Today’s Modern Research in Electro-Stimulation + the Eductor

By Jonas Paulauskas and Desire’ Dubounet MD for Med Expose’

If you have not been paying attention lately to the new scientific medical research there has been an incredible explosion of new research on the body electric. A vast amount of new attention has been directed to micro-current electro stimulation. Research has shown it effective in Diabetic Neuropathy, Depression, Stroke, Speech Therapy, Injury, Wound Healing, Overactive Bladder, Schizophrenia, and even Paralysis.

Of course the most educated experienced person in this industry is Desire’ Dubounet. She developed the basic designs when all of medicine and science could not even see the value. Then the autofocused cybernetic loop technology developed and perfected by the incredible genius of Desire’ is a dramatic technology generations ahead of the rest. Maybe two decades ahead. Modern science is now accepting Desire’s research.

Here is a brief list and review of just a small sample of the new today’s research.

Advancing the development, dissemination and utilization of knowledge about applied psychophysiology and biofeedback to improve health and the quality of life through research, education and practice.
Paralysed Men Move again
With Spinal Electro-Stimulation

By James Gallagher Health and science reporter, BBC News

Andrew Meas, Dustin Shillcox, Kent Stephenson and Rob Summers were treated at the University of Louisville’s Kentucky Spinal Cord Injury Research Centre.

Four paralysed men have been able to move their legs for the first time in years after electrical stimulation of their spinal cords, US doctors report.

They were able to flex their toes, ankles and knees - but could not walk independently.

A report, in the journal Brain, suggests the electricity makes the spinal cord more receptive to the few messages still arriving from the brain.

Experts said it could become a treatment for spinal injury.

The spinal cord acts like a high-speed rail line carrying electrical messages from the brain to the rest of the body. But if there is any damage to the track, then the message will not get through.
People with spinal cord injuries can lose all movement and sensation below the injury.

*Some of them will just describe it as feeling alive again*”

Dr Claudia Angeli 
University of Louisville

**Zap**
A team at the University of Louisville and the University of California have been pioneering electrical stimulation of the spinal cord below the injury.

Three years ago they reported that Rob Summers - a keen baseball player who was paralysed from the chest down in a hit-and-run car accident - was able to move his legs while supported on a treadmill.

Now three more patients, who had been paralysed for at least two years, have gone through the procedure and regained some movement.

Four men in the US, who are paralysed, are able to move their legs with a spinal zap
They were able to control their legs at a precise pace and all but one of them were able to control the force of the movement.

It confirms that function can be restored after paralysis and that Mr Summers' case was not a one-off.

One of the researchers, Dr Claudia Angeli from the University of Louisville, told the BBC: "They will tell you that the stimulation itself and being able to practise and move around makes them feel a lot better, some of them will just describe it as feeling alive again."

"Muscle mass increases significantly and they've all shown changes in bowel and bladder [function] as well."
It is not certain how the stimulation helps, however the researchers believe that some signals are still crossing the injury, but are not normally strong enough to trigger movement.

The electrical stimulation made the lower spinal cord more excitable so it was able to respond when the messages did arrive from the brain.

Analysis Fergus Walsh Medical correspondent

This experimental technique does not involve repair of the spinal cord, but nonetheless it may eventually have a role to play in helping other paralysed patients regain movement.

The technique does have limitations. The four patients had to change the setting for each leg movement. None of them is able to walk unaided.

But researchers say the patients' quality of life has been significantly improved.

As well as gaining muscle mass, they are also reported to have regained some control of bladder and sexual function - which many paralysed patients regard as more important than walking.

Dr Angeli described it as "making it ready to listen".

Progress
Dr Roderic Pettigrew, director of the US National Institute of Biomedical Imaging and Bioengineering, said: "Now that spinal stimulation has been successful in four out of four patients, there is evidence to suggest that a large cohort of individuals, previously with little realistic hope of any meaningful recovery from spinal cord injury, may benefit from this."

Susan Howley, from the Christopher and Dana Reeve Foundation which funds spinal cord injury research, said the study confirmed Mr Summers' case was "not an anomaly".

She added: "The implications of this study for the entire field are quite profound and we can now envision a day where epidural stimulation might be part of a cocktail of therapies used to treat paralysis."
Paralysed Man can Stand and Move his Legs again

By James Gallagher Health reporter, BBC News

Mr Summers: "The moment I stood up, I was in disbelief"
Continue reading the main story

Related Stories

- Spinal injury regeneration hope
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- Spinal injury reversed in the lab

A US man who was paralysed from the chest down after being hit by a car is now able to stand with electrical stimulation of his spinal cord.

Rob Summers, from Oregon, said standing on his own was "the most amazing feeling".

He can voluntarily move his toes, hips, knees and ankles and also walk on a treadmill while being supported, according to research in the Lancet.

However, a UK expert said this should not be interpreted as a cure.
Rob Summers is able to stand while his spinal cord is stimulated.

Rob was a keen baseball player and in 2006 was part of the team which won the College World Series.

But in that summer he was injured in a hit and run accident and his spinal cord was damaged.

Messages from the brain, which used to travel down the spinal cord, were blocked and he was paralysed.

Doctors surgically implanted 16 electrodes into his spine.

Rob trained daily in trying to stand, walk and move his legs, while electrical pulses were sent to the spinal cord.

Within days he was able to stand independently and eventually he could control his legs and step, with assistance, for short periods of time.

"None of us believed it," said Professor Reggie Edgerton, from the University of California. "I was afraid to believe it."

How does it work?

In most spinal cord injuries only a small amount of the tissue is damaged so many nerve cells remain.

The researchers say these cells pick up signals from the legs and respond automatically. This is what allows a healthy person to stand still or walk without actively thinking about it and it is this process the doctors were trying to tap into.

But after a spinal injury the cells need help, in this case precise electric stimulation.
It mimics a message from the brain to start moving and changes the "mood" of the spinal cord so that it is able to hear the information which is coming in from the legs and respond. Researchers say this, coupled with intensive training, allowed Rob to stand or walk while supported on a treadmill.

The researchers admit to having "no idea" about how the brain was also able to gain direct control of the toes, knee and hips.

They speculate that some nerve cells are being reactivated or maybe more of them are being created allowed signals from the brain to pass down the spinal cord.

Rob has also regained other functions such as bladder, bowel and blood pressure control.

He said it had been a "long journey of countless hours of training" which had "completely changed my life".

He added: "For someone who for four years was unable to even move a toe, to have the freedom and ability to stand on my own is the most amazing feeling."

**Warning**

This study has proved that electrical stimulation works in one person. Four more patients are being lined up to further test the treatment.

Professor Geoffrey Raisman, from the Institute of Neurology at UCL, said: "This one case is interesting, and from one of the leading groups in the world. To what extent this procedure could in the future provide a further and sustained improvement cannot be judged on the basis of one patient.

"From the point of view of people currently suffering from spinal cord injury, future trials of this procedure could add one more approach to getting some benefit. It is not and does not claim to be a cure."

Dr Melissa Andrews, from the Cambridge Centre for Brain Repair, said that while the study was a "little bit mind blowing" people should not say this is a cure.

She added: "I think people need to read this and say the possibility is out there, but it may not come tomorrow. It's the closest we've ever seen and it's the best hope right now."

Professor Susan Harkema, who was part of the study at the University of Louisville, said: "It is really critical to be clear that it's still in a research realm, but stay tuned we're going to learn a lot more every day."

For Rob he sees his story as a message of hope to people who are paralysed and as for walking again: "I see it as a major possibility."

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**More on This Story**
Benefits of electrical stimulation therapy found with people paralyzed by spinal cord injury

Date: February 18, 2011

Source: Toronto Rehabilitation Institute

Summary: A new treatment approach which uses tiny bursts of electricity to reawaken paralyzed muscles "significantly" reduced disability and improved grasping ability in people with incomplete spinal cord injuries, beyond the effects of standard therapy, new research shows.

A new treatment approach which uses tiny bursts of electricity to reawaken paralyzed muscles "significantly" reduced disability and improved grasping ability in people with incomplete spinal cord injuries, according to results published February 17.

