-induced avoidance.

To explore mechanisms by which chronic social defeat increases BDNF levels in the NAc, we first measured BDNF mRNA levels in this region by qPCR. Control, Susceptible, and Unsusceptible mice displayed equivalent levels of BDNF mRNA (p > 0.5), suggesting that the increased NAc BDNF protein associated with social avoidance is not dependent on local transcriptional regulation. To test this prediction, we examined the behavioral effects of an established method to locally delete the bdnf gene from the NAc by stereotaxically infusing adeno-associated virus (AAV) that expresses Cre-recombinase into the NAc of floxed BDNF mice (Berton et al., 2006; Graham et al., 2007). When AAV-CreGFP- and AAV-cre-infected mice were subjected to the social defeat paradigm, Bdnf gene knockdown within the NAc did not alleviate defeat-induced avoidance (Figure 3B). This is in striking contrast to a knockdown of Bdnf within the VTA, which we have recently shown to prevent defeat-induced avoidance (Berton et al., 2006). To further characterize...
relative contributions of BDNF within these structures to the behavioral sequelae of social defeat, we defeated ficedo BDNF mice that had been infused with AAV-CreGFP or AAV-GFP into either the VTA or the NAc. As shown previously, a VTA-specific Bdnf knockdown led to an increase in the proportion of Unsusceptible mice af- ter defeat (11% in AAV-GFP-versus 34% in AAV-CreGFP- injected mice), an effect not seen after a NAc Bdnf knock- down (data not shown). Likewise, Bdnf knockdown in VTA ameliorated the weight loss (t 13 = 2.19, p < 0.05; Figure 3C) and sucrose preference deficit (t 18 = 2.46, p < 0.05; Figure 3D) associated with the Susceptible phenotype. Among genes significantly upregulated in only Susceptible NAc, we found several ex- amples whose products have previously been implicated in depressive behaviors, such as histone deacetylase-2 (Hdac2) and adenylyl cyclase 7 (Adcy7) (Hines et al., 2001) from NAc (left) and VTA (right), (A) Schematic coronal sections (Paxinos and Franklin, 2001) showing target areas in the NAc and VTA inoculated with either recombinant BDNF (1.5 μg/die) decreases social interaction (promotes susceptibility) following a submaximal exposure to defeat (vehicle: t 395, p > 0.05) and BDNF: t 393, p < 0.05). (B) While the NAc-specific overexpression of HSV-GFP in Susceptible mice did not alleviate social avoidance (t 398, p > 0.05), HSV-floxERK promoted an Un- susceptible phenotype (t 395, p < 0.05). (C) Groups were matched for day 11 interaction times (12.2 ± 4.6 and 16.8 ± 7.2 s). Bars repre- sent mean ± SE (n = 5–15), * indicates signifi- cant post hoc comparisons to respective con- trol groups, p < 0.05, **p < 0.01, ***p < 0.001. (D) Controls; S, Susceptible; U, Unsusceptible. a summary of regulated genes in heatmap form, which emphasizes the unique regulation of gene expression in the VTA of Unsusceptible mice. Among genes significantly upregulated in only Susceptible NAc, we found several ex- amples whose products have previously been implicated in depressive behaviors, such as histone deacetylase-2 (Hdac2) and adenylyl cyclase 7 (Adcy7) (Hines et al., 2001; Schroeder et al., 2006). Similarly, only Susceptible VTA showed a significant upregulation of mRNA levels of galanin (Gal), which creates a prodepressant phenotype when infused directly into the VTA (Weiss et al., 1998), fur- ther validating our microarray results (see Supplemental Microarray Gene Lists). Augmented Firing of VTA Dopamine Neurons Mediates Adaptations to Social Defeat Among the genes that were significantly upregulated in the VTA of Unsusceptible mice only, we identified three voltage-gated potassium (K+) channels (Kcnmf1, Kcnnh3, and Kcn3). Because the induction of these proteins would be expected to reduce neuronal excitability, we hypothesized that their unique induction in Unsusceptible mice could provide a mechanism of susceptibility, per- haps by countering a defeat-induced excitation of VTA dopamine neurons. To test this hypothesis, we studied the effect of social defeat on spontaneous firing rates of VTA dopamine neurons. We first obtained extracellular single-unit recordings from VTA dopamine neurons in slices obtained from control or defeated mice on day 11 (without classifying mice based on susceptibility). At this time point, chronic social defeat caused a 36% increase in the firing rate of VTA dopamine neurons (n = 5, t 20 = 2.15, p < 0.05; Figure 5A). Dopaminergic cells showed no change in firing frequency (n = 5, t 20 = 0.11, p > 0.5). One defeated experience (n = 4, t 20 = 1.04, p > 0.05) or a 10-week-long social isolation stress (n = 4, t 20 = 0.90, p > 0.3) both failed to alter VTA firing rates, suggesting that this change is specific for chronic social defeat. Next, mice were classified as either Susceptible or Unsusceptible on day 11, and single-unit recordings were obtained from VTA dopamine neurons in the hemisphere contralateral to the defeat experience. A control infusion of AAV-CreGFP into the NAc did not alter social avoidance (F 1,33 = 0.01, p > 0.5). (C–E) As compared to local BDNF knockdown within the NAc, an analogous VTA knockdown ameliorated the effects of social defeat on weight loss (C) and % sucrose preference. Immunoblotting NAc samples from these two groups revealed that VTA-infected mice dis- played an 80% reduction in levels of BDNF pro-tein (E). Bars represent mean ± SE (n = 7–13), p < 0.05, **p < 0.01.
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Figure 4. Gene Expression Analysis after Social Defeat

DNA microarrays were performed on VTA and NAc of control, Susceptible, and Unsusceptible mice on day 11 after chronic social defeat. (A) Venn diagrams show the number of uniquely regulated genes in Susceptible and Unsusceptible mice (as compared to nondefeated controls), with the overlap depicting genes that were identically regulated by both conditions. Upregulated (red) and downregulated (blue) genes are shown separately (criteria for significance:

\[ R^{1.5} \text{-fold change compared to respective anatomical control group at } p < 0.05 \]. (B) Heatmaps illustrating the regulation of genes for each condition and anatomical structure, with red to blue gradient depicting an up to downregulation (\[ R^{2}\text{-fold increase} \]/\[ R^{2}\text{-fold decrease} \]). For example, the upper left panel displays significantly regulated genes in Susceptible NAc (top row) and how each of those genes is regulated in Unsusceptible NAc (bottom row). (C) Summary table showing examples of genes significantly upregulated (\( \uparrow \)) or downregulated (\( \downarrow \)) as compared to the nondefeated control group for each brain region. TF, transcription factor; SRY, sex-determining region-Y; TRAAK, TWICK-related amino acid-sensitive K+ channel; NEL, neural epidermal growth factor-like; MMTV, mouse mammary tumor virus.


Figure 5. Increased VTA Dopamine Neuron Firing Mediates Susceptibility

(A) Social defeat results in a significant increase in VTA dopamine neuron firing rates on day 11, with the inset showing a relative cumulative distribution histogram. (B) On day 25, dopamine neuron firing rates from only Susceptible mice display significantly enhanced firing rates. (C) Sample traces and spikes inset shows that averaged VTA firing rates for each mouse are significantly correlated with interaction ratios measured on day 11. (D) Single-unit recordings of GFP-positive or GFP-negative VTA dopamine neurons in slice culture, showing that HSV-Kir2.1 and HSV-drk are able to significantly modulate the spontaneous activity of VTA neurons in vitro (n = 3–5 mice/group, 20–30 neurons/group). (E) While the VTA-specific overexpression of HSV-GFP in Susceptible mice did not affect social avoidance (t10 = 2.98, p < 0.05), HSV-Kir2.1 promoted resilient behavior (t10 = 0.30, p > 0.5), and (F) resulted in a significant reduction in BDNF levels (one-tailed t test). (G) An intra-VTA injection of HSV-drk decreased social interaction (produced a Susceptible phenotype) following a submaximal social defeat regimen (HSV-GFP; \( t_{10} = 4.52, p < 0.001 \); and HSV-drk; \( t_{10} = 0.31, p > 0.5 \)) and (H) resulted in a significant increase in BDNF levels (one-tailed t test). Bars represent mean ± SE (n = 5–11). * indicates significant post hoc comparisons to respective control groups, *p < 0.05, **p < 0.01, ***p < 0.0001. performed 2 weeks later. At this time point, VTA dopamine neuron firing rates were increased in Susceptible mice (n = 5, \( F_{2,381} = 14.37, p < 0.0001 \)), with no effect seen in Unsusceptible mice (Figures 5B and 5C). VTA firing rates were significantly correlated with the interaction ratio measured on day 11 (\( r = 0.67, p < 0.01, n = 15 \); Figure 5C, inset).

To establish a causal link between changes in VTA excitability and social avoidance, we overexpressed an inward rectifying K+ channel (Kir2.1 or Kcnj2) in the VTA of Susceptible mice to examine whether this manipulation would promote resistance to avoidance. We chose Kir2.1 because it has been shown to reliably suppress the excitability of several types of neurons (Burrone et al., 2002; Nitabach et al., 2002; Dong et al., 2006); indeed, we found that HSV-mediated Kir2.1 overexpression robustly decreased the firing of VTA dopamine neurons (Figure 5D). We next took two groups of Susceptible mice, matched for day 11 interaction times (43.0 ± 5.3 and 43.9 ± 6.6 s), and injected one with HSV-GFP and the other with HSV-Kir2.1 into the VTA. When assayed 3 days later, HSV-Kir2.1-injected mice displayed an Unsusceptible phenotype as compared to their GFP-infected counterparts (Figure 5E), despite comparable levels of locomotor activity (Figure S5D). Also, HSV-Kir2.1-injected mice displayed significantly reduced NAc levels of BDNF (\( t_{20} = 1.96, p < 0.05 \); Figure 5F). The Unsusceptible phenotype induced by HSV-Kir2.1 was absent after transgene expression had degraded (8 days following HSV infusions; Figure S5E). Intra-VTA infusions of HSV-Kir2.1 had no effect on the behavior of Unsusceptible mice (Figure S5F). Converse effects were seen upon overexpressing a K+ channel (Kcnab2) rendered dominant-negative (HSV-dnK). HSV-dnK increased the firing rate of VTA dopamine neurons (Figure S5D), promoted the development of a Susceptible phenotype on a submaximal exposure to defeat (Figure S5G) without affecting general locomotor activity.
Deficits in Activity-Dependent BDNF Release Promote an Unsusceptible Phenotype

Thus far, our data are consistent with a model wherein susceptibility to an avoidant phenotype is caused by up-regulation of VTA neuronal activity, which results in increased BDNF signaling within the NAc. To test this hypothesis, we examined the consequence of naturally occurring variances in single-nucleotide polymorphism (SNP) in the BDNF promoter (5′-GAAAG, Val66Met), which impairs activity-dependent BDNF secretion (Chen et al., 2004; Egan et al., 2003). Vanil and Met/Met mice (Chen et al., 2000) showed comparable responses in the forced swim and sucrose preference tests (Figures S6A and S6B), suggesting that Met-BDNF does not affect baseline responses to stress or natural rewards. However, a dramatic phenotype emerged when mice were subjected to chronic social defeat: while Van/Val mice demonstrated a significant reduction in social interaction after defeat (t0 = 3.9, p < 0.01; Figure 6A), Met/Met mice displayed an Unsusceptible phenotype (t0 = 0.2, p > 0.5). Nondefeated Van/Val and Met/Met mice showed similar interaction scores (p > 0.5). When NAc sample were obtained postmortem, both defeated groups were analyzed for BDNF levels. Met/Met mice showed 50% lower levels of BDNF protein compared to Van/Val mice (t = 1.76, p < 0.05; Figure 6B). While this polymorphism impairs BDNF release, it did not modify VTA neuronal activity: extracellular recordings of VTA dopamine neurons from defeated Van/Val and Met/ Met mice showed similar levels of firing (n = 3/group, t = 0.14, p > 0.5; Figure 6C). These findings further support our model of how BDNF signaling within the VTA-NAc circuit relates to vulnerability and resistance to social defeat (Figure 6E) and indicate that preventing BDNF signaling to the NAc may be a key molecular mechanism of resistance.

Depressed Humans Display Increased Levels of BDNF in NAc

To examine the clinical relevance of our findings, we obtained postmortem samples of human NAc from depressed patients and unaffected controls (Table S3A). Only samples from males were examined, and groups were matched for age, postmortem interval, RNA integrity number (RIN), and tissue pH (Table S3B). We observed a 40% increase in levels of BDNF protein in the NAc of depressed patients as compared to controls (n = 10, t = 2.95, p < 0.01; Figure 6D), with no changes in levels of TrkB protein (data not shown) or BDNF mRNA levels (Figure 6C). Because most of the depressed patients were clinically treated with antidepressants (Table S3A), we tested whether this BDNF increase could reflect a drug effect. Chronic treatment (28 days) with imipramine (a standard antidepressant) had no effect on levels of BDNF or TrkB isoforms in NAc from naive mice (Figure 6D).

DISCUSSION

Upon exposure to psychological stress, why do some individuals succumb to debilitating psychiatric disease whereas others progress normally? The goal of the present study was to identify molecular mechanisms underlying vulnerability to stress-induced psychopathology, as well as molecular adaptations that promote resistance to those changes. We utilized the social defeat paradigm and segregated socially defeated c57BL/6 mice into Susceptible and Unsusceptible subgroups: resistance to defeat-induced avoidance was found to be long-lasting and latent. While Unsusceptible mice were immune to several depression-like changes (e.g., anhedonia and weight loss), they displayed similar signs consistent with exposure to chronic stress (e.g., elevated anxiety and CORT reactivity), which were also observed in Susceptible mice. Interestingly, on day 39, only Unsusceptible mice developed a significant increase in relative cardiac mass, suggesting that the persistence of the Unsusceptible phenotype may be associated with the potential tradeoff of prolonged β-adrenergic stimulation (Bonanno et al., 2003) and possibly its subsequent adverse consequences. This study shows that genetically identical (inbred) mice can display phenotypic differences after exposure to chronic stress; analogous findings have been observed in the chronic mild stress model (Strekalova et al., 2004). Such examples of phenotypic variability in inbred mice have always been attributed to environmental influences that are difficult to control and measure, such as variations in prenatal and postnatal development and early dominance hierarchies (Peaston and Whitehead, 2006; Wong et al., 2005). However, experiments performed on inbred mice raised in strictly defined environments have shown that up to 80% of random variation in quantitative traits (e.g., body weight) are unrelated to genetic and environmental influences (Garrard, 1993). This component to natural variation is thought to maintain Gaussian distributions of biological variables independent of environmental influences and sequence constraints and is now recognized as a major component of epigenetic modification that has also been shown to occur in rodent models of cocaine withdrawal (Grimm et al., 2003) and which promotes behavioral responses to cocaine (Graham et al., 2007; Horger et al., 1999). Postmortem NAc samples revealed that susceptibility to avoidance is marked by significantly increased levels of BDNF, a molecular adaptation that has also been shown to occur in rodent models of cocaine withdrawal (Grimm et al., 2003) and which promotes behavioral responses to cocaine (Graham et al., 2007; Horger et al., 1999).
A Naturally Occurring Polymorphism Promotes Long-Term Seizure-Like Lesioning in our Mouse Model

The 8196A SNP of the BDNF gene results in the substitution of Met in place of Val in the predominant of BDNF (Lu et al., 2005). Homozygous mice display a selective impairment in episodic memory and abnormal hippocampal activation (Egan et al., 2003). Consistent with a role for the Met allele in social anxiety, we also observed a strong association between VTA BDNF and social threat in male mice (Egan et al., 2007). Its effects on mesolimbic BDNF signaling may represent a compensatory biological advantage under adverse conditions.

EXPERIMENTAL PROCEDURES

Subjects and Drugs

Male 7-week-old c57Bl/6 (Jackson), CD1 retired breeders (Charles River Laboratories), or Met/Met-deficient BDNF mice (Berton et al., 2005), and 10- to 14-week-old Met/Met and Val/Val mice (Egan et al., 2007) were used. Cocaine (5 mg/kg) and imipramine (20 mg/kg) were given. All experiments were performed in accordance with the guidelines of the UTSWMC Institutional Animal Care and Use Committee and the Institutional Review Board.

Social Defeat and Behavioral Testing

Social defeat and avoidance testing were performed according to published protocols (Berton et al., 2008; Imamkazemi et al., 2008). During each defeat episode, intruder mice were allowed to interact for 10 min with an aggressive CD1 mouse, during which they were attacked and displaced subreotide-posting. For the social interaction test, we measured the time spent in the interaction zone (Fig. S1A) during the first (target absent) and second (target present) trials; the interaction ratio was calculated as 100 (interaction time, target present) ÷ [interaction time, target absent] × 100. PTZ-35°C temperature transponse (Biocom Medical Systems) were implanted in the dorsal intercar- nal region under isoflurane anesthesia. Behavioral phenotyping on days 11 and 30 were performed using standard protocols extensively described in Supplemental Experimental Procedures.

Sucrose Preference

For sucrose-preference testing, a solution of 1% or 2% sucrose or dil- ited primary antibody overnight at 4°C, peroxidase-labeled secondary antibodies, and 3,3′-diaminobenzidine were added to achieve similar brown staining intensity. Immunoblotting and Immunohistochemistry

Mice were anesthetized with a cocktail of ketamine (100 mg/kg) and xylazine (10 mg/kg), positioned in a small-animal stereotoxic instru- ment, and 30 gauge needles were used to bilaterally infuse 0.5 μl of virus (or BDNF) into NAc or VTA at a rate of 0.5 pl/min (Berton et al., 2008)

Electrophysiology

Samples that possessed cold acridine orange fluorescent (ACF), following which 250 μm VTA slices were placed in an ACF+-filled holding chamber. Slices were perfused with a recording chamber filled with a constant rate of ACF (2.5 μM/mL). Glass microelectrodes filled with 2.5 μM NaCl were used to record single-unit extracellular potentials that were monitored through a dual-channel amplifier (Axon Instruments). Neuronal identities were identified by their location and identification of neurons with regular and spontaneous action potentials with triphasic waveforms (Boggess et al., 2004), firing rate was recorded in the amplifier’s bridge mode, and data acquisition and off-line analysis of firing rate were collected using a Digitalis 1322A digitalizer and pClamp 8.2 (Axon Instruments). Cell culture recordings were performed in a cell-attached configuration.

Statistics

Unless otherwise noted, we used two-tailed unpaired Student’s t tests (for all of the data). p values of less than 0.05 were considered to be significantly regulated if they displayed a ≥5-fold change in expression compared to their respective analogical control group (p < 0.05).

Human Postmortem Study

Human brains were obtained from the Dallas Brain Collection (Stan et al., 2006). After obtaining rest of kin permission, tissue was collected from cases at the Dallas County Medical Examiner’s Office and The Transplant Service at UT Southwestern Medical Center. Blood toxicology screens were conducted in each subject, and with a recent or past history of drug abuse, neurological disorders, or loud, maniacal hallucinations were excluded. Clinical records and collateral information from telephone surveys were obtained in each of the subjects. Two psychiatrists carried out an extensive review of the clinical records and made independent diagnoses following a consensus diagnosis using DSM IV criteria. To obtain specimens of human nucleus accumbens, cerebral hemispheres were cut coronally into 1–2 cm blocks. Dissected NAc was immediately placed in a mixture of dry ice and isopentane (1:1, v:v). The frozen tissue was then pulver- ized on dry ice and stored at −80°C. For measurements of tissue pH at 150 mg cerebellar punch was homogenized in 5 ml of dH2O (ph adjusted to 7.00) and centrifuged for 3 min at 8000 × g at 4°C. The pH of this supernatant was measured in duplicate. Each sample’s pHFA intensity number was determined by isolating total RNA using TriReagent (Invitrogen) followed by analysis of gene expression with an Agilent 2100 Bioana- lyzer. For protein studies, 100 μg of NAc tissue was homogenized in 1 ml of lysis buffer (100 μg/ml PMSF, 2 μg/ml aprotinin, leupeptin, and pepstatin in HB + PB) with a Polytron homogenizer (200 rpm × 12 times). Samples were then sonicated, analyzed by the Brad- ford assay, protein concentrations were found to be between 2 and 5 μg.

PCR and Gene Expression Microarrays

RNA from NAc, VTA, and hypothalamus was prepared using the PReAway Micro Kit (JAGEN). cDNA was obtained using a first-strand synthesis kit (Invitrogen). All PCR experiments were conducted in trip- licate, and the data were analyzed by using the GeneSpring (Agile, 2006) and were normalized to measures of Gaphin mRNA. For microarrays, NaCl and VTA tissue was obtained from each animal. These datasets were then analyzed using the statistical analysis program, MISSPANEN, which is a freely available open source program. Microarray experiments were performed and Rescaled Expression values were subjected to a cubic spline normalization and averaged across experiments. Gene and pathway names were considered to be significantly regulated if they displayed a ≥5-fold change in expression compared to their respective analogical control group (p < 0.05).

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Stress: The Different Kinds of Stress

Stress management can be complicated and confusing because there are different types of stress—acute stress, episodic acute stress, and chronic stress—each with its own characteristics, symptoms, duration, and treatment approaches. Let's look at each one.

Acute Stress

Acute stress is the most common form of stress. It comes from demands and pressures of the recent past and anticipated demands and pressures of the near future. Acute stress is thrilling and exciting in small doses, but too much is exhausting. A fast run down a challenging ski slope, for example, is exhilarating early in the day. That same ski run late in the day is taxing and tiring. Skiing beyond one's limits can lead to falls and broken bones. By the same token, overdoing on short-term stress can lead to psychological distress, tension headaches, upset stomach, and other symptoms.

Fortunately, acute stress symptoms are recognized by most people. It's a laundry list of what has gone awry in their lives: the auto accident that crumpled the car fender, the loss of an important contract, a deadline they're rushing to meet, their child's occasional problems at school, and so on.

Because it is short term, acute stress doesn't have enough time to do the extensive damage associated with long-term stress. The most common symptoms are:

- Emotional distress—some combination of anger or irritability, anxiety, and depression, the three stress emotions;
- Muscular problems including tension headache, back pain, jaw pain, and the muscular tensions that lead to pulled muscles and tendon and ligament problems;
- Stomach, gut, and bowel problems such as heartburn, acid stomach, flatulence, diarrhea, constipation, and irritable bowel syndrome;
- Transient over arousal leads to elevation in blood pressure, rapid heartbeat, sweaty palms, heart palpitations, dizziness, migraine headaches, cold hands or feet, shortness of breath, and chest pain.

Acute stress can crop up in anyone's life, and it is highly treatable and manageable.

Episodic Acute Stress

There are those, however, who suffer acute stress frequently, whose lives are so disordered that they are studies in chaos and crisis. They're always in a rush, but always late. If something can go wrong, it does. They take on too much, have too many irons in the fire, and can't organize the slew of self-inflicted demands and pressures clamoring for their attention. They seem perpetually in the clutches of acute stress.

It is common for people with acute stress reactions to be over aroused, short-tempered, irritable, anxious, and tense. Often, they describe themselves as having "a lot of nervous energy." Always in a hurry, they tend to be abrupt, and sometimes their irritability comes across as hostility. Interpersonal relationships deteriorate rapidly when others respond with real hostility. The work becomes a very stressful place for them.

The cardiac prone, "Type A" personality described by cardiologists, Meter Friedman and Ray Rosenman, is similar to an extreme case of episodic acute stress. Type A's have an "excessive competitive drive, aggressiveness, impatience, and a harrying sense of time urgency." In addition there is a "free-floating, but well-rationalized form of hostility, and almost always a deep-seated insecurity." Such personality characteristics would seem to create frequent episodes of acute stress for the Type A individual. Friedman and Rosenman found Type A's to be much more likely to develop coronary heart disease than Type B's, who show an opposite pattern of behavior.

Another form of episodic acute stress comes from ceaseless worry. "Worry warts" see disaster around every corner and pessimistically forecast catastrophe in every situation. The world is a dangerous, unrewarding, punitive place where something awful is always about to happen. These "awfulizers" also tend to be over aroused and tense, but are more anxious and depressed than angry and hostile.

The symptoms of episodic acute stress are the symptoms of extended over arousal: persistent tension headaches, migraines, hypertension, chest pain, and heart disease. Treating episodic acute stress requires intervention on a number of levels, generally requiring professional help, which may take many months.

Often, lifestyle and personality issues are so ingrained and habitual with these individuals that they see nothing wrong with the way they conduct their lives. They blame their woes on other people and external events. Frequently, they see their lifestyle, their patterns of interacting with others, and their ways of perceiving the world as part and parcel of who and what they are.

Sufferers can be fiercely resistant to change. Only the promise of relief from pain and discomfort of their symptoms can keep them in treatment and on track in their recovery program.

Chronic Stress

While acute stress can be thrilling and exciting, chronic stress is not. This is the grinding stress that wears people away day after day, year after year. Chronic stress destroys bodies, minds, and lives. It wrecks havoc through long-term attrition. It's the stress of poverty, of dysfunctional families, of being trapped in an unhappy marriage or in a despoiled job or career. It's the stress that the never-ending "troubles" have brought to the people of Northern Ireland, the tensions of the Middle East have brought to the Arab and Jew, and the endless ethnic rivalries that have been brought to the people of Eastern Europe and the former Soviet Union.

Chronic stress comes when a person never sees a way out of a miserable situation. It's the stress of unrelenting demands and pressures for seemingly interminable periods of time. With no hope, the individual gives up searching for solutions.

Some chronic stresses stem from traumatic, early childhood experiences that become internalized and remain forever painful and present. Some experiences profoundly affect personality. A view of the world, or a belief system, is created that causes unending stress for the individual (e.g., the world is a threatening place, people will find out you are a pretender, you must be perfect at all times). When personality or deep-seated convictions and beliefs must be reformulated, recovery requires active self-examination; often with
professional help.

The worst aspect of chronic stress is that people get used to it. They forget it's there. People are immediately aware of acute stress because it is new; they ignore chronic stress because it is old, familiar, and sometimes, almost comfortable.

Chronic stress kills through suicide, violence, heart attack, stroke, and, perhaps, even cancer. People wear down to a final, fatal breakdown. Because physical and mental resources are depleted through long-term attrition, the symptoms of chronic stress are difficult to treat and may require extended medical as well as behavioral treatment and stress management.

Adapted from The Stress Solution by Lyle H. Miller, Ph.D., and Alma Dell Smith, Ph.D.