In a study posted online in the journal Neurehabilitation and Neural Repair, Toronto researchers report that functional electrical stimulation (FES) therapy worked considerably better than conventional occupational therapy alone to increase patients' ability to pick up and hold objects.

FES therapy uses low-intensity electrical pulses generated by a pocket-sized electric stimulator. Unlike permanent FES systems, the one designed by Dr. Popovic and colleagues is for short-term treatment. The therapist uses the stimulator to make muscles move in a patient's limb. The idea is that after many repetitions, the nervous system can 'relearn' the motion and eventually activate the muscles on its own, without the device.

The randomized trial, believed to be the first of its kind, involved 21 rehabilitation inpatients who could not grasp objects or perform many activities of daily living. All received conventional occupational therapy five days per week for eight weeks. However, one group (9 people) also received an hour of stimulation
therapy daily, while another group (12 people) had an additional hour of conventional occupational therapy only.

Patients who received only occupational therapy saw a "gentle improvement" in their grasping ability, but the level of improvement achieved with stimulation therapy was at least three times greater using the Spinal Cord Independence Measure, which evaluates degree of disability in patients with spinal cord injury.

Based on their findings, the study’s authors recommend that stimulation therapy should be part of the therapeutic process for people with incomplete spinal cord injuries whose hand function is impaired.

Dr. Popovic's team has almost completed a prototype of their stimulator, but need financial support to take it forward. Dr. Popovic thinks the device could be available to hospitals within a year of being funded. One limitation of the study is that the research team could not get all participants to take part in a six-month follow-up assessment. However, six individuals who received FES therapy were assessed six months after the study. All had better hand function after six months than on the day they were discharged from the study.

Dr. Popovic stresses that FES therapy should augment, and not replace, existing occupational therapy. Another study, now underway, will determine whether stimulation therapy can improve grasping ability in people with chronic (long-term) incomplete spinal cord injuries.

"This study proves that by stimulating peripheral nerves and muscles, you can actually 'retrain' the brain," says the study's lead author, Dr. Milos R. Popovic, a Senior Scientist at Toronto Rehab and head of the Rehabilitation Engineering Laboratory. "A few years ago, we did not believe this was possible."

Story Source:
The above story is based on materials provided by Toronto Rehabilitation Institute. Note: Materials may be edited for content and length.

Journal Reference:


http://blog.amsvans.com/study-shows-electrical-stimulation-therapy-can-help-spinal-cord-injuries/
How Electric Brain Stimulation Relieves Depression

By TRACI PEDERSEN Associate News Editor

For many people who don’t respond to standard antidepressant treatment, electric brain stimulation — known as vagus nerve stimulation — has been shown to effectively relieve severe symptoms of depression. But how exactly does it work?

Researchers at Washington University School of Medicine in St. Louis are beginning to discover how implanting these electronic stimulators lessens depression.

Their findings, published in the journal Brain Stimulation, reveal that vagus nerve stimulation causes changes in brain metabolism weeks or even months before patients feel relief from symptoms.

“Previous studies involving large numbers of people have demonstrated that many with treatment-resistant depression improve with vagus nerve stimulation,” said first author Charles R. Conway, M.D., associate professor of psychiatry.

“But little is known about how this stimulation works to relieve depression. We focused on specific brain regions known to be connected to depression.”

The study involved 13 people with treatment-resistant depression. Their symptoms had not improved after several months of treatment with as many as five different antidepressant medications. Most had been depressed for at least two years, but some had been clinically depressed for more than 20 years.

All of the patients underwent surgery to have a device inserted that would electronically stimulate the left vagus nerve, which runs down the side of the body from the brainstem to the abdomen. Once activated, the device delivers a 30-second electronic stimulus to the vagus nerve every five minutes.
The researchers used positron emission tomography (PET) brain imaging on the patients before their first stimulation, and again three and 12 months after stimulation had begun.

Over time, nine of the 13 participants experienced improvements in depression with the treatment.

However, in most cases it took several months for improvement to occur.

In those who reported improvement, the scans showed significant changes in brain metabolism following three months of stimulation.

This typically preceded improvements in symptoms of depression by several months.

“We saw very large changes in brain metabolism occurring far in advance of any improvement in mood,” Conway says. “It’s almost as if there’s an adaptive process that occurs. First, the brain begins to function differently. Then, the patient’s mood begins to improve.”

Many of those who responded to the device eventually were able to stop taking medication, said Conway.

“Sometimes the antidepressant drugs work in concert with the stimulator, but it appears to us that when people get better, it is the vagus nerve stimulator that is doing the heavy lifting,” Conway explains. “Stimulation seems to be responsible for most of the improvement we see.”

Furthermore, the PET scans showed that structures deeper in the brain also begin to change several months after nerve stimulation begins. Many of those structures have high concentrations of brain cells that release dopamine.

There is growing evidence that problems in dopamine pathways may be especially important in treatment-resistant depression, said Conway.

The finding that vagus nerve stimulators influence those pathways may explain why the therapy can help and why, when it does work, its effects are long-lasting. Patients who respond to vagus nerve stimulation tend to get better and to stay better.

“We hypothesized that something significant had to be occurring in the brain, and our research seems to back that up,” he said.

Source: Washington University in St. Louis
What is overactive bladder symptom complex and who does it affect?

Overactive bladder symptom complex is a symptom complex, the pivotal symptom of which is urgency, which is a compelling desire to pass urine, which is difficult to defer.

If you get urgency this will lead onto frequency, which is an increased frequency of urine production which can occur in the daytime, or at night-time, when it is known as Nocturia.

It also leads to reduced volume voided, and if patients get urgency, particularly female patients, as in a third of females with overactive bladder, they can't make it to the toilet in time and they get incontinence, which is known as urgency incontinence.

Obviously if patients are getting symptoms of this nature, they need to see their doctor. In that context the most appropriate investigation first off, is for them to fill out a bladder diary to record the frequency of voids, passing urine, and what other symptoms they are experiencing.
If necessary, their doctor will either start them on therapy, give them advice about lifestyle, and/or refer them to a specialist.

**What treatments are currently available for overactive bladder symptom complex?**

It's very important for the investigations to be carried out, mainly a bladder diary and assessment of fluid intake. Lifestyle advice may be necessary in some patients.

It's also important to exclude other pathology, such as increased urine production at night-time, so called Nocturnal Polyuria where more than a third of the 24-hour urine production is produced at night-time. And that includes the voids during the night, which wake somebody from sleep, sleep disturbing voiding, which is the definition of Nocturia. Going twice or more times at night is counted as being potentially clinically significant. In making this calculation of Nocturnal Polyuria, one needs not only to add in the volumes produced at night-time, when somebody has woken from sleep, but also the first void of the morning when somebody is getting up.

Having made the diagnosis, and excluded these other problems such as increased fluid intake, increased urine production at night-time, which can be due to other physiological conditions such as diabetes, heart failure, or fluid retention, then patients can be considered for treatment with agents which reduce bladder over activity which act on the bladder. These are either known as anticholinergics, or there is a beta-3 agonist, which has recently been introduced.
A multi-million European Union funded project looking to find new treatments for bladder problems was announced around 2 years ago. Why is it necessary to find new treatments for overactive bladder syndrome?

The reason for a research program, which has been lead from Sheffield, looking at this area, is because this is a condition which is extremely important affecting up to 10% of the population at any one time.

The existing therapies need to be improved upon because they do have side effects in some patients, particularly the anticholinergics. And these side effects can be so troublesome in patients that they lead to people not being able to tolerate them.

In addition, obviously, we need to advance our knowledge in this area to understand what causes the overactive bladder symptom complex so we can find better ways of treating this condition. This is particularly important because we have an aging population and this condition increases with age, and so it's inevitably going to become more prevalent in the population, and more of a problem because of the impact it has on activities: daily living, lifestyle, and indeed on quality of life therefore.

What hurdles do you expect researchers will face when trying to develop new treatments for overactive bladder syndrome?

The principal hurdle is firstly to identify the exact underlying cause of the symptom complex. As I've mentioned already, it's not just a simple diagnosis based on symptoms because one has to consider that the bladder is an unreliable witness. Because symptoms are not disease-specific, the identification of symptoms will vary upon the way in which they are reported, and the way they are interpreted by a clinician. At the end of the day, even having made a symptom complex diagnosis, it's important to understand the underlying pathophysiology both in terms of bladder dysfunction, as well as other dysfunctions, which occur in the body, which can be affecting the production of urine and its storage by the bladder.
Please can you tell us about the new treatment Martin Slovak, a biomedical engineering graduate from the Brno University of Technology in the Czech Republic, is working on?