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FREQUENTLY ASKED QUESTIONS

Q: How does stress affect my body and my health?
A: Everyone has stress. We have short-term stress, like getting lost while driving or missing the bus. Even everyday events, such as planning a meal or making time for errands, can be stressful. This kind of stress can make us feel worried or anxious. Other times, we face long-term stress, such as racial discrimination, a life-threatening illness, or divorce. These stressful events also affect your health on many levels. Long-term stress is real and can increase your risk for some health problems, like depression. Both short and long-term stress can have effects on your body. Research is starting to show the serious effects of stress on our bodies. Stress triggers changes in our bodies and makes us more likely to get sick. It can also make problems we already have worse. It can play a part in these problems:

- trouble sleeping
- headaches
- constipation
- diarrhea
- irritability
- lack of energy
- lack of concentration
- eating too much or not at all
- anger
- sadness
- higher risk of asthma and arthritis flares
- tension
- stomach cramping
- stomach bloating
- skin problems, like hives
- depression
- anxiety
- weight gain or loss
- heart problems
- high blood pressure
- irritable bowel syndrome
- diabetes
- neck and/or back pain
- less sexual desire
- harder to get pregnant

Q: What are some of the most stressful life events?
A: Any change in our lives can be stressful—even some of the happiest ones like having a baby or taking a new job. Here are some of life’s most stressful events:

- death of a spouse
- divorce
- marital separation
- spending time in jail
- death of a close family member
- personal illness or injury
- marriage
- pregnancy
- retirement

From the Holmes and Rahe Scale of Life Events (1967)

<table>
<thead>
<tr>
<th>Event</th>
<th>Score</th>
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<tr>
<td>Death of a Spouse</td>
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<tr>
<td>Marital Separation</td>
<td>95</td>
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<tr>
<td>Death of a Parent</td>
<td>85</td>
</tr>
<tr>
<td>Major Change in Job</td>
<td>75</td>
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<tr>
<td>Death of Other Relative</td>
<td>75</td>
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<tr>
<td>Major Financial Loss</td>
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<tr>
<td>Marital Relationship End</td>
<td>70</td>
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<tr>
<td>Illness or Injury of Close Relative</td>
<td>65</td>
</tr>
<tr>
<td>Illness or Injury of Self</td>
<td>60</td>
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<tr>
<td>Marital Relationship Difficulties</td>
<td>50</td>
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<tr>
<td>Change in Education Level</td>
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<td>Hospitalization</td>
<td>40</td>
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<td>Change in Residence</td>
<td>30</td>
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<tr>
<td>Retirement</td>
<td>30</td>
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</tbody>
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Q: What is post-traumatic stress disorder (PTSD)?
A: Post-traumatic stress disorder (PTSD) can be a debilitating condition that can occur after exposure to a terrifying event or ordeal in which grave physical harm occurred or was threatened. Traumatic events that can trigger PTSD include violent personal assaults such as rape or mugging, natural or human-caused disasters, accidents, or military combat. Many people with PTSD repeatedly re-experience the ordeal in the form of flashback episodes, memories, nightmares, or frightening thoughts, especially when they are exposed to events or objects that remind them of the trauma. Anniversaries of the event can also trigger symptoms. People with PTSD also can have emotional numbness, sleep disturbances, depression, anxiety, irritability, or outbursts of anger. Feelings of intense guilt (called survivor guilt) are also common, particularly if others did not survive the traumatic event.

Most people who are exposed to a traumatic, stressful event have some symptoms of PTSD in the days and weeks following the event, but the symptoms generally disappear. But about 8% of men and 20% of women go on to develop PTSD, and roughly 30% of these people develop a chronic, or long-lasting, form that persists throughout their lives.

Q: How can I help handle my stress?
A: Don’t let stress make you sick. As women, we tend to carry a higher burden of stress than we should. Often we aren’t even aware of our stress levels. Listen to your body, so that you know when stress is affecting your health. Here are ways to help you handle your stress.

- Relax. It’s important to unwind. Each person has her own way to relax. Some ways include deep breathing, yoga, meditation, and massage therapy. If you can’t do these things, take a few minutes to sit, listen to soothing music, or read a book.
- Make time for yourself. It’s important to care for yourself. Think of this as an order from your doctor, so you don’t feel guilty! No matter how busy you are, you can try to set aside at least 15 minutes each day in your schedule to do something for yourself, like taking a bubble bath, going for a walk, or calling a friend.
- Sleep. Sleeping is a great way to help both your body and mind.

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FREQUENTLY ASKED QUESTIONS

Your stress could get worse if you don’t get enough sleep. You also can’t fight off sickness as well when you sleep poorly. With enough sleep, you can tackle your problems better and lower your risk for illness. Try to get seven to nine hours of sleep every night.

- **Eat right.** Try to fuel up with fruits, vegetables, and proteins. Good sources of protein can be peanut butter, chicken, or tuna salad. Eat whole-grains, such as wheat breads and wheat crackers. Don’t be fooled by the jolt you get from caffeine or sugar. Your energy will wear off.
- **Get moving.** Believe it or not, getting physical activity not only helps relieve your tense muscles, but helps your mood too! Your body makes certain chemicals, called endorphins, before and after you work out. They relieve stress and improve your mood.
- **Talk to friends.** Talk to your friends to help you work through your stress. Friends are good listeners. Finding someone who will let you talk freely about your problems and feelings without judging you does a world of good. It also helps to hear a different point of view. Friends will remind you that you’re not alone.
- **Get help from a professional if you need it.** Talk to a therapist. A therapist can help you work through stress and find better ways to deal with problems. For more serious stress related disorders, like PTSD, therapy can be helpful. There also are medications that can help ease symptoms of depression and anxiety and help promote sleep.

- **Compromise.** Sometimes, it’s not always worth the stress to argue. Give in once in awhile.
- **Write down your thoughts.** Have you ever typed an email to a friend about your lousy day and felt better afterward? Why not grab a pen and paper and write down what’s going on in your life? Keeping a journal can be a great way to get things off your chest and work through issues. Later, you can go back and read through your journal and see how you’ve made progress!
- **Help others.** Helping someone else can help you. Help your neighbor, your friends, your family, or volunteer in your community. Certain chemicals, called endorphins, are released in your body when you do good deeds. They relieve stress and improve your mood.
- **Get a hobby.** Find something you enjoy. Make sure to give yourself time to explore your interests.
- **Set limits.** When it comes to things like work and family, figure out what you can really do. There are only so many hours in the day. Set limits with yourself and others. Don’t be afraid to say NO to requests for your time and energy.
- **Plan your time.** Think ahead about how you’re going to spend your time. Write a to-do list. Figure out what’s most important to do.
- **Don’t deal with stress in unhealthy ways.** This includes drinking too much alcohol, using drugs, smoking, or overeating.

Q: I heard deep breathing could help my stress. How do I do it?

A: Deep breathing is a good way to relax. Try it a couple of times every day. Here’s how to do it.

1. Lie down or sit in a chair.
2. Rest your hands on your stomach.
3. Slowly count to four and inhale through your nose. Feel your stomach rise. Hold it for a second.
4. Slowly count to four while you exhale through your mouth. To control how fast you exhale, purse your lips like you’re going to whistle. Your stomach will slowly fall.
5. Repeat five to 10 times.

Q: Does stress cause ulcers?

A: Doctors used to think that ulcers were caused by stress and spicy foods. Now, we know that stress doesn’t cause ulcers—it just irritates them. Ulcers are actually caused by a bacterium (germ) called H. pylori. Researchers don’t yet know for sure how people get it. They think people might get it through food or water. It’s treated with a combination of antibiotics and other drugs.

- **Compromise.** Sometimes, it’s not always worth the stress to argue. Give in once in awhile.
- **Write down your thoughts.** Have you ever typed an email to a friend about your lousy day and felt better afterward? Why not grab a pen and paper and write down what’s going on in your life? Keeping a journal can be a great way to get things off your chest and work through issues. Later, you can go back and read through your journal and see how you’ve made progress!
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- **Don’t deal with stress in unhealthy ways.** This includes drinking too much alcohol, using drugs, smoking, or overeating.
For More Information . . .

You can find out more about stress by contacting the National Women’s Health Information Center (NWHIC) at 1-800-994-9662 or the following organizations:

**National Institute of Mental Health**
Phone: (301) 443-4513
Internet Address: http://www.nimh.nih.gov

**American Psychological Association**
Phone: (800) 374-2721
Internet Address: http://www.apa.org

**Anxiety Disorders Association of America**
Phone: (240) 488-1001
Internet Address: http://www.adaa.org

**National Alliance for the Mentally Ill**
Phone: (800) 950-6264
Internet Address: http://www.nami.org

**National Center for Post Traumatic Stress Disorder**
Phone: (802) 296-5132
Internet Address: http://www.ncptsd.org

**National Mental Health Association**
Phone: (800) 969-6642
Internet Address: http://www.nmha.org

**National Mental Health Information Center**
Phone: (800) 789-2647
Internet Address: http://www.mental-health.org

**American Institute of Stress**
Phone: (914) 963-1200
Internet Address: http://www.stress.org

**American Psychiatric Association**
Phone: (202) 642-7300
Internet Address: http://www.psych.org

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Integration of Behavioral and Relaxation Approaches into the Treatment of Chronic Pain and Insomnia

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Integration of Behavioral and Relaxation Approaches into the Treatment of Chronic Pain and Insomnia
January 1985 through July 1995
1147 Citations
Prepared by
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Richard Friedman, Ph.D., State University of New York
at Stony Brook
Patricia Myers, State University of New York at Stony Brook

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1995

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stress

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The treatment of many chronic diseases is facilitated by integrating somatic therapies such as drugs and surgery with psychological and behavioral interventions. Chronic pain and insomnia are particularly good examples of conditions for which integrated treatment has been beneficial. However, medical and psychological treatment approaches have frequently been applied independently. Integrated treatment has been compromised in part because biomedical practitioners may have been unaware of the substance of behavioral medicine interventions and the accumulation of empirically sound data regarding their efficacy.

At the same time many behavioral medicine practitioners may have been unaware of current trends in somatic therapies. There seems to be a general consensus, however, that integrating these two approaches would facilitate clinical efficacy and efficiency.

This bibliography was prepared in support of the National Institutes of Health Technology Assessment Conference on the Integration of Behavioral and Relaxation Approaches into the Treatment of Chronic Pain and Insomnia, held in Bethesda, Maryland, October 16-18, 1995. Because the literature is large, the bibliography is necessarily selective. It emphasizes monographs and journal articles published in English from January 1985 through July 1995. Preference was given to articles dealing with adult human subjects. The bibliography is arranged with categories devoted to assessment, psychological and behavioral interventions, and somatic treatments. Also included is a section on methods and policy issues. Within each category, arrangement is alphabetical by author.

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SS 2 = CHRONIC ADJ PAIN OR LOW ADJ BACK ADJ PAIN
SS 3 = SUBS APPLY TH, PX
SS 3 = EXP PAIN
SS 4 = SUBS CANCEL
SS 4 = 1 OR 2 OR 3
SS 5 = EXP BEHAVIOR THERAPY OR RELAXATION TECHNIQUES OR RELAXATION OR BEHAVIORAL MEDICINE OR COGNITIVE THERAPY
SS 6 = BIOFEEDBACK OR EXP COMBINED MODALITY THERAPY OR HYPNOSIS OR YOGA OR PSYCHOSOMATIC MEDICINE
SS 7 = EXP STRESS OR EXP STRESS, PSYCHOLOGICAL OR EXERCISE OR AUTOGENIC TRAINING
SS 8 = COGNITIVE ADJ RESTRUCT: OR OPERANT ADJ TECHNIQUE
SS 9 = COPING NEAR STRATEG: OR TRANSCENDENTAL ADJ MEDITATION
SS 10 = PREVENTIVE NEAR INTERVENTION OR DEEP ADJ BREATHING
SS 11 = TAI ADJ CHI OR PSYCHOSOMATIC ADJ INTERVENTION OR PSYCHOSOMATICS
SS 12 = (TW) UNORTHODOX OR NONTRADITIONAL OR UNCONVENTIONAL OR NON ADJ TRADITIONAL
SS 13 = THERAPEUTIC ADJ TOUCH OR PALLIATIVE ADJ TREATMENT OR MEDITATION
SS 14 = 5 OR 6 OR 7 OR 8 OR 9 OR 10 OR 11 OR 12 OR 13
SS 15 = 4 AND 14
SS 16 = 4 AND EXP ANALGESICS OR 4 AND EXP ANTIBIOTICS OR 4 AND EXP ADRENERGIC ANTAGONISTS OR 4 AND
EXP ANTIDEPRESSIVE AGENTS, TRICYCLIC OR 4 AND
EXP ANTICONVULSANTS
SS 17 = HALCION OR AMBIEN OR VALIUM OR IBUPROFEN OR
IMIPRAMINE OR AMITRIPTYLINE OR DOXEPIN OR
PHENOXYBENZAMINE
SS 18 = EXP BENZODIAZEPINES OR CARBAMAZAPINE OR
EXP ADRENAL CORTEX HORMONES OR
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Journal Article:
Authors Article Title
Gillin JC, Byerley WF. The diagnosis and management of insomnia.
Abbreviated Journal Date Volume Issue Pages
Title
Monograph:
Authors/Editors Title
Adrian C, Barber J, editors. Psychological approaches to the
Place of Publisher Date Total No.
Publication of Pages
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*For details of the formats used for references, see the
following publication:
Patrias, Karen. National Library of Medicine recommended formats
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Last updated: 31 December 1996
First published: 31 December 1996
Metadata | Permanence level: Permanent: Stable Content
U.S. National Library of Medicine, 8600 Rockville Pike, Bethesda, MD 20894
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Stress Reduction Related Books

- **Author**: Greenberg, Jerrold S.
  - **Title**: Comprehensive stress management / Jerrold S. Greenberg.
  - **Edition**: 10th ed.
- **Author**: Rugg, Gordon.
  - **Title**: The stress-free guide to studying at university: a student's guide towards a better life / Gordon Rugg, Sue Gerrard and Susie Hooper.
- **Author**: Rugg, Gordon
  - **Title**: Faculty stress / David R. Buckholdt, Gale E. Miller, editors.
- **Author**: Hartney, Elizabeth.
  - **Title**: Stress management for teachers / Elizabeth Hartney.
- **Author**: Palmer, Stephen, 1955-
  - **Title**: How to deal with stress / Stephen Palmer & Cary Cooper.
- **Author**: Brownhill, Simon.
  - **Title**: Taking the stress out of bad behaviour: behaviour management of 3-11 year olds / Simon Brownhill.
- **Author**: Levin, Peter, 1936-
  - **Title**: Conquer study stress!: 20 problems solved / Peter Levin.

Effect of stress on job-satisfaction and work-values among teachers.

**Pub Info**


- **Title**: Nitric Oxide in Plant Growth, Development and Stress Physiology [electronic resource] / edited by Lorenzo Lamattina, Joseph C. Polacco.
- **Author**: Cheng, Weili.
- **Author**: Lehrer, Robert L. Woolfolk, Wesley E. Sime ; foreword by David H. Barlow.
  - **Title**: Principles and practice of stress management / edited by Paul M. Lehrer, Robert L. Woolfolk, Wesley E. Sime ; foreword by David H. Barlow.
- **Author**: Levin, Peter, 1936-
  - **Title**: Conquer study stress!: 20 problems solved / Peter Levin.
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<td>Personality-guided therapy for posttraumatic stress disorder /</td>
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<td>Juneja, Nalini</td>
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<td>De-stress for exams.</td>
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Title: A taste-berry teen’s guide to managing the stress and pressures of life : with contributions from teens for teens / [compiled by] Bettie B. Youngs, Jennifer Leigh Youngs.

Title: Discipline without stress, punishments, or rewards : how teachers and parents promote responsibility & learning / Marvin Marshall.

Title: A comparative study of stress and burnout among and between special education administrators and elementary high school principals / Donald B. Barber.

Title: Different approaches to the study of stress and performance in sport / by Tim Woodman.

Title: The emotions of teacher stress / Denise Carlyle and Peter Woods.

Title: 60 ways to relieve stress in 60 seconds / by Manning Rubin ; illustrated by Paul Frahm.

Title: The 10-step method of stress relief: decoding the meaning and significance of stress / Albert Crum.

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Title: Anxiety, stress, and coping.
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<td>An empirical study of the relationship between role stress and empowerment in front-line managers and workers [electronic resource].</td>
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Post-traumatic stress disorder--Treatment.
Psychic trauma--Treatment.
Series: Explorations in metapsychology, 1555-0818
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LC Control No.: 2005001042
Type of Material: Book (Print, Microform, Electronic, etc.)
Personal Name: Greenwald, Ricky.
Main Title: Child trauma handbook : a guide for helping trauma-exposed children and adolescents / Ricky Greenwald.
Description: xi, 341 p. : ill. ; 28 cm.
9780789027931
Contents: How trauma-informed treatment is different -- The structure of trauma treatment -- The trauma-informed therapeutic relationship -- The initial interview-from “hello” up to history -- Taking a trauma history with children -- Trauma-informed case formulation -- Making a treatment contract -- Case management -- Parent training -- Self-control skills training -- Trauma resolution methods -- Preparation for exposure -- Conducting an exposure session -- Reevaluation and consolidation of gains -- Relapse prevention and harm reduction -- Challenging cases: applying the fairy tale model -- Creating a safe environment -- Discipline is love -- Using incentives for success -- The magic words: cognitive interventions.
Notes: Includes bibliographical references (p. 327-329) and index.
Subjects: Psychic trauma in children--Treatment--Handbooks, manuals, etc.
Psychic trauma in adolescence--Treatment--Handbooks, manuals, etc.
Post-traumatic stress disorder in children--Treatment--Handbooks, manuals, etc.
Post-traumatic stress disorder in adolescence--Treatment--Handbooks, manuals, etc.
Stress Disorders, Post-Traumatic--therapy.
Adolescent.
Child.
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LC Control No.: 2004027129
Type of Material: Book (Print, Microform, Electronic, etc.)
Main Title: Trauma treatment techniques : innovative trends /
Jacqueline Garrick, Mary Beth Williams, editors.
Published/Created: Binghamton, NY : Haworth Maltreatment & Trauma Press, c2006.
Related Names: Garrick, Jacqueline, 1963-
Williams, Mary Beth.
Description: xix, 252 p. : ill. (some col.) ; 22 cm.
0789028441 (soft cover : alk. paper)

Notes: “Co-published simultaneously as Journal of aggression, maltreatment & trauma, Volume 12, Numbers 1/2, 2006.” Includes bibliographical references and index.


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LC Control No.: 2004027730
Type of Material: Book (Print, Microform, Electronic, etc.)
Main Title: Causes, role, and influence of mood states / Anita V. Clark, editor.
Related Names: Clark, Anita V.
Description: ix, 205 p. : ill. ; 27 cm.
ISBN: 1594542503
Contents: Stress, psychopathology and the regulation of mood and cortisol levels / Mark Ellenbogen -- Methodological and practical issues in the experience, induction and assessment of mood states / Len Lecci and R.J. Wirth -- Mood rhythmicity and individual differences / Ana Adan -- Role and influence of moods including anxiety on motor control / Benoit Bolmont -- Reading and affective frontal brain electrical activity (EEG) in distinguishing fearful and self-conscious shyness: preliminary findings / Diane L. Santesso et al. -- The merging of cognitive and affective neuroscience: studies of the affective auditory verbal learning test / D. Erik Everhart et al. -- Acute physical activity and self-reported affect: a review / Justy Reed -- On becoming emotionalized in conversation: psycho-physiological changes as a heuristic to discovering communicatively significant events / Käsermann Marie-Louise and Altorfer Andreas -- Daytime distribution of mood during ramadan intermittent fasting / Rachida Roky -- Does pain reduction improve pain behavior and mood in chronic pain patients? / Sabine M. Sator-Katzenschlager et al.

Notes: Includes index.

Subjects: Mood (Psychology)--Physiological aspects. Affective disorders.

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LC Control No.: 2004018675
Type of Material: Book (Print, Microform, Electronic, etc.)
Main Title: Cardiovascular disease: diet, nutrition and emerging risk factors: the report of a British Nutrition Foundation task force / chaired by Keith Frayn ; edited by Sara Stanner.
Published/Created: Oxford, UK ; Ames, Iowa, USA : Published by Blackwell Pub. for the British Nutrition Foundation, 2005.
Related Names: Frayn, K. N. (Keith N.)
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Stanner, Sara.
British Nutrition Foundation.
Description: xvii, 380 p. : ill. ; 25 cm.
1405101660 (pbk. : alk. paper)
Notes: Includes bibliographical references (p. 312-370) and index.

Nutrition.
Risk Factors.

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LC Control No.: 2003097931
Type of Material: Book (Print, Microform, Electronic, etc.)
Personal Name: Volkman, Victor R.
Main Title: Beyond trauma : conversations on traumatic incident reduction / edited by Victor R. Volkman.
Published/Created: Ann Arbor, MI : Loving Healing Press, c2004.
Related Names: Volkman, Victor R.
Description: ix, 295 p. : ill. ; 24 cm.
ISBN: 193269000X (pbk.)
Notes: Includes index.

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LC Control No.: 2003061932
Type of Material: Book (Print, Microform, Electronic, etc.)
Main Title: Redox-genome interactions in health and disease / edited by Jürgen Fuchs, Maurizio Podda, Lester Packer.
Published/Created: New York : M. Dekker, c2004.
Description: xviii, 629 p. : ill. ; 26 cm.
ISBN: 0824740483 (alk. paper)
Notes: Includes bibliographical references and index.
Genetic Diseases, Inborn--etiology.
Oxidative Stress--genetics.
Gene Expression Regulation.
Oxidation-Reduction.
Series: Oxidative stress and disease ; 10

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LC Control No.: 2008023487
Type of Material: Book (Print, Microform, Electronic, etc.)
Personal Name: Tindall, Judith A., 1942-
Main Title: Peer power, book two : strategies for the professional leader : applying peer helper skills / Judith A. Tindall.
Published/Created: New York : Routledge, 2008.
Projected Publication Date: 0812
Description: p. cm.
Contents: Drugs and alcohol abuse : intervention and prevention -- Taking care of you! Stress management -- Mental health awareness and referral -- Leadership training -- Peer helping through tutoring -- Peer helping through group work : peer education and support -- Enhancing sexual health through peer helping -- Recognizing disordered eating problems -- Suicide prevention -- Coping with loss -- Highway traffic safety -- Bullying reduction -- Peer helping through mentoring -- Peer helpers role in crisis management -- Peer helping through character education development -- Problem gambling : prevention and intervention -- Youth tobacco prevention through community impact.

Subjects: Peer counseling--Problems, exercises, etc.

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LC Control No.: 2008011650
Type of Material: Book (Print, Microform, Electronic, etc.)
Main Title: Contemporary issues in law enforcement and policing / edited by Andrew Millie, Dilip K. Das.
Portion of Title: Law enforcement and policing
Published/Created: Boca Raton : CRC Press, c2008.
Related Names: Millie, Andrew.
Das, Dilip K., 1941-
Related Titles: Police practice & research.
Description: xxvii, 216 p. : ill., maps ; 25 cm.
ISBN: 9781420072150 (alk. paper)
1420072153 (alk. paper)
Contents: Searching for stress in all the wrong places : combating chronic organizational stressors in policing / Jeanne B. Stinchcomb -- Constructing the ‘other’ within police culture : an analysis of a deviant unit within the police organization / Venessa Garcia -- Corruption and the blue code of silence / Jerome H. Skolnick -- Survey of innovations in the development and maintenance of ethical standards by Australian police departments / Tim Prenzler and Carol Ronken -- Terrorism old and new : counterterrorism in Canada / Stéphane Leman-Langlois and Jean-Paul Brodeur -- Policing terrorism : a threat to community policing or just a shift in priorities? / John Murray -- The hotspot matrix : a framework for the spatio-temporal targeting of crime reduction / Jerry H. Ratcliffe -- Catching a serial rapist : hits and misses in criminal profiling / Per Stangeland -- Restorative policing in Canada : Royal Canadian mounted police, community justice forums, and Youth Criminal Justice Act
Stress (Psychology)

Type of Material: Book (Print, Microform, Electronic, etc.)

Personal Name: Olshevski, Jodi L.

Main Title: Stress reduction for caregivers / Jodi L. Olshevski, Anne D. Katz, Bob G. Knight; with guest author T.J. McCallum.


Related Names: Katz, Anne D.

Knight, Bob.

Description: xii, 141 p.: ill. ; 24 cm.

ISBN: 0876309406 (acid-free paper)

0876309414 (acid-free paper)

Notes: Includes bibliographical references and index.

Subjects: Older people--Home care--Psychological aspects.

Alzheimer's disease--Patients--Home care--Psychological aspects.

Senile dementia--Patients--Home care--Psychological aspects.

Caregivers--Mental health.

Stress management.

LC Control No.: 98055754

Type of Material: Book (Print, Microform, Electronic, etc.)

Personal Name: Venu.

Main Title: Rainbow stress reduction: play your stress away with colorful healing art and stress reducing games / by Venu.


Description: x, 73 p. : col. ill. ; 22 cm.

ISBN: 0878771670

LC Control No.: 85892065

Type of Material: Book (Print, Microform, Electronic, etc.)

Personal Name: Boren, Douglas W. (Douglas Walter)


Published/Created: 1984.

Description: xi, 104 leaves.

Notes: Thesis (Ph. D.)--Professional School of Psychological Studies, 1984.

Additional Formats:


LC Control No.: 97152328

Type of Material: Book (Print, Microform, Electronic, etc.)

Personal Name: Guyer, Evelyn A.

Main Title: Family bonding: intervention through positive parenting, baby massage, and stress reduction / by Evelyn A. Guyer.


Description: viii, 108 p. : ill. ; 23 cm.

Notes: Includes bibliographical references (p. 99-103).

Subjects: Family.

Parenting.

Parent and child.

Infants--Family relationships.

Massage for children.

Stress (Psychology)--Prevention.

LC Control No.: 96009048

Type of Material: Book (Print, Microform, Electronic, etc.)

Personal Name: Schell, Bernadette H. (Bernadette Hlubik), 1952-

Main Title: A self-diagnostic approach to understanding organizational and personal stressors: the C-O-P-E model for stress

1026

1027

Notes: Includes bibliographical references (p. [386]-395) and index.

Subjects: Communicable diseases—Popular works.
1036

Description: 102 p. : ill. ; 28 cm.
ISBN: 0915667061 : $10.95
Notes: Includes bibliographical references.
Subjects: Law schools--United States--Psychological aspects.
Law students--United States--Psychology.
Stress (Psychology)
Series: Winning in law school
LC Control No.: 85018306
Type of Material: Book (Print, Microform, Electronic, etc.)
Personal Name: Congo, David, 1946-
Main Title: Less stress : the 10-minute stress reduction plan / David & Janet Congo.
Related Names: Congo, Janet, 1949-
Description: 140 p. : ill. ; 21 cm.
ISBN: 0830709681 (pbk.)
Notes: Bibliography: p. [133]-140.
Subjects: Christian life.
Stress (Psychology)--Religious aspects--Christianity.
LC Control No.: 82018926
Type of Material: Book (Print, Microform, Electronic, etc.)
Main Title: Stress reduction and prevention / edited by Donald Meichenbaum and Matt E. Jaremko.
Related Names: Meichenbaum, Donald.
Jaremko, Matt E.
Description: xii, 499 p. ; 24 cm.
ISBN: 0306410664
Notes: Includes bibliographies and indexes.
Subjects: Stress (Psychology)
Stress, Psychological--prevention and control.
Stress, Psychological--therapy.