There are various ways of treating overactive bladder symptom complex. The first and important way of treating it is to identify any underlying causes with a bladder diary. And with this in mind, one can then progress on either to drug therapy, which in recent years has been the mainstay of therapy, but also there is increasing evidence that it is possible to use other non-drug therapy related approaches such as electrical stimulation.

Martin Slovak is working on a new treatment which is based on existing therapy, but which may prove to be more cost effective and easier for patients to use, as it's non-invasive and does not involve inserting needles into the patient. But by using surface electrical stimulation may be effective, and therefore provide a useful alternative to existing therapy in this area.
How long would you expect a new treatment like this to take to develop?

It's to be expected that a new therapy such as this will take 18 months to 2 years to go through validation and careful assessment in a randomised fashion against a placebo arm to identify that there is a significant treatment effect size, which can be achieved with this new therapy.

What impact do you think a new treatment for overactive bladder syndrome would have on the quality of life of patients?

Overactive bladder symptom complex is very intrusive in terms of quality of life because of the disruption it has both day and night on people's activities. Waking people at night, which is Nocturia, or sleep disturbed voiding, has significant consequences as people become very tired, and has a knock on effect for the next day if they are tired.

Also it disrupts quality of life. In the daytime, getting a compelling desire to pass urine when somebody is doing something, for instance in the car on the motorway, or going out shopping, or socialising, can be very disruptive and embarrassing. In female patients, up to a third suffer urgency incontinence. Incontinence is an extremely depressing symptom, which obviously has enormous consequences in terms of social isolation.
So there is no doubt that any new therapies which will be effective in improving the symptoms of overactive bladder symptom complex, whether that's frequency, Nocturia, urgency, or urgency incontinence, will have a significant impact on quality of life.

The new electrical stimulation therapy device.

Would an at-home portable electronic device be an economically efficient treatment?

Yes if it's provided through the NHS, as an NHS development under the NHS supported program Devices for Dignity, it would be very cost effective as the capital cost of this treatment would be no more than two months’ supply of drug therapy.

How exactly is this project being funded?

The project is being funded by the European Commission’s 7th Framework Programme for Research and Technological Development.

About Professor Chris Chapple
Professor Christopher Chapple is a Consultant Urological Surgeon at Sheffield Teaching Hospitals and Visiting Professor at Sheffield Hallam University. He has a particular interest in functional reconstruction of the lower urinary tract and the underlying pharmacological control mechanisms and provides a tertiary service in lower urinary tract reconstructive surgery. He trained at the Middlesex Hospital where he subsequently completed his doctorate thesis, and continued there and at the Institute of Urology in London for his sub-specialist training.

He is Chairman of the International Relations Committee at the European Association of Urology, having previously been the Adjunct Secretary General responsible for Education and Past Director of the European School of Urology. He is editor-in-chief of the journal Neurourology and Urodynamics and is on the editorial board of several journals such as the British Journal of Urology, European Urology, Surgery and Current Opinion in Urology. He is an active member of many international urological associations and societies including the British Association of Urological Surgeons, the European Association of Urology, the International Continence Society, the Association of Academic European Urologists and the American Association of Genitourinary Surgeons. He has chaired a number of guidelines initiatives including the NICE Guidelines Development Group on male lower urinary tract symptoms. He was awarded the St Peter's medal by the British Association of Urological Surgeons in 2011. Professor Chapple has co-authored over 350 articles in peer-reviewed Journals and has written several books and a number of book chapters.
Health

Stroke patients able to regain language after external brain stimulation in experimental treatment

Sheryl Ubelacker, Canadian Press | June 27, 2013 | Last Updated: Jun 27 5:43 PM ET

More from Canadian Press
External stimulation of the brain has shown promise in a new, small study at helping stroke patients recover from loss of speech and language faculties, or aphasia.

Stroke patients able to regain language after external brain stimulation in experimental treatment

TORONTO — An experimental procedure that stimulates the brain with electrical pulses through the skull may help people recover the ability to speak after suffering a stroke, researchers say.

Up to 30% of stroke survivors are left with a condition called aphasia, in which they have difficulty understanding language, speaking, reading or writing.

Strokes vastly misunderstood by Canadians, many of whom think most are fatal: poll

TORONTO — A new poll suggest Canadians don’t have a great understanding of the realities of strokes, with nearly one in five thinking most strokes are fatal.

One in six Canadians seem to believe there is nothing a stroke survivor can do to prevent future strokes and more than one-third think the recovery period is limited to a few months.

These statistics are included in the Heart and Stroke Foundation’s annual report on stroke.

The poll suggests stroke touches the lives of many Canadians, with one in two saying they know someone who had a stroke and one in five reporting they have been involved in the care of a stroke survivor.

In a small study, Canadian and German researchers tested the effects of transcranial magnetic stimulation, or TMS, on patients recovering from a stroke but left with different degrees of aphasia caused by the damage to their brains.

Twenty-four stroke patients were enrolled in the trial, with 13 getting TMS and 11 treated with a sham procedure. Following the sessions, participants were immediately given speech language therapy.

Patients received 20 minutes of TMS or sham stimulation followed by 45 minutes of speech and language therapy for 10 days, the authors report in the American Heart Association journal Stroke.

“Those who received the real treatment recovered better from their aphasia than those who received the sham treatment,” said lead author Dr. Alexander Thiel, director of the stroke unit at Jewish General Hospital in Montreal.
Improvements in the TMS-treated group were about two to three times greater than in the sham-treatment group, he said Thursday from Montreal.

“Even those who received the sham treatment, they also improved, but they didn’t improve as much as the others.”

There are different types of aphasia, said Thiel, who worked with colleagues at the Max Planck Institute for neurological research in Cologne, Germany, where he worked before coming to Canada.

“The most common one is expressive aphasia, so they have difficulty formulating full sentences, difficulties getting correct words out or that they want to tell you something and they know exactly what they want to tell but they can’t get the words out.

“And that, of course, is very frustrating.”

TMS is a non-invasive procedure, in which a handheld magnetic coil is applied to the skull, lining up over a specific area on one side of the brain. The device delivers a low-intensity electrical current which causes muscles to contract, creating a “tingling, twitching” feeling in the scalp.

The device is applied to the side of skull where the brain has not been affected by the stroke — in this case on the right side.

The idea is to shut down the right side to force the weakened left side of the brain — particularly the areas involved in speech — to do all the work of relearning language.

“So we try to shut down the unaffected hemisphere so all the therapeutic effort would go to the affected hemisphere,” said Thiel, explaining that the effects of TMS last about 30 to 45 minutes, during which time patients undergo speech-language therapy.

The idea is to shut down the right side to force the weakened left side of the brain — particularly the areas involved in speech — to do all the work of relearning language, he said. The mental exercise also may prompt the brain to form new connections, a phenomenon known as neuroplasticity.

“We want to re-activate what’s there in the left hemisphere, make it work,” he said. “This is similar to physical rehabilitation where the unaffected limb is immobilized with a splint so that the patient must use the affected limb during the therapy session.”
Researchers also tested writing and reading ability.

‘We saw some effect on writing, some improvement, but the main improvement was really in naming objects’

“We saw some effect on writing, some improvement, but the main improvement was really in naming objects,” Thiel said. “And this is very important because if you can’t speak, the first thing you start with or a little child starts with, it points at things and names them.”

Not all stroke survivors with aphasia could be treated with the electrical stimulation technique. People who have seizures or wear a pacemaker would not be candidates, and anyone with complete speech loss would likely not benefit, he pointed out.

The small trial is a proof-of-concept study, which shows TMS was safe for patients and appeared to have benefit in overcoming aphasia more quickly. But more research is needed to definitively prove its effectiveness, Thiel stressed.

In October, the scientists will begin an international, multicentred trial of TMS with about 100 stroke patients. Dubbed NORTHSTAR, the study will include three Canadian centres — two in Montreal and one in Toronto.