1037

Type of Material: Book (Print, Microform, Electronic, etc.)
Personal Name: Ryan, Regina Sara.
Main Title: Breastfeeding : your priceless gift to your baby and yourself / Regina Sara Ryan and Deborah Auletta.
Related Names: Auletta, Deborah.
Description: 1 v. (unpaged) : col. ill. ; 16 x 22 cm.
Contents: 20 reasons to breastfeed -- "Breastfeeding is the #1 option," say U.S. pediatricians and infant-health authorities around the world -- Breastmilk is baby's "personally-designed" and perfect food -- Allergies and asthma are less likely with breastfeeding -- Breastfeeding protects babies from illness -- Breastfeeding saves babies' lives -- Breastfed babies need less doctor visits -- Breast milk feeds the brain . . . and links to increased intelligence -- Physical/emotional bonding between mother and child is increased by breastfeeding -- Breastfed babies have less need to cry -- Breastfeeding encourages stress reduction -- in baby and mom -- Breastfeeding is much less costly than formula feeding -- Breastfeeding builds straighter teeth -- And stronger teeth -- Breastfeeding is good for the earth -- Breastfeeding helps mother's body readjust -- After pregnancy -- Breastfeeding also protects a mother's health . . . throughout her life -- Breastfeeding builds a woman's self-confidence -- Breastfeeding honors a woman's body -- Breastfeeding makes travel easier -- Breastfed babies smell better -- Breastfeeding is nature's obvious plan -- References -- Recommended reading.
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Notes: Includes bibliographical references.
Subjects: Breastfeeding--Health aspects--Popular works.
LC Control No.: 2004276624
Type of Material: Book (Print, Microform, Electronic, etc.)
Personal Name: Kabat-Zinn, Jon.
Main Title: Full catastrophe living : using the wisdom of your body and mind to face stress, pain, and illness / Jon Kabat-Zinn.
Edition Information:
Delta trade pbk. reissue.
Related Names: University of Massachusetts Medical Center/Worcester. Stress Reduction Clinic.
Description: xxxiii, 471 p. : ill. ; 24 cm.
ISBN: 0385303122
Notes: “The program of the Stress Reduction Clinic at the University of Massachusetts Medical Center.”
Includes bibliographical references (p. 450-454) and index.
Subjects: Stress management.
Stress (Psychology)
LC Control No.: 2004017096
Type of Material: Book (Print, Microform, Electronic, etc.)
Personal Name: Braverman, Eric R.
Main Title: The amazing way to reverse heart disease naturally : beyond the hypertension hype : why drugs are not the answer / Eric R. Braverman, with Dasha Braverman.
Related Names: Braverman, Dasha, 1979-
Braverman, Eric R. How to lower your blood pressure and reverse heart disease naturally.
Description: viii, 198 p. : ill. ; 22 cm.
ISBN: 157400969
Notes: Includes bibliographical references.
Physicians--Psychology.
Stress management.
Physician and patient.
Stress, Psychological--prevention & control.
Physicians--psychology.
LC Control No.: 2004003712

precursors: high blood pressure and elevated cholesterol, -- Beyond the medical hype: why drugs are not the answer, -- What’s the alternative?, -- The no-more hypertension and heart disease program -- The rainbow diet(tm): how it works, -- Key supplements for full-spectrum support, -- Stress reduction, lifestyle changes, and other healing therapies, -- Putting the program into practice, -- Tests for tracking your cardiovascular fitness, -- Proof of the program: twenty-five case histories.
Notes: Previously published under the title: How to lower your blood pressure and reverse heart disease naturally.
Includes bibliographical references (p. 175-184) and index.
Heart--Diseases--Diet therapy.
Dietary supplements.
LC Control No.: 2004049371
Type of Material: Book (Print, Microform, Electronic, etc.)
Personal Name: Bartlett, Edward E., 1950-
Main Title: Stress busters : a clinician’s guide to stress reduction / Edward E. Bartlett.
Published/Created: Towson, MD : Data Trace Pub. Co., c2004.
Description: 77 p. : ill. ; 28 cm.
ISBN: 1591201071
Contents: Understanding the elements of heart disease -- The two
stress

Type of Material: Book (Print, Microform, Electronic, etc.)
Personal Name: Buchalter, Susan I. (Susan Irene), 1955-
Main Title: A practical art therapy / Susan I. Buchalter.
Description: 160 p. : ill. ; 24 cm.
ISBN: 1843107694 (pbk.)
Contents: Warm-ups -- Murals -- Drawing -- Advertising -- Painting --
Collages -- Puppets and masks -- Sculpture -- Clay --
Combining modalities -- Mandalas -- Portraits -- Group work -- Holiday projects -- Stress reduction --
Miscellaneous.
Notes: Includes bibliographical references (p. 158) and index.
Subjects: Art therapy.
Art Therapy.
LC Control No.: 2003069479

Type of Material: Book (Print, Microform, Electronic, etc.)
Personal Name: Shaw, Scott, 1958-
Main Title: Chi Kung for beginners : master the flow of Chi for good health, stress reduction & increased energy / Scott Shaw.
Description: xi, 165 p. : ill. ; 21 cm.
Notes: Includes bibliographical references (p. 153-155) and index.
Subjects: Qi gong.
LC Control No.: 2003015477

Type of Material: Book (Print, Microform, Electronic, etc.)
Personal Name: Groves, Dawn, 1955-
Main Title: Stress reduction for busy people : finding peace in a chronically anxious world / Dawn Groves.
Published/Created: Novato, Calif. : New World Library ; Distributed to the trade by Publishers Group West, c2004.
Description: xx, 127 p. : 17 cm.
Contents: Understanding stress -- We’re designed to respond -- Don’t worry about it -- The good, the bad, and the ugly -- Why it’s hard to calm down -- Managing stress in body, mind, and spirit -- Get enough sleep -- Eat healthful foods -- Exercise regularly -- Your stress-management strategy -- Living in a complicated world -- What to do in a crisis -- Living in an age of fear -- Children and stress -- Spiritual goal-setting -- What is spiritual goal-setting? -- How to set spiritual goals -- Common excuses for not setting goals -- Goal-setting hints and tips -- The spiritual practice -- When to set a goal.
Notes: Includes bibliographical references (p. 121-124).
Subjects: Stress management.
Stress (Psychology)--Prevention.
Adjustment (Psychology)
LC Control No.: 2003015477

Type of Material: Book (Print, Microform, Electronic, etc.)
Personal Name: Finger, Alan, 1946-
Main Title: Yoga Zone yoga for life : an intermediate guide to health, fitness, and relaxation / Alan Finger, with Al Bingham and Elizabeth Royles Parker.
Portion of Title: Yoga Zone
Yoga for life
Related Names: Bingham, Al.
Parker, Elizabeth Royles.
aging, dying, and death -- Environmental health --
Strategies for teaching environmental health.
Notes: Includes bibliographical references and index.
Subjects: Health education (Elementary)--United States.
LC Control No.: 2002606135
Type of Material: Music Sound Recording
Personal Name: Null, Gary.
Main Title: Seven steps to perfect health [sound recording].
Variant Title: Title on container: Gary Null's 7 steps to perfect health
7 steps to perfect health
Published/Created: New York : Gary Null Anti-aging Center, [2000]
Description: 8 sound cassettes (8 hr.) : analog.
Summary: Presents recordings of broadcasts from Gary Null's radio
program. He identifies and discusses seven steps that
can lead to good health and longevity, such as healthy
nutrition, exercise, stress reduction, and elimination
of risk factors.
Notes: In container (25 cm.).
Subjects: Health.
Nutrition.
Exercise.
LC Control No.: 2002113739
Type of Material: Book (Print, Microform, Electronic, etc.)
Personal Name: Halperin, Gary.
Main Title: Feel better now...meditation : for stress reduction &
relaxation / Gary Halperin.
Projected Publication Date: 0212
Description: p. cm.
ISBN: 097001502X
Other System No.: (DLC) 2002113739

Mindwaves, how soon is now [sound recording] : an
audio/visual journey into stress reduction.
Published/Created: 1999.
Description: 1 sound disc : digital ; 4 3/4 in.
Notes: Copyright registration information: Mindwaves, Inc.;
Mindwaves, Inc., employer for hire of MacTavish
Williamson, 1944- (narrated text & co-producer of video
& soundtrack) & Thomas W. Williamson, 1963- (director,
producer of video & music).
Compact disc.
Brief record.
LC Control No.: 2002111085
Type of Material: Book (Print, Microform, Electronic, etc.)
Personal Name: Davis, Martha.
Main Title: The relaxation & stress reduction workbook / Martha Davis,
Elizabeth Robbins Eshelman, Matthew McKay.
Edition Information:
5th ed.
Projected Publication Date: 0212
Description: p. cm.
ISBN: 1567315011
Other System No.: (DLC) 2002111085
Quality Code: pcc
LC Control No.: 2008007961
Type of Material: Book (Print, Microform, Electronic, etc.)
Personal Name: Schwartz, Jim (James), 1957-
Main Title: The mind-body fertility connection : the true pathway to
is THE Medical Concern

stress

conception / Jim Schwartz.
Edition Information:
1st ed.
Published/Created: Woodbury, Minn. : Llewellyn Publications, c2008.
Projected Publication Date: 0807
Description: p. cm.
ISBN: 9780738713762
Contents: The fertility journey -- The evidence supporting the -- Mind/body connection -- How the mind works -- The stress response and the -- Importance of stress reduction -- Issues and emotions that block conception -- The dynamic of fear: how the past can affect the present -- The imperfect world of the perfectionist -- Reprogramming at the cellular level -- Working with meditation and visualization -- Energy work: healing at the core -- The Tao of conception -- Preparing for conception: a timeline and action plan -- Complementary modalities that support fertility and how to find a practitioner -- The fertility journey.
Notes: Includes bibliographical references and index.
Subjects: Infertility, Female--Psychological aspects--Popular works.
Infertility, Female--Alternative treatment--Popular works.
Mind and body therapies--Popular works.
LC Control No.: 2008003637
Type of Material: Book (Print, Microform, Electronic, etc.)
Personal Name: Davis, Martha, 1947-
Main Title: The relaxation & stress reduction workbook / Martha Davis, Elizabeth Robbins Eshelman, Matthew McKay.
Variant Title: Relaxation and stress reduction workbook
Edition Information:
6th ed.
Related Names: Eshelman, Elizabeth Robbins.
McKay, Matthew.
Description: xx, 371 p. : ill. ; 26 cm.
1572245492 (pbk. : alk. paper)
Notes: Includes bibliographical references and index.
Subjects: Stress management.
Relaxation.
Relaxation Techniques--Popular Works.
Stress, Psychological--prevention & control--Popular Works.
Series: A New Harbinger self-help workbook
LC Control No.: 2007048590
Type of Material: Book (Print, Microform, Electronic, etc.)
Personal Name: Blaine, Sandy.
Main Title: Yoga for computer users : healthy necks, shoulders, wrists, and hands in the postmodern age / Sandy Blaine.
Edition Information:
1st ed.
Description: 128 p. : col. ill. ; 23 cm.
1930485190 (pbk. : alk. paper)
Desktop yoga -- Take a break! Balancing practice with computer time -- Practicing at work: issues and suggestions -- The poses: take a break from your
stress


Notes: Includes bibliographical references (p. 121) and index.

Subjects: Hatha yoga--Therapeutic use.

Computer users--Health and hygiene.

Overuse injuries--Prevention.

Series: Rodmell Press yoga shorts

LC Control No.: 2007045872

Type of Material: Book (Print, Microform, Electronic, etc.)

Personal Name: McBee, Lucia.

Main Title: Mindfulness-based elder care : A CAM model for frail elders and their caregivers/ Lucia McBee.


Projected Publication Date: 0803

Description: p. ; cm.

ISBN: 9780826115119 (alk. paper)

Contents: A box for father: healthcare and nursing homes -- Learning from the inside out: mind-body and mindfulness-based -- Knock, knock: complementary and alternative medicine -- The sound of one hand clapping: mindfulness-based elder care -- Imagine this: mindfulness-based elder care for frail elders in the nursing -- Drifting away from my head to my heart: mindfulness-based elder care for elders with dementia -- Mindfulness-based elder care for isolated elders and palliative care -- Dance like nobody is watching: mindfulness-based elder care and creativity -- Who will take care of us? an overview of mindfulness-based elder care for -- Riding the waves: mindfulness-based elder care for informal caregivers -- Learning to take care of myself: a seven week mindfulness-based elder care course -- introduction to stress reduction for professional caregivers: a one-hour class and other options for staff -- Walking with tigers.

Notes: Includes bibliographical references and index.


Frail elderly--Nursing home care.

Alternative medicine.

Meditation.

Caregivers.

Mind and body.

Frail Elderly.

Health Services for the Aged.
is THE Medical Concern

Integrating complementary/alternative medicine into your cardiac program -- Legal and ethical issues in integrative cardiology -- Academic integrative medical centers of excellence -- Approaches to clinical trials of complementary and alternative medicine -- Bioenergetic techniques -- Acupuncture -- Herbal and dietary supplements in cardiovascular care: efficacy and incorporation into practice -- The modified Mediterranean diet -- Guided imagery in integrative cardiology -- The role of stress and various modalities for dealing with stress and prevention -- Noetic therapy, spirituality and prayer -- Tai Chi and Qi Gong for heart health -- An ayurvedic approach to cardiovascular disease -- Applications of music therapy in the continuum of care for the cardiac patient -- Naturopathic medicine -- Homeopathy -- Psychological risk factors and pathophysiological pathways involved in coronary artery disease: relevance to complementary medicine interventions -- Integrative cardiology: mechanisms of cardiovascular action of acupuncture -- The emotional basis of coronary heart disease -- Nontraditional approaches to lipoprotein metabolism manipulation -- Herbs for menopause and cardiovascular disease -- Obesity and weight loss: an overview of diet, drugs and dietary supplements -- Complementary and alternative medicine and cardiac surgery -- Chronic heart failure: an integrative approach to alternative and complementary therapies -- Management of common problems in cardiovascular care, sudden death and arrhythmias -- Aging: the environment reflects humanity -- End-of-life care: hospice for the heart -- Presence, healing and healers: an introduction to mindfulness,
meditation, and its relevance to stress reduction and health for patients, physicians and health-care professionals.

Notes: Includes bibliographical references and index.

Subjects: Cardiology.
Integrative medicine.
Heart--Diseases--Alternative treatment.
Cardiovascular Diseases--therapy.
Complementary Therapies--methods.

LC Control No.: 2005055114
Type of Material: Book (Print, Microform, Electronic, etc.)
Personal Name: Small, Gary W.
Main Title: The longevity bible : 8 essential strategies for keeping your mind sharp and your body young / Gary Small, with Gigi Vorgan.
Edition Information:
1st ed.
Published/Created: New York : Hyperion, c2006.
Related Names: Vorgan, Gigi, 1958-
Description: xi, 318 p. : ill. ; 25 cm.
ISBN: 1401301843
9781401301842

Summary: Aging expert Dr. Small show us how to live longer, stronger, better lives by following simple guidelines such as a positive attitude, gratifying relationships, and lifelong education. Comprised of advice on memory fitness, healthy diet, physical conditioning, and stress reduction, this book follows the stories of four typical readers in different stages of their lives, and how those lives are improved with Dr. Small's plans. --From publisher description.

Notes: Includes bibliographical references (p. 289-304) and index.

Subjects: Longevity.
Aging.
Health.

LC Control No.: 2005031293
Type of Material: Book (Print, Microform, Electronic, etc.)
Personal Name: Kanan, Joseph, 1962-
Main Title: Living pain free through chiropractic and trigger point therapy / by Joseph Kanan.
Published/Created: Apple Valley, MN : Center Path Pub., 2006.
Projected Publication Date: 0602
Description: p. cm.
ISBN: 9780972402262 (alk. paper)
Contents: How your body works -- Chiropractic 101 -- Trigger point therapy -- Low back pain -- Headaches -- Neck and upper back pain -- Arm and hand pain -- Leg pain -- Fibromyalgia -- The secrets to a healthy diet -- Exercising and stretching -- Stress reduction -- Living the wellness lifestyle.

Subjects: Myofascial pain syndromes--Chiropractic treatment.
Acupuncture points.

LC Control No.: 2005276563
Type of Material: Book (Print, Microform, Electronic, etc.)
Personal Name: Rief, Sandra F.
Main Title: How to reach and teach children with ADD/ADHD : practical techniques, strategies, and interventions / Sandra F. Rief.
Edition Information:
2nd ed.
Related Names: Rief, Sandra F. How to reach and teach ADD/ADHD children.
Description: xix, 439 p. : ill. ; 28 cm.
ISBN: 0787972959 (pbk.)
Contents: 1: Key information for understanding and managing ADHD -- Understanding attention-deficit/hyperactivity disorder -- Making the diagnosis: a comprehensive evaluation for ADHD -- Multimodal treatments for ADHD -- Medication treatment and management -- Do’s and don’ts for teachers and parents -- Critical factors in the success of students with ADHD -- ADHD and social skills interventions -- ADHD in preschool and kindergarten -- ADHD in middle school and high school -- 2: Managing the challenge of ADHD behaviors -- Classroom management and positive discipline practices -- Preventing or minimizing behavior problems during transitions and less structured times -- Individualized behavior management, interventions, and supports -- Strategies to increase listening, following directions, and compliance -- Attention!! Strategies for engaging, maintaining, and regulating students’ attention -- 3: Instructional and academic strategies and supports -- Reaching students through differentiated instruction -- Multisensory instruction -- Reaching students through their learning styles and multiple intelligences -- The advantages of cooperative learning for students with ADHD -- Organization, time management, and study skills -- Learning strategies and study skills -- Writing and reading challenges for students with ADHD -- Written language strategies, accommodations, and interventions: pre-planning/organizing, handwriting, assistive technology -- Strategies for building written expression and editing skills -- Reading strategies and interventions: building decoding skills, vocabulary, and fluency -- Reading comprehension strategies and interventions -- Mathematics: challenges and strategies -- 4: Personal stories and case studies -- A parent’s story: what every teacher and clinician needs to hear -- Case studies and interventions (Adam and Vincent) -- 5: Collaborative efforts and school responsibilities in helping children with ADHD -- Team for success: communication, collaboration, and mutual support -- The role of the school’s multidisciplinary team -- School documentation and communication with medical providers and others -- Educational laws and rights of students with ADHD -- Innovative collaborative programs for helping children with ADHD -- 6: Additional supports and strategies -- Stress reduction, relaxation strategies, leisure activities, and exercise -- Music for relaxation, transitions, energizing, and visualization.
Includes bibliographical references.
Subjects: Attention-deficit-disordered children--Education--United States--Handbooks, manuals, etc. Hyperactive children--Education--United States--Handbooks, manuals, etc. Classroom management--United States--Handbooks, manuals, etc. Series: Jossey-Bass teacher
LC Control No.: 2005041220
Type of Material: Book (Print, Microform, Electronic, etc.)
Personal Name: Boyd, D. Barry.
Main Title: The cancer recovery plan : maximize your cancer treatment with this proven nutrition, exercise, and stress-reduction program / D. Barry Boyd and Marian
Betancourt.
Published/Created: New York : Avery, 2005.
Related Names: Betancourt, Marian.
Description: 244 p. ; 23 cm.
ISBN: 1583332308
Notes: Includes bibliographical references and index.
Subjects: Cancer--Nutritional aspects.
Cancer--Popular works.
Stress management.
Physical fitness.
Weight loss.
LC Control No.: 2008030870
Type of Material: Book (Print, Microform, Electronic, etc.)
Main Title: Single embryo transfer / edited by J. Gerris ... [et al.].
Projected Publication Date: 0811
Related Names: Gerris, Jan.
Description: p. ; cm.
ISBN: 9780521888349 (hardback)
Contents: The risks associated with multiple pregnancies / Ulla-Britt Wennerholm -- An overview of determinants of oocyte and embryo developmental competence : specificity, accuracy and applicability in clinical IVF / Jonathan Van Blerkom -- Single embryo transfer : concepts and definitions / Jan Gerris and Petra De Sutter -- Patient selection for single embryo transfer / Ofer Fainaru and Mark D. Hornstein -- Perinatal outcome after single embryo transfer / Petra De Sutter and Jan Gerris -- Single embryo transfer as a model for early conception and implantation / Anja Pinborg and Anne Loft -- Ovarian stimulation, blastocyst culture and preimplantation

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Big Tobacco, Big Sugar, Big Pharma, Big Oil, and Big War Industry are exempt from lay and they kill and injure, maim and cripple in the name of profit. They seek to control and dominate medicine to further build their profits.

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Notes: Includes bibliographical references and index.


Human embryo—Transplantation.
Embryo Transfer—methods.

Pregnancy Complications.
Pregnancy, Multiple.

LC Control No.: 2008016261

Type of Material: Book (Print, Microform, Electronic, etc.)

Main Title: Acceptance and mindfulness treatments for children and adolescents: a practitioner's guide / [edited by] Laurie A. Greco and Steven C. Hayes.


Projected Publication Date: 0806

Related Names: Greco, Laurie A.
Hayes, Steven C.

Description: p. ; cm.

1572245417 (hardcover : alk. paper)

Contents: Acceptance and mindfulness interventions for youth: it's time / Steven C. Hayes and Laurie A. Greco -- Third-wave behavior therapies for children and adolescents: progress, challenges, and future directions / Karen M. O'Brien and Amy R. Murrell -- Assessment of acceptance and mindfulness processes in youth / Lisa W. Coyne,

Notes: Includes bibliographical references and index.

Subjects: Cognitive therapy for children.
Cognitive therapy for teenagers.
Acceptance and commitment therapy.
Adolescent.
Awareness.
Child.
Patient Acceptance of Health Care--psychology.
Psychotherapy--methods.

Personal Name: Rappaport, Laury.
Main Title: Focusing-oriented art therapy: accessing the body's wisdom and creative intelligence / Laury Rappaport.
Projected Publication Date: 0809
Description: p. ; cm.
Notes: Includes bibliographical references.
Subjects: Art therapy.
Focused expressive psychotherapy.
Art Therapy--methods.
Imagery (Psychotherapy)

Personal Name: Gordon, James S. (James Samuel)
Main Title: Stress management / James S. Gordon ; introduction by C. Everett Koop ; foreword by Sandra Thurman.
Description: 112 p. : ill. ; 23 cm.
ISBN: 0791059871
Summary: Discusses biological and psychological aspects of stress, techniques for stress reduction, and stress management programs.


Subjects: Stress management--Juvenile literature. Stress management. Stress (Psychology)

Series: 21st century health and wellness

LC Control No.: 89025293

Type of Material: Book (Print, Microform, Electronic, etc.)

Personal Name: Gordon, James S. (James Samuel)

Main Title: Stress management / James S. Gordon ; introduction by C. Everett Koop.


Description: 111 p. : ill. ; 24 cm.

ISBN: 0791000427 079100516X (pbk.)

Summary: Discusses biological and psychological aspects of stress, techniques for stress reduction, and stress management programs.

Notes: Includes bibliographical references (p. 103-104) and index.


Stress (Psychology)

Series: The Encyclopedia of health. Psychological disorders and their treatment

LC Control No.: 2006002758

Type of Material: Book (Print, Microform, Electronic, etc.)

Personal Name: Hanna, Judith Lynne.

Main Title: Dancing for health : conquering and preventing stress / Judith Lynne Hanna.

Published/Created: Lanham, MD : AltaMira Press, c2006.


Description: vii, 256 p. : ill. ; 23 cm.


Contents: Setting the Stage -- Evolution’s Gifts -- Dance-Stress Coupling -- Historical and Non-Western Dance-Stress Relations -- Meeting the Gods and Demons -- Shaking Off Poison, Plague, Death and Sin -- Coming to Terms with Life Crises -- Resolving Conflict -- Revitalizing the Past and Facing the Future -- Western Dance-Stress Relations -- “Playing” Onstage in Western Theatrical Dance -- A Dance Career in the west -- Amateur Dancing in the West -- Dance (Movement) Therapy -- Finale: Dance and Stress Resistance, Reduction and Euphoria.


Includes bibliographical references (p. 227-243) and index.

Subjects: Dance--Psychological aspects. Stress (Psychology)

Dance therapy.

LC Control No.: 01132722

Type of Material: Book (Print, Microform, Electronic, etc.)

Main Title: Medical and psychological aspects of sport and exercise / David I. Mostofsky, Leonard D. Zaichkowsky, [editors].

Published/Created: Morgantown, W. Va. : Fitness Information Technology, c2002.

Related Names: Mostofsky, David I. Zaichkowsky, Leonard D., 1944-

Description: viii, 289 p. : ill. ; 26 cm.

ISBN: 188569329X

Contents: Importance of sport and exercise to quality of life and longevity / Roy J. Shephard -- Working out those

Notes: Includes bibliographical references and index.