The researchers want to get patients into the study as early as possible following a stroke, ideally about a month after the event. That’s because genes that kick into gear to form new connections in the brain peak about two to three weeks after a stroke, he said.

“We think that there is a window of opportunity where these kinds of therapies are especially effective.”
Effects of deep brain stimulation on speech in patients with Parkinson’s disease and dystonia


Abstract

Disorders affecting the basal ganglia can have a severe effect on speech motor control. The effect can vary depending on the pathophysiology of the basal ganglia disease but in general terms it can be classified as hypokinetic or hyperkinetic dysarthria. Despite the role of basal ganglia on speech, there is a marked discrepancy between the effect of medical and surgical treatments on limb and speech motor control. This is compounded by the complex nature of speech and communication in general, and the lack of animal models of speech motor control. The emergence of deep brain stimulation of basal ganglia structures gives us the opportunity to record systematically the effects on speech and attempt some assumptions on the role of basal ganglia on speech motor control. The aim of the present work was to examine the impact of bilateral subthalamic nucleus deep brain stimulation (STN-DBS) for Parkinson’s disease (PD) and globus pallidus internus (GPI-DBS) for dystonia on speech motor control. A consecutive series of PD and dystonia patients who underwent DBS was evaluated. Patients were studied in a prospective longitudinal manner with both clinical assessment of their speech intelligibility and acoustical analysis of their speech. The role of pre-operative clinical factors and electrical parameters of stimulation, mainly electrode positioning and voltage amplitude was systematically examined. In addition, for selected patients, tongue movements were studied using electropalatography. Aerodynamic aspects of speech were also studied. The impact of speech therapy was assessed in a subgroup of patients. The clinical evaluation of speech intelligibility one and three years post STN-DBS in PD patients showed a deterioration of speech, partly related to medially placed electrodes and high amplitude of stimulation. Pre-operative predictive factors included low speech intelligibility before surgery and longer disease duration. Articulation rather than voice was most frequently affected with a distinct dysarthria type emerging, mainly hyperkinetic-dystonic, rather than hypokinetic. Traditionally effective therapy for PD dysarthria had little to no benefit following STN-DBS. Speech following GPI-DBS for dystonia did not significantly change after one year of stimulation. A subgroup of patients showed hypokinetic features, mainly reduced voice volume and fast rate of speech more typical of Parkinsonian speech. Speech changes in both STN-DBS and GPI-DBS were apparent after six months of stimulation. This progressive deterioration of speech and the critical role of the electrical parameters of stimulation suggest a long-term effect of electrical stimulation of basal ganglia on speech motor control.
Electrical pulses to the brain could help stroke victims

A new therapy that uses tiny pulses of electricity to stimulate the brain is promising to help patients recover after suffering a stroke.
British researchers have developed a new treatment that uses magnets and electrical pulses to help repair parts of the brain damaged during a stroke. The technique, known as trans-cranial electric stimulation, promotes the growth of new neurons and can help to restore movement to patients who have been left paralysed by stroke. They also hope that the approach could be used to help improve victims' speech, which is also often affected following a stroke.

Professor Jane Burridge, a restorative neuroscientist at Southampton University, said: "The electrical stimulation promotes new growth of neurons. "The studies so far show that the electrical stimulation increases the excitability of the cortex and people tend to perform better shortly after you have done this at doing sums, speaking or moving.

"We want to make sure that this is longer lasting so we are combining it with the use of rehabilitation robots, which allow the patients to move, increasing the chance of the new neurons connecting."

Strokes are caused a sudden loss of blood supply to the brain caused by a clot or bleeding, which starves the neurons of oxygen and causes them to die. This can cause permanent damage to the brain, leading to paralysis, memory loss and speech problems. An estimated 150,000 people have a stroke in the UK each year and it accounts for around 53,000 deaths annually.

It is also the leading cause of disability in Europe, with roughly 450,000 people currently severely disabled as a result of a strokes in England alone. Many stroke patients do slowly regain some movement and feeling over time as the brain "rewires" itself. Professor Burridge and her colleagues at Southampton University and University College London believe that using trans-cranial electric stimulation can help speed up that process and increase patient's recovery by promoting the rewiring process. Using magnetic pulses they can locate the exact part of the brain that has been damaged and fix electrodes on the scalp of the patient. By passing a small electrical current, which cannot be felt by the patient, through their brain, it stimulates neurons to grow.
Professor Burridge believes that getting patients to replicate the movements they have lost with the aid of robotic arms can increase the rate at which these new neurons connect and restore function to the body.

A small trial involving five patients has delivered encouraging results and the researchers are about to start a clinical trial involving 40 patients.

"We can have the patients playing games with the help of the robotic arm and this means they are practicing useful movements," said Professor Burridge.

"If you do that when the cortex is being stimulated then you are more likely to get a more lasting effect from the changes in the brain."
It Seems Like Magic But it's just SCIO

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IN HISTORY
Frequency-modulated electromagnetic neural stimulation (FREMS) as a treatment for symptomatic diabetic neuropathy: results from a double-blind, randomised, multicentre, long-term, placebo-controlled clinical trial

E. Bossi · G. Bacq · I. Sciortini · V. Spallone · S. Tesfaye · P. Valensi · D. Ziegler · on behalf of the FREMS European Trial Study Group

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Abstract
Aims/hypothesis The aim was to evaluate the efficacy and safety of transcutaneous frequency-modulated electromagnetic neural stimulation (FREMS) as a treatment for symptomatic peripheral neuropathy in patients with diabetes mellitus.
Methods This was a double-blind, randomised, multicentre, parallel-group study of three series, each of ten treatment sessions of FREMS or placebo administered within 3 weeks, 3 months apart, with an overall follow-up of about 51 weeks. The primary endpoint was the change in nerve conduction velocity (NCV) of deep peroneal, tibial and sural nerves. Secondary endpoints included the effects of treatment on pain, tactile, thermal and vibration sensations. Patients eligible to participate were aged 18–75 years with diabetes for ≥1 year, HbA1c <11.0% (97 mmol/mol), with symptomatic diabetic polyneuropathy at the lower extremities (i.e. abnormal amplitude, latency or NCV of either tibial, deep peroneal or sural nerve, but with an evocable potential and measurable NCV of the sural nerve), a Michigan Diabetes Neuropathy Score ≥7 and on a stable dose of medications for diabetic neuropathy in the month prior to enrolment. Data were collected in an outpatient setting. Participants were allocated to the FREMS or placebo arm (1:1 ratio).

Electronic supplementary material The online version of this article (dx.doi.org/10.1007/s00125-012-2795-7) contains peer-reviewed but unedited supplementary material, which is available to authorised users.

FREMS Study Group members are listed in the Acknowledgements section.

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Electrical stimulation in wound care

Complex wounds

Electrical stimulation therapy in wounds involves the use of an externally applied current to create an electrical flow through the tissues. In recent years, there has been a renewed interest in using this as a treatment where wound healing is delayed and a range of sophisticated products have been developed to provide electrical flow through the tissues, although the exact mechanism for some of these effects is not known. This supplement explores the use of electrical stimulation in chronic wounds.

Case Study

A recent study of 66 patients with wound healing in which electrical stimulation was used to promote healing. The clinical use of electrical stimulation has been increasing in recent years. The study was conducted on 66 patients with chronic wounds. The patients were divided into two groups: control and experimental. The control group received standard care, while the experimental group received electrical stimulation therapy.

Results

The experimental group showed significantly faster wound healing compared to the control group. The healing rate in the experimental group was 17% faster than that in the control group.

Conclusion

Electrical stimulation therapy has the potential to promote wound healing. Further research is needed to determine the optimal parameters for electrical stimulation therapy.

Key Concepts

- Electrical stimulation
- Chronic wounds
- Wound healing
- Electrical flow
- Tissue repair

Figure 1: Diagrammatic view of bacterial biofilm formation (courtesy of Dr. Rakel Cooper)
**Electro Therapy:**

**Electrotherapy** is the use of electrical energy in the treatment of impairments of health and conditions of abnormal functioning. In medicine, the term electrotherapy can apply to a variety of treatments, including the use of electrical devices such as deep brain stimulators for neurological disease. The term has also been applied specifically to the use of electrical current to speed wound healing. Additionally, the term "electrotherapy" has also been applied to a range of alternative medical devices and treatments.

**Uses of Electrotherapy**
The use of electrotherapy has been widely researched and the advantages have been well accepted in the field of rehabilitation. The American Physical Therapy Association acknowledges the use of Electrotherapy for:

1. Pain management
2. Improvement of joint movement
3. Treatment of neuromuscular dysfunction
4. Improvement of strength
5. Improvement of motor control
6. Retard muscle atrophy
7. Improve local blood flow
8. Induce repeated stretching of contracted, shortened soft tissues
9. Tissue repair
10. Enhance microcirculation and protein synthesis to heal wounds
11. Restore integrity of connective and dermal tissues
12. Acute and chronic edema
13. Accelerate absorption rate
14. Affect blood vessel permeability
15. Increase mobility of proteins, blood cells and lymphatic flow
16. Peripheral blood flow
17. Induce arterial, venous and lymphatic flow
18. Iontophoresis
19. Delivery of pharmacological agents
20. Urine and fecal incontinence
21. Affect pelvic floor musculature to reduce pelvic pain and strengthen musculature
22. Treatment may lead to complete continence.

Electrotherapy is used for relaxation of muscle spasms, prevention and retardation of disuse atrophy, increase of local blood circulation, muscle rehabilitation and re-education, maintaining and increasing range of motion, management of chronic and intractable pain, post-traumatic acute pain, post surgical acute pain, immediate post-surgical stimulation of muscles to prevent venous thrombosis, wound healing and drug delivery. Reputable medical and therapy Journals have published peer-reviewed research articles that attest to the medical properties of the various electro therapies. Yet some of the treatment effectiveness mechanisms are little understood. Therefore effectiveness and best practices for their use in some instances are still anecdotal.

Electrotherapy devices have been studied in the treatment of chronic wounds and pressure ulcers. A 1999 meta-analysis of published trials found some evidence that electrotherapy could speed the healing of such wounds, though it was unclear which devices were most effective and which types of wounds were most likely to benefit. However, a more detailed review by the Cochrane Library found no evidence that electromagnetic therapy, a subset of electrotherapy, was effective in healing pressure ulcers or venous stasis ulcers.
The management of chronic wounds can pose several challenges to the clinician and patient alike; they drain healthcare resources, are a source of frustration and have a huge impact on quality of life. While major strides have been taken in developing products that manage issues such as exudate and maceration, until recently little has been available to directly influence static cellular activity, often the cause of non-healing. POSiFECT® is a new therapy that is specifically designed to change this.

For over 30 years, scientists have been aware that cells, the basic building blocks of all living things, communicate with each other and have their functions regulated by the transfer of electrochemical signals (Kloth, 2005). These signals are known as ‘bio-currents’, ‘bio-electric currents’ or ‘ionic currents’. The discovery of these currents has had a significant impact on our understanding of disease processes and pharmaceutical interventions and resulted in the award of the Nobel Prize for Medicine in 1991.

Bio-currents are caused by the passage of different chemicals in and out of the cell wall. The currents not only help regulate how the cell works but also affect neighbouring cells; they enable the release of specific chemical messengers and promote the movement of some cells away or towards one another (galvanotaxis).

### The role of bio-currents in wound healing

In wound healing, these bio-electric currents have a vital role. They promote the laying down of collagen and the formation of stronger scar tissue (Weiss et al, 1990; Sheridan et al, 1996; Tasgan et al, 1997), the formation of new blood vessels (angiogenesis) and the migration of white blood cells (Fukushima et al, 1953; Orlda and Feldman, 1982). White blood cells are a key component of normal healing; they fight infection, breakdown dead and damaged tissues and release growth factors that stimulate fibroblast activity (Bourguignon and Bourguignon, 1987; Goldman and Pollack, 1996). It appears without doubt that bio-currents contribute to normal healing processes (Illingsworth and Barker, 1980; Variable, 1989).

Bio-currents may also have a significant effect on bacterial colonisation in the wound. The effects of bio-currents on bacterial colonies have been known for many years (Wheeler et al, 1971; Rowley et al, 1974; Kincaid and Lavoie, 1989). It has also been found that the production of minute electrical fields affect the formation and stability of biofilms, causing them to break up (Moore, 2007).

Biofilms are formed by synergistic colonies of bacteria that attach to a surface, such as the wound bed, and produce a slimy protein covering (glycocalyx) to protect themselves from attack by the host’s immune system. In chronic wounds it has been suggested that biofilms can be one of the causes of repeated infections, wound stagnation and tissue breakdown (Bowler et al, 2001). Although bio-currents are normal and essential to wound healing, it has been found that in some chronic wounds these normal
Evaluation of electrical stimulation for ischemic wound therapy: a feasibility study using the lapine wound model

Kimberly A. Morris • Michael F. McGee • John J. Jasper • Keith M. Bogie

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Abstract Chronic wounds are a major secondary complication for many people with impaired mobility. Electrical stimulation (ES) has been recommended as an adjunctive therapy, however optimal treatment paradigms have not been established. Our group seeks to determine the basic mechanisms underlying ES wound therapy, an area where understanding is currently limited. A feasibility study was carried out to develop the Ahn/Mustoe lapine wound model for systematic investigation of the effects of electrical stimulation on ischemic wound therapy. A standardized surgical procedure incorporated a hybrid stimulation system comprising an implantable mini-stimulator and surface electrodes, with creation of repeatable ischemic wounds. Twenty mature male New Zealand white rabbits (3 kg weight) were employed to evaluate the effects of two empirically selected stimulation paradigms applied continuously for 7–21 days, using each animal as its own control. Outcome measures included transcutaneous blood gas levels, histology, total RNA content and analysis of α2 (I) collagen (COL-I), type IV collagen (COL-IV), α1 (V) collagen (COL-V), and vascular endothelial growth factor (VEGF) expression using real-time quantitative PCR. All markers for stimulated wounds showed increased activity relative to non-stimulated control wounds between 7 and 14 days following injury, with peak activity at 14 days. By 21 days post-injury, all activity had returned to near baseline level. VEGF and COL-IV levels were found to be significantly higher for pattern A (110 μs pulse width) compared to pattern B (5 μs pulse width) at 14 days, implying that pattern A may be more effective at promoting angiogenesis. All wounds were fully re-epithelialized by 10 days post-injury. Both COL-I and COL-V showed statistically significant (P < 0.05) increased activity between day 7 and day 14 for pattern A, potentially indicating a continued effect on matrix remodeling. The early closure of all wounds implies that the rabbit ear model may not be valid for chronic wound studies.

Keywords Wounds (chronic) • Animal model • Electrical stimulation

Chronic ischemic wounds present a significant healthcare burden worldwide, particularly for individuals with decreased mobility and compromised vasculature. In 2004, Bennett et al. [6] found that the annual cost of treating pressure ulcers was approximately 4% of the total UK National Health Service expenditure (1.4–2.1 billion GBP, 2.0–3.0 billion Euro). Normal wound healing is a complex, multi-stage process which proceeds through inflammation and tissue proliferation to tissue remodeling including scar formation [10]. According to the Centers for Medicare and Medicaid Services, chronic wounds are wounds failing to heal within 30 days [18]. In practical terms, a wound is considered to be chronic when it has failed to heal within 3 months [19]. Biologically speaking, this corresponds to an interruption of the inflammatory response, or the secondary
Electrical stimulation of the brain is a safe treatment for Depression and Schizophrenia

AUTHORS
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• April 2014

Gentle electrical stimulation of the brain can help with depression and maybe also boost attention. Flickr/Rohan Phillips

The use of weak electrical currents to stimulate the brain is a safe treatment for depression and might even improve attention and reduce pain elsewhere in the body, an Australian study has found. Medical researchers from the University of New South Wales and the Black Dog Institute found that up to half of the 64 participants in the study reported substantial improvements after receiving transcranial Direct Current Stimulation (tDCS) daily for six weeks. The treatment passes a mild, painless current into the brain through electrodes on the scalp. Patients remain awake during the procedure. Previous studies have shown that it can boost memory performance, and can also improve brain function in schizophrenia patients.
“We are excited about these results,” said trial leader, Professor Colleen Loo, from the university’s School of Psychiatry. "This is the largest randomised controlled trial of transcranial direct current stimulation ever undertaken and, while the results need to be replicated, they confirm previous reports of significant antidepressant effects.”