Subjects: Physical fitness.
Exercise therapy.
Sports--Psychological aspects.
Sports--Physiological aspects.
Exercise--Psychological aspects.
Exercise--Physiological aspects.
Sports medicine.
Sports--Physiology.
Sports--Psychology.
Exercise--Physiology.
Exercise--Psychology.
Exercise Therapy.
LC Control No.: 99060962
Type of Material: Book (Print, Microform, Electronic, etc.)
Personal Name: Jaske, C. E.
Main Title: Fatigue strength reduction and stress concentration factors for welds in pressure vessels and piping / C.E. Jaske, J.L. Hechmer.
Related Names: Hechmer, J.L.
Description: p. ; cm.
ISBN: 1581454392 (pbk.)
Series: Wrc bulletin ; 432
LC Control No.: 98061688
Type of Material: Book (Print, Microform, Electronic, etc.)
Personal Name: Jaske, C. E.
Main Title: Fatigue strength reduction and stress concentration factors for welds in pressure vessels and piping / C.E. Jaske, J.L. Hechmer.
Related Names: Hechmer, J.L.
Description: p. cm.
Series: Bulletin ; 432
LC Classification: 9812 BOOK NOT YET IN LC
CALL NUMBER: Library of Congress Holdings Information Not Available
LC Control No.: 2005057210
Type of Material: Book (Print, Microform, Electronic, etc.)
Personal Name: Burgess, Wes.
Main Title: The bipolar handbook : real-life questions with up-to-date...
1. Bipolar disorder basics -- Cycling in bipolar disorder
   -- Time course -- Causes of bipolar disorder -- Bipolar
   mania -- Bipolar depression -- Bipolar types I, II, and
   III -- Mixed-state bipolar disorder -- Getting the right
diagnosis -- Misdiagnosis -- Bipolar disorder in our
   culture -- 2. Healthy life changes you should make now
to decrease bipolar symptoms -- Stress drives bipolar
   disorder -- Stress reduction and relaxation techniques
   -- Sleepers, awake! Sleep and bipolar disorder -- How to
   get a good night’s sleep -- Sleeping pills and alcohol
   -- Nutrition and weight loss -- Vitamins, herbs, and
   supplements -- Exercise -- Caffeine, alcohol, drugs, and
   tobacco -- Health fads -- How to stop smoking painlessly
   -- Six steps for reducing bipolar symptoms --
   3. Medical treatment for bipolar disorder -- Mood
   stabilizers -- Carbamazepine (Equetro, Tegretol,
   Carbatrol, and other brands), Oxcarbazepine (Trileptal),
   Valproate and valproic acid (Depakote and Depakene),
   Lithium salt (Eskalith, Lithobid, and other brands),
   Lamotrigine (Lamictal), Topiramate (Topamax),
   Gabapentine (Neurontin), Tiagabine (Gabitril), and
   Levetiracetam (Keppra) -- Atypical antipsychotics --
   Olanzapine (Zyprexa), Ziprasidone (Geodon), Quetiapine
   (Seroquel), Clozapine (Clozaril), Risperidone
   (Risperdal), and Aripiprazole (Abilify) -- Antianxiety
   medications -- Alprazolam (Xanax), Lorazepam (Ativan),
   Clonazepam (Klonopin), Diazepam (Valium) -- Seldom used
   medications that can help bipolar disorder -- Clonidine
   (Catapres), MAO inhibitors : Tranylcypromine (Parnate)
   and Phenelzine (Nardil), Liothyronine (Cytomel),
   Thyroxin (Synthroid), Verapamil (Isoptin), Diltiazem
   (Cardizem), and Nifedipine (Adalat) -- New medications
   for bipolar disorder -- Antalarmin, Mifepristone
   (Mifeprax), Memantine (Namenda), Riluzole (Rilutek),
   Pregabalin (Lyrica), Aprepitant (Emend), and Modafinil
   -- Treatments for bipolar disorder that do not use
   medications -- Medications that can make bipolar
   disorder worse -- The dramatic effect of seizures on
   depression --
   4. How to find the right doctor -- 5. Psychotherapy --
   Types of psychotherapy -- Understanding the differences
   between types of therapists -- The benefits of
   psychotherapy for bipolar disorder -- Why bipolar
   disorder cannot be treated with psychotherapy alone --
   Choosing a therapist -- The four stages of bipolar
   recovery -- 6. Practical life strategies for career
   success -- Understanding your strengths and weaknesses
   -- Defining career success -- Seven questions to ask
   yourself when choosing a career -- Interviewing and
   getting a job -- Decrease your stress at the workplace
   -- Dealing with supervisors and coworkers -- Boundary
   issues in the workplace -- Work attitudes and
   vulnerabilities -- Disability -- Five major causes of
   disability in bipolar disorder -- A seven-step plan for
   success in the workplace --
   7. Finding and maintaining healthy personal relationships
   -- Making conversation -- Learn to make small talk : a
   three-step method -- Socializing -- Love relationships
is THE Medical Concern

stress

-- Sex -- Anger and jealousy -- Fantasies and obsessions
-- Social boundaries in relationships -- Finding the
right partner -- Starting new relationships -- Don’t get
hurt by other people -- A bipolar golden rule : help
other people keep from hurting you -- Now that I’m
myself again -- Seven rules for safe bipolar dating --
8. Women’s issues in bipolar disorder -- Bipolar
premenstrual syndrome -- Pregnancy -- Women’s sexual
issues -- Hormone supplementation -- Bipolar women in
abusive relationships --

9. Crisis management : how family members can help prevent
cries -- Spouses, partners, and friends -- Warning
signs -- Psychosis -- Hospitalization -- Attitudes that
make it difficult to recover from bipolar disorder --
What to do when nothing is working -- 10. Resources --
Using the Internet to fight bipolar disorder -- Online
Internet forums : bipolar news and chat groups --
Organizations and the services they provide -- U.S.
government health and information services -- Privately
owned bipolar Websites -- Professional books on bipolar
disorder and medical science -- Psychobiological and
philosophical books -- Bipolar and health books for the
general reader -- Epilogue -- Appendix A. The official
DSM-IV diagnostic criteria for mania and atypical
depression -- Appendix B. The National Institute of
Mental Health list of the symptoms of mania, combined
bipolar and unipolar depression, and psychosis.

Notes: Includes bibliographical references (p. [218]-228) and
index.

Subjects: Manic-depressive illness--Handbooks, manuals, etc.
Manic-depressive illness--Miscellanea.
Bipolar Disorder.

LC Control No.: 2003024987
Type of Material: Book (Print, Microform, Electronic, etc.)
Personal Name: Girdano, Daniel A.
Main Title: Controlling stress and tension / Daniel A. Girdano, Dorothy
E. Dusek, George S. Everly, Jr.
Edition Information:
7th ed.
Published/Created: San Francisco : Pearson/Benjamin Cummings, c2005.
Related Names: Dusek, Dorothy.
Everly, George S., 1950-
Description: xxii, 423 p. : ill. ; 23 cm.
ISBN: 0805360298
Contents: Stress, stressors and stress management -- Systems that
control stress arousal -- The body’s response to stress
-- Stressful emotions, thoughts, and beliefs -- The
human spirit -- Patterns of behavior -- Demands and
expectations -- Stress and the human-environment
interaction -- Stress in relationships -- The stress of
trauma and terror -- Stress in the workplace --
Breathing and relaxation -- Muscle relaxation --
Autogenics and visual imagery -- Yoga and
stretch-relaxation -- Meditation -- Stress reduction
through physical activity -- Your personal stress
management plan.

Notes: Includes bibliographical references and index.

Subjects: Stress management.
Stress (Psychology)
LC Control No.: 87035399
Type of Material: Book (Print, Microform, Electronic, etc.)
Main Title: Causes, coping, and consequences of stress at work / edited
by Cary L. Cooper and Roy Payne.
Published/Created: Chichester ; New York : Wiley, c1988.
Related Names: Cooper, Cary L.

Payne, Roy.

Description: xii, 418 p. : ill. ; 24 cm.
ISBN: 0471918792 : $45.00

Contents: The epidemiology of occupational stress / Ben C. Fletcher
-- Blue collar stress / Meredith Wallace, Mary Levens,
and George Singer -- Sources of managerial and
professional stress in large organizations / Ronald J.
Burke -- Operator stress and computer-based work / Rob
Briner and G. Robert J. Hockey -- Nonwork roles and
stress at work / Barbara A. Gutek, Rena L. Repetti, and
Deborah L. Silver -- Psychological stressors associated
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consequences of coping with stress / Jeffrey R. Edwards
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John M. Ivancevich and Michael T. Matteson -- Workplace
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Lawrence R. Murphy -- The future of physiological
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Modulation and determination of cellular glutathione concentrations / Lars-Oliver Klotz -- Oxidants in
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Neville N. Osborne -- Oxidative stress and cataract /
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... [et al.] --
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J. Calder ... [et al.] -- Peroxynitrite and ocular
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Misconceptions in Biofeedback Resulting in the current FDA conflict

Key words and concepts: Geek, Biofeedback is therapy, the powers of the mind to effect things, stress reduction improves health, awareness builds health, psychosomatic disease, psych-neuro-immuno-soma connection of all disease, Biofeedback as Bioresonance, Bioresonance as Biofeedback

We had a phone call from the FDA recently where on the topic of stress reduction the FDA agent said “Everyone in the world know that reducing stress is good for all diseases as do all intelligent people, but you’re going to have a hard time convincing the FDA of that”. There is a distinct lack of intelligence in the FDA. Our system is designed for reeducation of muscles. The Chinese word for sport is TU which means educating the muscles. I told an FDA agent we sell our device to sport athletes and she barked back what do muscles have to do with sport. The geek often engages mouth before engaging brain. But an industry that makes peanut distributors place a “Warning: May Contain Nuts” label on all packaging of the Peanuts, has difficulty in engaging brain.

Definition of geek:

Jesus taught us that the Meek will inherit the Earth. But today the Geeks have stolen the Earth. The small petty mind of the Geek has taken over every aspect of our lives. Paper pushing, picayune, petty minds that over analyze and over regulate our lives. This Geek mind is selfless, without compassion, loveless, over critical and over demanding and above all else self limiting. The geek mind is small and tries to impose limitations and restrictions of freedom. The geek mind is petty, over picayune and over conservative. The geek mind cannot accept the powers of the mind, because the idea that the mind effects things is counter to his basic belief that the mind restricts things. He fears and abhors freedom of spirit. Expansive great spirits who see holistic outstretching visions are the enemy of the geek. The mediocre confining mind of the geek will give incredible resistance to any great spirit it encounters. This in itself is a proof of the powers of the mind, as the nature of the geek mind is to impose its nature of restriction onto the things it perceives.

Geeks with their small minds tend to reduce everything they see. Their small petty minds must devalue and lessen everything they perceive. The concept they fear the most is the power of the mind. They cannot accept the power of the mind for it is contrary to their very existence. And it seems that playing psychic is not in the character of the geek. The first step in this process is to understand that the mind can affect things. The effect is small and we cannot control things but the mind effects things. The small mind of the geek has difficulty accepting this truth because it is counter to their basic small mindedness. Motivation greatly determines perception. Accumulated perceptions construct beliefs. And a false belief is very difficult to disband. The smaller the mind the more it can cling to a false belief.

People hold to their beliefs and especially false beliefs. Geeks hold violently to their false beliefs. One of their false beliefs is that they are not a geek when actually they are. Some of the most closed minds I have ever met will swear they are open minded.

This article is to clarify some basic concepts that have created some difficulty in the area of biofeedback.

1. Biofeedback is therapy. The geek sees a description of biofeedback as “measuring a physiological response and feeding it back to the patient”. Since he does not believe in the powers of the mind he does not see that as therapy. But to the rest of us it is. All biofeedback sessions are therapy. Doctors send patients to biofeedback as therapy. The CPT (Certified Practitioner Therapy Insurance Book) lists biofeedback as therapy. The insurance companies see it as therapy. It is so obviously therapy and treatment, that here the geek embarrasses himself. He fights and twists and has a hard time giving up his false belief and thus he must give resistance to more expansive minds. The geek often is not aware of just what happens in the real world of medicine, but to all involved in medicine Biofeedback is therapy.

Biofeedback builds awareness. Awareness helps the mind to affect itself and the therapy comes from self regulatory powers of the mind.

2. Stress reduction improves Health. The evidence of the psycho-somatic disease was astounding. Now the evidence of the Psycho-Neuro-Immuno-Soma link is profound and completely proven. (See the PNIJ of the UMISH). But here again the geek cannot accept that the mind can be a part. If the mind is part of health then so is the geek mind. And this is intolerable to the geek. The rest of us can see that stress reduction can help people.

The rest of us can see that too much stress can over stimulate the sympathetic nerves and sedate the para sympathetic nerves that control immunity and digestion. There are thousands of scientifically proven ways the stress reduction can improve health and thus help any disease known to man. But this thought is too expansive to the geek. And the geek hates to be lectured to, he hates to be found out as a geek.

The rest of us can see that stress reduction and biofeedback is empowering to the patient. But the prayer, spirit, God, psychic connection, and religion. The mind has power. We have the right to believe this and the scientific evidence is conclusive.

There is indeed a non-local universe and it has been proven that the mind can effect things (see the movie proof and the journal on proof of the powers of the mind). The geek will try to play psychic and pretend that he can put down the book and movie without watching it or reading it. And it seems that playing psychic is not in the character of the geek. The first step in this process is to understand that the mind can affect things. The effect is small and we cannot control things but the mind effects things. The small mind of the geek has difficulty accepting this truth because it is counter to their basic small mindedness. Motivation greatly determines perception. Accumulated perceptions construct beliefs. And a false belief is very difficult to disband. The smaller the mind the more it can cling to a false belief.

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geek fears and loathes empowering anybody. His basic personality is to dis-empower people. He likes to restrain powers and limit all situations he sees.
The rest of us can see Stress reduction improves anyone's Health.

3. Biofeedback as Bioresonance, Bioresonance as Biofeedback

Here science of the body electric comes into play. We can safely measure the body electric and in a cybernetic loop use a biofeedback cascade to induce certain bioresonance. This can be helpful and still allows us to be in the confines of biofeedback. The limitations of the original S10k can be adhered to and still the expansive mind can stay in the S10k box but reach out to people and find a way to safely help everyone.

After over twenty years of use, over 200,000,000 patient visits, there have been no records of any significant risks. There have been over two hundred studies published on the device and the large study involved 2,500+ therapists, 97,000+ patients, and over 275,000 patient visits. All certified and inspected by governmental agencies. The conclusion was total safety, results in over two hundred diseases, and effective stress reduction. The geek is now twisting in his chair. His instinct is to doubt this. That would be fine and doubt we can live and work with. But some geeks go extra and feel that there must have been a crime. They play psychic and assume that no one could be so expansive and intelligent to do this and this person must be a illegitimate. This assumption then cuts off the communication and an adversarial attack ensues.

There is a extra level of geek suspicion in America today. The legal system is very adversarial and often over reactive. A close inspection of the Seattle Times article on me will see that there is no evidence of any impropriety. No one hurt, no one deceived, and no one put at risk. All of our therapists are trained to work with the medical system and if the need for medical care is needed of course it is recommended.

Our device is proven safe and is so effective that people get such good results and want to share these results with their friends. Their overzealous enthusiasm can be too excessive. We are constantly trying to contain their enthusiasm and restrain the zeal.