The findings of Professor Loo’s team have been published in the British Journal of Psychiatry.

Professor Loo said that participants in the study had not benefited from at least two other depression treatments.

“Most of the people who went into this trial had tried at least two other antidepressant treatments and got nowhere. So the results are far more significant than they might initially appear - we weren’t dealing with people who were easy to treat,” Professor Loo said.

The results improved gradually, suggesting the treatment is best applied over an extended period. Participants who improved during the trial were offered weekly follow-up treatments. Of those people, 85% showed no relapse after three months.

The research team also reported unexpected physical and mental benefits in participants, including improved attention.

“One participant with a long-standing reading problem said his reading had improved after the trial and others commented that they were able to think more clearly,” Professor Loo said.

“Another participant with chronic neck pain reported that the pain had disappeared during the trial. We think that is because tDCS actually changes the brain’s perception of pain. We believe these cognitive benefits are another positive aspect of the treatment worthy of investigation.”

The researchers are now considering an additional trial to include people with bipolar disorder. Early results from overseas suggest tDCS is just as effective in this group.

Paul Fitzgerald, a Professor of Psychiatry at Monash University, cautioned that although research into tDCS had produced some positive results, it was “still early days”.

“There have been some positive studies, but not all of them have been positive - there have also been some studies that have failed to show a difference between active treatment and placebos.
“A lot of the studies that have been conducted to date have been involved a relatively small patient population, and with limited duration of follow-up after the end of treatment. You’d really need to build up a greater series of studies with large patient numbers and longer-term follow ups to really get a handle on how effective this treatment might be.”

Professor Fitzgerald said that patients who suffered from very severe depression and who did not get better with the “standard treatment options” were often open to new treatment possibilities, including electrical brain stimulation.
Electric Current and Local Anesthetic Combination Successfully Treats Pain Associated With Diabetic Neuropathy

In an open-label trial, a unique electric current combined with a local anesthetic reduced pain in patients who have diabetic neuropathy.

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Editor's Note: This article describes an advance in electromagnetic treatment—the simultaneous use of a local anesthetic with an electric current. The two combined measures produce a block of nerve transmission by different mechanisms, which not only provide immediate pain relief but lasting relief in many patients by a reset mechanism that we, frankly, don’t fully understand.

Many studies show that electric currents and electromagnetic energy waves derived from an electric current, including laser, infrared, and radio, provide short-term pain relief by blocking nerve transmission at the spinal cord gates, releasing local endorphins, and reducing edema. Tissue healing, which provides long-term relief, is produced by activation of fibroblasts and angiogenesis. The study described in this paper tackles a difficult patient population: diabetics with neuropathy. Results were outstanding. We should now seriously consider adding a local anesthetic to our electromagnetic treatments to enhance therapeutic outcomes.

More than 24 million Americans have diabetes, and it is estimated that between 40% and 50% of these people will experience some form of nerve damage from their diabetes. Diabetic peripheral neuropathy (DPN) is a major cause of morbidity in patients, which is often manifested in the form of pain.

Considered the most distressing symptom of DPN, pain can be potentially disabling. Pharmacologic treatment of pain in patients with DPN includes tricyclic antidepressants, selective serotonin and norepinephrine reuptake inhibitors, and anticonvulsants. The only two drugs approved by the FDA for DPN are the antidepressant duloxetine (Cymbalta) and the anticonvulsant pregabalin (Lyrica). Patients with localized DPN may also
month of completion of the combined electric current and local anesthetic therapy protocol. A total of 3 patients out of 60 discontinued the trial prior to getting their post-NCS, leaving 57 patients for evaluation.

The results in Table 2 demonstrated a trend toward increased amplitude and decreased latency of motor nerve function after treatment. These trends in motor nerve function may represent a decline in neurological morbidity of DPN as nerve function improves. In both sensory nerves tested, the plurality of patients did not have a recordable response both pre- and post-treatment. However, more than 40% of patients did show an improvement in personal sensory nerve conduction while more than 31% showed an improvement in their sural sensory nerve.

Substudy patients were further categorized by disease severity. Of the 57 patients evaluated, by definition, 19 patients were placed in each category; mild, moderate, and severe.

The graph in Figure 2 (page 35) analyzes the percent of patients stratified by disease severity that showed improvement after combined electric current and local anesthetic therapy. The results indicate that patients who were diagnosed and treated earlier had improved motor results and significantly better sensory results. Also of importance is the difference between motor and sensory nerve improvement in patients with severe symptoms. Because motor response typically precedes sensory response, it is possible that patients with severe disease may not have experienced their full results from the treatment protocol at the time the NCS was completed.

Patients who discontinued the trial were a result of personal choice, disinterest, and natural death. No trial discontinuations were related to the combined electric current and local anesthetic therapy protocol or side effects from either the injections or electroanalgesia.

Out of the 101 study participants, 23 are 1 year post-treatment without relapse of pain symptoms. Each is reporting improved quality of life and benefiting from the therapy.

Discussion

The results of this open-label trial show that combined electric current and local anesthetic therapy decreases pain in a significant number of patients who have DPN. These results have been clearly proven subjectively. Our objective findings through nerve conduction velocity tests have also shown improvement in motor nerve function after treatment and some improvement in sensory nerve function. Sensory nerve improvement was experienced more by patients staged with mild disease, which indicates that either early diagnosis and treatment may be an important factor in projecting outcomes or that the timing of the post-treatment NCS may have been too close to the patient’s combined electroanalgesic therapy.

The skepticism entering the trial by all researchers existed on multiple levels. First, there was a belief that all electricity was considered the same, and secondly, we expected that this protocol would yield results similar to Anodyne. Anodyne is an infrared light therapy system that was cleared by the FDA in 1994. It uses an 890 nm wavelength, which provides a combination of topical heat and an increased local release of nitric oxide to relieve pain. While the authors found Anodyne to provide some relief, they learned that their patients would require continued maintenance therapy to feel better. Moreover, when treatment was terminated, most patients became symptomatic.

Our first concern—that all electricity is created equal—was disproved. While we are truly in the early phase of determining what different amplitudes and frequencies in different parts of the body may do for different diseases, we are confident that varied intensities and duration of electronic signals elicit an improved response with less accommodation. The identical protocol was tested with alternative electrical stimulation devices, which were missing one or more of the key differentiating engineered designs of
Better Living Through Electrochemistry

By Sally Adee  |  February 9, 2012

Have you ever wanted to take a vacation from your own head?
You could do it easily enough with liberal applications of alcohol, weed or hallucinogens, but that's not the kind of vacation I'm talking about. What if you could take a very specific vacation only from the stuff that makes it painful to be you: the sneering inner monologue that insists you're not capable enough or smart enough or pretty enough or whatever hideous narrative rides you. Now that would be a vacation. You'd still be you, but you'd be able to navigate the world without the emotional baggage that now drags on your every decision. Can you imagine what that would feel like?

Late last year, I got the chance to find out, in the course of investigating a story (in this week's New Scientist) about how researchers are using neurofeedback and electrical brain stimulation to accelerate learning. What I found was that electricity might be the most powerful drug I've ever used in my life.

It used to be just plain old chemistry that had neuroscientists gnawing their fingernails about the ethics of brain enhancement. As Adderall, Ritalin and other cognitive enhancing drugs gain widespread acceptance as tools to improve your everyday focus, even the stigma of obtaining them through less than legal channels appears to be disappearing. People will overlook a lot of moral gray areas in the quest to juice their brain power.

But until recently, you were out of luck if you wanted to do that without taking drugs that might be addictive, habit-forming or associated with unfortunate behavioural side effects. Over the past few years, however, it's become increasingly clear that applying an electrical current to your head confers similar benefits. US military researchers have had great success using transcranial direct current stimulation (tDCS), in which they hook you up to what's essentially a 9-volt battery and let the current flow through your brain. After a few years of lab testing, they've found that they can more
Can electrical jolts to the brain produce Eureka moments?

by Ed Yong  February 2, 2011

Finding those Eureka moments that allow us to solve difficult problems can be an electrifying experience, but rarely like this. Richard Chi and Allan Snyder managed to trigger moments of insight in volunteers, by using focused electric pulses to block the activity in a small part of their brains. After the pulses, people were better at solving a tricky puzzle by thinking outside the box.
Lose Weight with Electro-Shock Therapy

By Douglas Robb on January 29, 2013@healthhabits

A new study, published in the journal *Obesity and Weight Loss Therapy*, has found that cranial electrotherapy stimulation was able to amplify the weight loss effects of both...

- Low Calorie diets
- Low Carbohydrate diets

The Science

After 2 months of simultaneous treatment with electric stimulation and diet there was an average weight loss of...

- 7.07 kg in the reduced caloria diet group
- 9.48 kg in the ketogenic/low-carb diet group

whereas in the non-electric stim groups, the researchers observed an average weight loss of...

- 5.9 kg in the reduced caloria diet group
- 7.17 kg in the ketogenic/low-carb diet group

This means that the electric stimulation participants lost...

- 20% more body-fat on a low-cal diet
- 32% more body-fat on a ketogenic/low-carb diet
Brain stimulation promises 'long-lasting' maths boost

Effects of CES Math Stimulation can Last 6 Months

The brain stimulation technique could help children who struggle with arithmetic, say researchers.

Applying high-frequency electrical noise to the brain can boost maths skills up to six months later, say Oxford University researchers.

A small study in Current Biology suggests the brain stimulation technique makes neurons function more efficiently. It could help those suffering with neurodegenerative illness, stroke or learning difficulties. An expert said the technique could have "real, applied impact." Transcranial random noise stimulation (TRNS) involves applying random electrical noise to targeted areas of the brain by placing electrodes on the surface of the scalp. It is a relatively new method of brain stimulation which is painless and non-invasive.

Our neuro-imaging results suggested that TRNS increases the efficiency with which stimulated brain areas use their supplies of oxygen and nutrients.”

Dr Roi Cohen Kadosh, University of Oxford
Stimulating brain with electricity aids learning speed

By Leila Battison
Science reporter

Electrically stimulating the brain can help to speed up the process of learning, scientists have shown.

Applying a small current to specific parts of the brain can increase its activity, making learning easier.

Researchers from the University of Oxford have studied the changing structure of the brain in stroke patients and in healthy adults.

Prof Heidi Johansen-Berg presented their findings at the British Science Festival in Bradford.

The team at Oxford has been conducting research into how the structure of the brain changes in adulthood, and in particular what changes occur after a stroke.

They have used an approach called functional MRI to monitor activity in the brain as stroke patients re-learn motor skills that were lost as a result of their illness.

One of the major findings is that the brain is very flexible and can restructure itself, growing new connections and reassigning tasks to different areas, when damage occurs or a specific task is practised.

As part of this research, they investigated the possibility of using non-invasive electric brain stimulation to improve the recovery of these motor skills; the short-term improvement in stroke patients had already been noted.

But an unexpected result was found when the same brain stimulation was applied to healthy adults: their speed of learning was also significantly increased.
MAGNETIC ELECTRO-ACUPUNCTURE BRAIN STIMULATION

MAGNETIC WAND

Lose Weight with Electro-Shock Therapy
By Douglas Robb on January 29, 2013@healthhabits

A new study, published in the journal Obesity and Weight Loss Therapy, has found that cranial electrotherapy stimulation was able to amplify the weight loss effects of both...

Better Living Through Electrochemistry
By Sally Davis [February, 2015]

Professional Magnetic Wand

We can direct the Power of the Cybermagnetic Music or the SCIO/Eductor Energy into an Acupuncture point or into a Brain area

Skill Learning

- Can we accelerate nondeclarative (skill) learning?
  - Previous research – enhancement simple motor procedural learning with motor cortex stimulation (Galea & Celnik, 2009)
  - Wanted to examine more complex motor procedural task

Strategy

Enhance motor skill
Excite – Motor Cortex

Depress competing memory
Inhibit – Prefrontal Cortex
Brain stimulation promises 'long-lasting' maths boost

Effects of CES Math Stimulation can Last 6 Months

The brain stimulation technique could help children who struggle with arithmetic, say researchers.

Applying high-frequency electrical noise to the brain can boost maths skills up to six months later, say Oxford University researchers.

A small study in Current Biology suggests the brain stimulation technique makes neurons function more efficiently. It could help those suffering with neurodegenerative illness, stroke or learning difficulties. An expert said the technique could have "real applied impact." Transcranial random noise stimulation (TRNS) delivers applying random electrical noise to targeted areas of the brain by placing electrodes on the surface of the scalp. It is a relatively new method of brain stimulation with the potential to boost cognition.

Our neuro-imaging results suggested that TRNS increases the efficiency with which stimulated brain areas use their supplies of oxygen and nutrients."

Dr. Roi Cohen Kadosh, University of Oxford
Electric shock treatment ‘cures memory loss’, scientists claim

As we age, the connections between the neurons in our brain weaken.

Researchers found the amount of current needed was a fraction used in controversial electric shock treatment on mentally ill patients.

In their study, published in the journal Neuropsychologia, researchers used a current of 1-2 milliseconds via electrodes to the scalp of volunteers to stimulate the anterior temporal lobes of the brain.

This is the section which deals with the memory of proper names – those with a capital letter at the front like people and places.

The suspects were given photos of famous faces to look at and were tested before, during and after the process.

Recognising the face but not being able to recall the name is a common phenomenon for almost everyone but worse for those suffering neurological disorders.

They found the electrical stimulation increased memory by 11 per cent but only for up to an hour after the treatment was given.

Researchers found that a tiny surge of power to parts of the brain can improve recall memory by 11 per cent.

The treatment stimulates certain neurons in the brain so when a person tries to retrieve a name from their brain, they suddenly start working.

If developed it could provide treatment for stroke victims as well as people whose memory fades through other ailments or even old age.

The study, from Temple University, Philadelphia, could also offer solutions to those who suffer the embarrassing situation of forgetting a person’s name.

“We know a lot about how to make people’s memory worse, but we don’t know very much about how to make people’s memory better,” said Ingrid Olson, a psychologist who led the study.

“These findings hold promise because they point to possible therapeutic treatments for memory rehabilitation following a stroke or other neurological insult.”
CRANIAL ELECTROTHERAPY STIMULATION (CES)

Cranial electrotherapy stimulation (CES) is the use of low-intensity microcurrent (under one milliampere) to stimulate various parts of the brain in an effort to achieve neurochemical changes as an alternative to drug therapy. It is widely used as a treatment for insomnia, depression, and anxiety, but has also been proposed as an alternative intervention for children with autism and ADHD.

Cranial electrotherapy stimulation is also known by several other terms, including transcranial electrotherapy, microcurrent electrical therapy, electrochemical treatment, and microcurrent therapy. This treatment is non-invasive, and involves placing electrodes on or near the ear while a hand-held device produces the electrical current that reaches the brain. Various protocols exist, but typically the stimulation is provided daily for a period of two to three weeks, and then on a less frequent basis. Children are able to read, watch television, or listen to music during the therapy. Effects are generally immediate, but are also cumulative, so it is important to maintain the recommended protocol to achieve the full benefits of the therapy.

The theory behind CES is that the microcurrent travels to the brainstem and activates nerve cells that produce the neurotransmitters serotonin and acetylcholine. These chemicals are linked to relaxation and to the inhibition of anxiety and agitation. Their release is believed to help the brain to create an alpha wave state, which promotes mental focus and relaxation.

Patients often describe the sensation of CES to be pleasant, and to help them to immediately feel relaxed and more mentally alert. They often report a tingling or pulsing sensation in the earlobe which is not painful. Side effects are rare, and may include mild headaches, light-headedness, or skin irritation from the electrodes. Rarely, more serious side effects have been reported, including sleep disturbances, excessive excitement, or an increase in anxiety.