I am just a electrical engineer, scientist, medical professional who has designed a totally safe energetic medical device, based on good science. I registered it as a legal system of biofeedback for stress detection and reduction. Now after two decades of use with no record of any significant risk, hundreds of peer reviewed medical articles, a vast multitude of case studies and testimonials; I am attacked because it works. Or am I attacked because it is drugless. Is my courage to defy risk, hundreds of peer reviewed medical articles, a vast multitude of case studies and testimonials; for stress detection and reduction. Now after two decades of use with no record of any significant risks. There have been over two hundred studies published on the device and the large study involved 2,500+ therapists, 97,000+ patients, and over 275,000 patient visits. All certified and inspected by governmental agencies. The conclusion was total safety, results in over two hundred diseases, and effective stress reduction. The geek is now twisting in his chair. His instinct is to doubt this. That would be fine and doubt we can live and work with. But some geeks go extra and feel that there must have been a crime. They play psychic and assume that no one could be so expansive and intelligent to do this and this person must be a illegitimate. This assumption then cuts off the communication and an adversarial attack ensues.

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My iniquity seems to be too much make up and too high a heel. Many fear my intellect and charisma, as I am seen as a threat to the pharmaceutical companies. I am not. I can appreciate any direct inquiry, any open challenge, but let's drop the adversarial unpleasantness and let's work together to help make America safe and progressive. America cannot afford to go backwards in medicine by destroying energetic medicine without a true open discussion.

The suspicious adversarial clash resulted in the misunderstanding of my 1996 indictment. I have made an official legal deposition on this whole matter. It was done with a lawer and I under oath answer questions that you should see the results of. The deposition is on video, audio or a transcript can be arranged. I will send the video. I hope you watch it and respond. I assure you that you will find me intelligent, honest, ethical, sincere and dedicated to professionalism.

4. People have the Freedom of Speech and Freedom to Choose

Geeks hate freedom. Any type of freedom is an expression of expansion of spirit. Geeks hate expansion. They want things to be anal retentively controlled. Whatever a geek sees he wants to reduce and confine. It is a reflection of his small petty mind. When big thinkers see things they want to expand the vision, to magnify to effect, to accomplish more, and reach beyond. Geeks will be very annoyed by large thinkers. They will attempt anything and try to twist and rationalize; the geek may even lie and misconstrue to attack the great spirit. Geeks think that People should do what is expected and no more. Freedom is not in the geek language. When someone has tremendous results from the EPFX they want to tell people. The geek wants them to be quiet and doubt. The geek wants them to go to the same doctor they do and take the same medicine and do the same things that are expected. The constitution gave us freedoms and the geeks aspire to take them away. It is a constant balance.

Geeks do not believe the following:

1. Biofeedback is therapy.
2. Stress reduction improves health.
3. Biofeedback is Bioresonance, Bioresonance is Biofeedback
4. People have the Freedom of Speech and Freedom to Choose
5. The mind can affect things. Prayer works.

This is the heart of the conflict. These simple truths are very antagonistic to the small petty minds. There are no damages no complaints just a conflict of expansive minds versus petty geek minds. The problem with the EPFX device is more with the geek minds than with non-compliance. We have passed every inspection and every challenge. The confirmed safety, efficacy and registration of the EPFX are apparent. The conflict is a very small petty contention. This is just a misunderstanding. One would hope for more civil communication to work out a solution rather than court action. But geeks often do not like face to face confrontation they like to backstab. I hope that the geeks will see it fit to ask me for anything regarding me and take this correspondence into consideration.

Small minds fear large words such as International. International is too big and must be reduced. The powers of the mind and prayer, to dynamic must be reduced. Holistic therapy is too big too expansive must be reduced. Stress reduction and biofeedback is too big and must be reduced. Prof. Nelson’s heart and compassion is too big and must be reduced. Small minds want to reduce, large minds want to expand. Einstein said “Great spirits get incredible resistance from mediocre minds”.

Now as for CBS let’s review their article it comes from some geek who dislikes the four items above. They lie and cheat to get a hidden camera into a clinic. They willingly negotiate and pay for a session. The device does not pick up anything wrong other than an Immune system imbalance and a Systemic Electrical Oscillation Disorder (these usually indicate a liar as it does in this case, the investigator is lying as to their intent).

Then they lie again saying that the device is FDA illegal. It is not. There is just a self imposed Eclosion hold on imports into the USA as we deal with small petty items of regulation. This is important for
us to resolve. But the issues are very petty. With millions dying from tobacco, obesity, and doctor prescribed drugs, you would think there were much greater stories but every issue must get its necessary examination.

Saying the device is unproven, without asking for the proof is the mark of a true vindictive geek. The next lie is when they say that Prof. Nelson is a felon. This is not true. The case against me is weak and just used as a geek tool to discredit me. A full review of the case by a normal minded person will see this. But the small minded geek uses it without any due diligence in asking for any retort. This is the sign of good journalism. Bad geek journalists use backstabbing techniques. CBS will not allow a retort.

There was a TV story from Texas where the only person they could get to speak against the EPFX was a frightened woman who had never been on the device and did not want to. The interviewer said to me in a retort that they could not find any complaints or negativity from any user. Then why the story? Because the geek mind can not accept my expansive large mind.

When I saw proof that biofeedback could help everyone safely and without harmful drugs my mind made a system for all. Everyday making it safer, compliant, legal, effective and easy to use. My spirit saw a way to help people. But the geeks struggle with the four items and they are inwardly driven to defeat expansive great spirits. They are driven to reduce and restrain. They are instinctually compelled to give extreme resistance to any great spirit. And they like to do it behind the back.

If this letter makes you think I am happy. If it makes you mad at the geeks slow down. We need them for balance. God loves them, that’s why he made so many. We need to work things out.

If you are mad at me for touching your heart and inside you find your geekiness, then honor it and use it correctly and honestly to refine and improve the system. Do not shoot the messenger just because you do not like the message. Geeks do a lot of shooting. Freedom of speech is a freedom and right that must be defended everyday from the onset of small minded, picayune, petty geeks.

In the last few letters to the Chicago Tribune, I explained that every lie directed at us by the geeks can be easily answered. Prof. Nelson is not a felon as they say. The case against me is weak and just used as a tool to reject anything that is not to their liking. The petition I received from the freon companies is not a lie, but it is a tool to keep biofeedback technology from spreading to the masses.

I knew that if we did not respond to the geeks, they would just keep attacking us. I also knew that CBS would not allow me to respond to their unproven comments. So I wrote letters to the Chicago Tribune. The first to the publisher, the second to the publisher and to the editor of the Chicago Tribune, and the third letter was to the editor of the Chicago Tribune.

Honesty is something that every human should value. And I have always valued honesty. It is something that I have always tried to do. It is something that I have always tried to be. And it is something that I have always tried to have.

I have always been honest, and I have always been direct. I have always been honest, and I have always been direct. I have always been honest, and I have always been direct.

If you are mad at me for touching your heart and inside you find your geekiness, then honor it and use it correctly and honestly to refine and improve the system. Do not shoot the messenger just because you do not like the message. Geeks do a lot of shooting. Freedom of speech is a freedom and right that must be defended everyday from the onset of small minded, picayune, petty geeks.
The Philosophical Differences in Medicine and the Need for Stress Reduction in Treatment

This short essay is to point the major differences between allopathic drug and cut medicine and natural holistic medicine. The huge profits of the drug companies and small minds of some people hold back the true advancement in medicine. A major difference is in reductionism versus holism.

Stress accumulates and weakens the body. A weakened body cannot resist disease. The incredible work of Dr Hans Selye points to stress as the cause of most disease. The simplest analogy is the story of the straw that broke the camel’s back. The story is the camel will carry things but when we get too greedy and add too much.

We pile things on and on till just one more straw....

When we finally colapse, we only remeber the last straw and not the other larger burdens

The story goes that just one more straw breaks the camel’s back. In reductionism we blame the last straw. In holism we look at the entire burden. In modern allopathic medicine we ask what is wrong and the patient says everything was fine till (insert symptom). Then the doctor looks at the last incident and the last straw. In holistic medicine we look at the entire burden and all of the stressors. The allopathic doctor looks for a diagnosis for insurance payment; the Holistic doctor looks for the causes of disease.

The Holmes-Rahe Life Stress inventory shows how stressful events in our lives burden and thus
weaken us making us prone and susceptible to diseases. As stress accumulates it further weakens us. Even Christmas is stressful. Some people can tolerate stress more some less, but too much is disease.

The small mind is reductionist and petty. It looks for simple ideas like a diagnosis. The more intelligent mind has expansive thinking and more intellectually complete views. It takes time to be Holistic. An allopath medical doctor thinks that the flies cause the garbage. Every time he finds garbage he finds flies. Every time he finds disease he finds infection so he figures the infection caused the disease. The Holistic doctor looks for multiple causes of disease that weaken the system not one straw.

Allopathy- Reductionistic Medicine

When a stressor strikes it causes an alarm reaction. A stressor like a heavy metal might cause a sore throat, a toxic chemical in food might cause diarrhea, lead in the air might cause asthma, a fight at work might cause insomnia, a fight at home might cause constipation, too much work and not enough pay can cause headaches, muscle tightness, and a cascade of diseases.

Selye saw the reaction phase of initial symptoms as a warning, a notice, and a signpost of disease.

If the stressor continues however the body adapts to the stressor and reduces the symptom. The symptom goes away. The next phase is the adaptation stage. The warning symptoms go away but the disease or systemic weakness continues to have deleterious effects on the body. You can be really sick and have no symptoms. Allopathic traditional modern medicine is built on symptom reduction. The verbal interview is the key start of the process and it starts with what is wrong with you.

The most important thing to remember in medicine is being symptom free is not an Indicator of Health.

Being symptom free is NOT an Indicator of Health
Hungarian born Hans Selye was called the Einstein of medicine for his insights into the true cause of disease. Selye worked with Professor Nelson now Desire' and Selye passed the torch of truth to Nelson.

An FDA officer said to us “Everyone in the World knows that stress reduction helps disease, but you will have a hard time convincing the FDA of that.” This type of small minded ignorance of the truth of medicine makes new advancement difficult. The drug companies like their stranglehold on medicine and reducing stress thus disease without drugs is counter to their massive profits.

A new medicine with stress reduction and awareness of the causes of disease is needed. If people wish to choose synthetic drugs they should be able and free to choose but when someone wants natural medicine it should also be a viable choice. Freedom of choice is also feared by small minds. People need to be aware of these facts and take more responsibility for health.

So we need to see that the problems of medicine come from some false beliefs. One the false belief that the person knows what is wrong and that symptoms are the most important problem. Reductionism is a problem with the complexity of the human needing more intellectual holistic evaluation. Big Sugar, Big Tobacco, Big Pharma, Big Oil, Big War Machine all kill for profit and these are a key problem for health.
HEALTH IS EASE OF FLOW

Stressors block Flow, Stress is more than Just personal stress. Stress Reduction is the key to Medicine.

When the stressor or stressors weaken the defenses of the body, the weakest link of the body (from nature or nurture) is most prone to distress and thus disease.

LACK OF AWARENESS OR LACK OF EDUCATION
STRESS
HEREDITY
MENTAL FACTORS
(Greed, anger, delusion arrogance ETC)
ALLERGY
BAD POSTURE

TOXICITY
TRAUMA INJURY
PATHOGENS (microorganisms, bacteria, fungus, virus, prions, worms, etc.)
PERVERSE ENERGY (heat, cold, wind, dryness, radiation, magnetic, etc.)
DEFICIENCY OR EXCESS OF NUTRIENTS

Nelson Method of Medicine
1. Reduce the Causes of Disease. Change Behavior, get patients to Care, get the nail out of the tire
2. Repair the organs weakened by the Causes. Restore Health. Fix the Tire
3. Unblock the Blockages to energy, nutrition, Oxygen, waste, Parasites, acupuncture, neural FLOW
4. Treat the symptoms with natural means before resorting to Synthetic. Use foods, exercise, herbs, homeopathics
any and all natural means before resorting to Synthetics
5. Balance the metabolic typology or Constitutional Imbalances. Treat the patient as an Individual Whole

Selye Pathway of Disease
health then enter stressor (toxin etc)-crisis
1. ALARM Stage
   symptoms are the alarm, not the enemy, symptoms at first are related to the Stressor, later the dysfunction
   if stressor continues then
2. ADAPTATION Stage
   symptoms go away as we adapt, the distress a disease penetrates deeper. You can have no symptoms and be very very sick.
   Being symptom free is not an indicator of Health
   if stressor continues then
3. EXHAUSTION Stage
   the stressors batter the weakest organs
   if stressor continues then
   a. FUNCTIONAL
      first the stressors effect the weakest organ function
      if stressor continues then
   b. ORGANIC
      then the weak organs start to swell or shrink
   if stressor continues then
   c. DEATH
      cellular, organ, organ system, organism death

Since the body’s weakest link is prone to disease from the stressors, any disease will improve with reduction of the stressors. If there is good nutrition and no excess or deficiency of nutrients, the body’s repair system improves. With stress reduction the Parasympathetic system becomes free to boost digestion and immunity as well as other systems. Homeopaths can have more specific targets. Drugs such as nicotine target the lung primarily. But with the lack of systemic oxygen, any other weak link in the body from genetics or from life will be involved. Thus stress reduction is a universal therapy for all diseases. Reductionism of disease via inaccurate and expensive current medical diagnostic tools, are archaic, inaccurate, overly complex, non-productive, expensive, unsafe, risky and most often ineffective. Adding to this the risk of side effects from Synthetic drugs and we see the poor history of medicine. Nelson and Selye have plotted out a safe, inexpensive and effective new modus medicinae.