In the United States, the Federal Food and Drug Administration (FDA) approves cranial electrotherapy stimulation for the treatment of insomnia, depression, and anxiety, but not for other medical conditions including pain management, chemical dependency, autism or ADHD. Because physicians are not typically trained in its use, and continuing education opportunities are limited, this treatment is often recommended by psychologists or alternative health providers who may not have a full understanding of the medical and neurophysiological implications of these conditions. Critics express concerns that CES treatment focuses on alleviating a set of symptoms, rather than treating the underlying condition.
Every military application of tDCS I’ve seen so far specifically mentions drones and drone pilot training. This logo has a drone in it! For the record, I think the use of drones is illegal and immoral, and that the deaths of innocents are un-American and unacceptable. That said, the tDCS research coming out of this sector is fascinating and will no doubt have an impact beyond military training.

This comes from https://community.apan.org/afosr/m/bioenergy_program_review/114364.aspx and is a public document (no longer available). It appears to be a set of slides used in a presentation. It documents the most aggressive use of tDCS for the purpose of learning and cognitive enhancement I’ve seen. You will conclude, after reading this that the Air Force is not fooling around.
FDA approves first migraine prevention device

WASHINGTON, March 19 — The US Food and Drug Administration (FDA) has authorized the first nerve-stimulating device that can prevent the onset of migraines, according to a Wall Street Journal report.

Doc Steve I just worked with the head of emergency surgery at a local hospital diagnosed with Ovarian Cancer but she refused to do the Chemo & Radiation the Oncology Dept recommended....After only 2 sessions with me I told her to go for another biopsy...No trace of any Cancer was found! She was stunned and told me I had given her life back to her and called me a miracle worker but the real miracle was the SCIO that guided the protocol I created for her....
Mirth and laughter elicited during brain stimulation

Guadalupe Fernández-Baca Vaca 1, Hans O Lüders 1, Maysaa Merhi Basha 2, Jonathan P Miller 3

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ABSTRACT - There are few reports of laughter and/or mirth evoked by electrical stimulation of the brain. In this study, we present a patient with intractable epilepsy in whom mirth and laughter was consistently produced during stimulation of the left inferior frontal gyrus (opercular part) using stereotactically placed depth electrodes. A review of the literature shows that cortical sites that produce mirth when stimulated are located in the dominant hemisphere close to language areas or cortical negative motor areas.

Key words: brain stimulation, cortical mapping, mirth, laughter, language areas, negative motor areas, gelastic seizures

Electrical stimulation in epileptic patients undergoing pre-surgical evaluation with intracranial electrodes is routinely performed to determine the location of eloquent cortical areas. This provides a unique opportunity to study the functional anatomy of the human brain. Laughter and mirth have been studied by researchers for centuries yet their neural correlates still remain poorly defined (Wild et al., 2003). There are few reports of laughter and mirth provoked by electrical stimulation of the brain. Arroyo et al. (1993) suggested that the motor program of laughter and the experience of mirth are dissociated. Based on their results, it was concluded that laughter is represented in the anterior cingulate gyrus and that mirth is a function of the temporal lobe. This was later supported by results published by Satow et al. (2003) and Sperli et al. (2006). Other reported data (Fried et al., 1998; Krolak-Salmon et al., 2006; Schmitt et al., 2006) showed that laughter with and without mirth can be provoked by stimulation of the frontal cortex; in the pre-supplementary sensorimotor area (pre-SSMA), immediately anterior to face and hand representation in the rostral part of the supplementary sensorimotor area (SSMA), and the superior frontal gyrus.

In this manuscrit, we present evidence that electrical stimulation of the left inferior frontal gyrus (opercular part) consistently elicited mirth and laughter in a patient with stereotactically placed depth electrodes for intractable epilepsy.
Electrical Stimulation in Epilepsy: Vagus Nerve and Brain Stimulation

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Opinion statement
Vagus nerve stimulation (VNS) for epilepsy is a well established and effective treatment for medically intractable epilepsy. VNS is indicated if resective epilepsy surgery is unsuccessful or is not an option. About 50% of patients with VNS have a seizure reduction greater than 50%, but less than 10% become seizure-free. VNS also has an alerting effect on patients and may allow a reduction in sedating medications. The major adverse event is hoarseness, but treatment is generally well tolerated. The therapeutic effect can be delayed: patients may improve several months after VNS implantation. Direct brain stimulation (DBS) is an emerging treatment for epilepsy. Scheduled stimulation is similar to brain stimulation in Parkinson’s disease. Only the anterior thalamic nucleus has been studied in a larger randomized, controlled trial, in which patients with the stimulator turned on had a significantly reduced seizure frequency. Responsive stimulation applies an electrical stimulus at the site of seizure onset to terminate the seizure if one occurs. The seizure-onset zone must be well defined before implantation. Responsive stimulation requires seizure detection and application of a stimulus online. A large pivotal trial showed a significant reduction in seizure frequency. Both DBS and responsive neurostimulation are well tolerated, but there has been some concern about depression with DBS. Infection, hemorrhage, and lead breakage are adverse events possible with any type of stimulator. None of the brain stimulation devices have been approved by the US Food and Drug Administration, but final approval is expected soon. These devices are indicated for patients with bilateral seizure onset or seizure onset in eloquent areas. Although the initial trials of brain stimulation do not show overwhelming improvement in seizure frequency, the technology will improve with time as we continue to learn about the use of brain stimulation for epilepsy. Optimization of VNS has been going on for 10 years, and we need to ensure that brain stimulation is similarly developed further. In addition, sophisticated devices such as responsive neurostimulators can greatly enhance our understanding of the pathophysiology of epilepsy.
Using Electrical Nerve Stimulation Machine for Diabetic Neuropathy Should Be Considered

The most common forms of electro-analgesia is the Tens machine. There has been several clinical reports and ongoing research with regards to the use of Tens machines for certain medical conditions such as arthritic pain, myofacial, lower back pain, bladder incontinence, visceral pain, post operative pain and neurogenic pain. Due to these studies being inconclusive, the question as to whether the Tens are more effective than a placebo in combating pain is still unresolved. The mechanisms currently proposed with regards to the Neuro modulation that Tens produces include pain control, restoration of input afferent, and presynaptic inhibition in the dorsal horn of the spinal cord and direct inhibition of an abnormal excited nerve.

Studies revealed that the electrical stimulation reduces pain via nociceptive inhibition in the horn of the spines dorum horn at a presynaptic level and in turn limits its central transmission and that the electrical nerve stimulation machine on the skin myelinated nerve fibres and the electrical stimuli activates a low threshold. With low frequency Tens a marked increase in met-enkephalin and beta endorphins were noted and also demonstrated antinociceptive reversal effects by naloxone. Through micro opioid receptors the effects were postulated. However, naloxone was not reversed with high frequency Tens analgesia, implicating a dynorphin binding receptor that is naloxone resistant. Increased levels of dynorphin A were revealed in cerebral spinal fluid samples. Pain in interpreted when painful peripheral stimulation occurs as the C fibres carry the information which causes the T cells to open the gate which in turn the cortex and thalamus receive the pain transmission centrally. This theory explains the gate control theory, as the gate is usually closed. A range of both positive and negative outcomes have been noted in a wide range of medical conditions when using the Tens machine. Due to several trials and studies conducted there has been an overall consensus in favour of the use of Tens. Around 70 to 80% of patients experience initial pain relief provided by Tens, and around 20 to 30% success rate decreased after a few months of using Tens. In order to establish the full benefits, the Tens should be applied for at least an hour.

The stimulus preferences differ, and studies revealed that 57% of patients that used the Tens machine daily most definitely benefited as well as displayed different stimuli to particular pulse patterns and frequencies and were found to be adjusting their stimulators in subsequent treatment sessions. Tens has also proved positive for mild levels of pain post operative and post traumatic and proved ineffective for acute pain and tension headaches. However, Tens proved positive for painful diabetic neuropathy and treatment using Tens should be considered for this disorder.
Spontaneous????

SEEMS LIKE MAGIC
BUT IT IS JUST THE
EDUCTOR

EDUCTOR IS ON

EDUCTOR IS CALIBRATING...

EDUCTOR IS WORKING...

EDUCTOR IS WORKING...

EDUCTOR IS WORKING...

EDUCTOR IS WORKING...

EDUCTOR IS WORKING...

EDUCTOR IS WORKING...

EDUCTOR IS WORKING...

TRAINING FINISHED