Potato Glycoalkaloid Solanine Toxicity Used in Homeopathic soup

Each year the world produces approximately 350 million tons of potatoes. The U.S. per capita consumption of potatoes is about 61 kgs per year. As you can see potatoes (Solanum tubersum) serve as a major food source as well as an inexpensive source of energy and good quality protein. Potatoes are grown mainly for human consumption but they are also widely used as food for livestock.

Once a week for a month no more to kill gut fungus

It is a less commonly known fact that potatoes produce compounds called glycoalkaloids that have been shown to be toxic to both man and to animals. At high enough levels the glycoalkaloid found in potatoes known as solanine can cause irritation of the gastrointestinal tract, impairment of the nervous system, and it is believed that they can cause teratogenic or birth defects. Neurological signs can include ataxia, convulsions, coma, muscle weakness, and involuntary urination. For homeopathic reversal action we can use these solanines to stabilize nerve disease and to kill gut fungus.

Potatoes produce several different glycoalkaloids. The most well-known one of these is Solanine; it is believed to be responsible for some food poisoning. Solanine is a glycoalkaloid containing a steroid alkaloid nucleus with a side chain of three sugars. Solanine is the most active cholinesterase inhibitor found in food due to its location in edible portions of plants.
**ChE-Is (cholinesterase inhibitors)** are a group of compounds that are used as a part of the treatment plan for mild to moderate Alzheimer's disease. This soup once a week can help.

CHE-inhibitors Are also used medicinally:

- To treat myasthenia gravis. In myasthenia gravis, they are used to increase neuromuscular transmission.
- To treat glaucoma
- To treat postural tachycardia syndrome
- As an antidote to anticholinergic poisoning
- To reverse the effect of non-depolarising muscle relaxants
- To treat neuropsychiatric symptoms of diseases such as Alzheimer's disease, particularly apathy
- To increase chances of lucid dreaming (by prolonging REM sleep)[2]
- To treat Alzheimer's disease, Lewy Body Dementia and Parkinson's disease. In these neurodegenerative conditions AChEIs are primarily used to treat the cognitive (memory and learning deficits mostly) symptoms of dementia. These symptoms are attenuated due to the role of acetylcholine in cognition in the CNS. There is some evidence to suggest that AChEIs may attenuate psychotic symptoms (especially visual hallucinations) in Parkinson's disease.[3]
- To treat cognitive impairments in patients with schizophrenia. There is some evidence to suggest efficacy in treating positive, negative and affective symptoms.[4][5][6]
- As a treatment for autism and to increase the percentage of Rapid eye movement sleep in autistic children, in line with the mechanism by which they encourage lucid dreaming

**Some major effects of cholinesterase inhibitors:**

- Actions on the parasympathetic nervous system, (the parasympathetic branch of the autonomic nervous system) may cause bradycardia, hypotension, hypersecretion, bronchoconstriction, GI tract hypermotility, and decrease intraocular pressure.
- SLUDGE syndrome.

**ChE-Is (cholinesterase inhibitors)** have the ability to prevent the breakdown of acetylcholine—a very active neurotransmitter—in the human body. The accumulation of acetylcholine in neuromuscular junctions impairs the function of the nervous system and its effect on organs. Studies have linked birth defects such as spinal bifida in humans as well as breeding problems in animals to potato glycoalkaloids.

**Alpha-Chaconine is another glycoalkaloid that is found in potatoes.**

As you can see both solanine and chaconine have the same aglycone as solanine, solaridine. The side chain sugar on the other hand is different in solanine and in chaconine. Both chaconine and solanine have been tested on mice, rabbits, and chick embryos and they have been shown to have similar toxicities.
**Solanine Levels and Burning Sensation**

Steroidal glycoalkaloids (SGA's) of potatoes may be detrimental to the health of humans and animals, but they are beneficial to the plants. The SGA's such as solanine are thought to be a component of the certain varieties resistance to insects. The insects they provide protection from the potato beetle, potato leafhopper, and wireworms.

It is also believed that SGA's may assist some crops in resistance to disease. At a low pH level some SGA's have shown to have antifungal effects. Synergistic fungi inhibitory effects were reported when alpha-chaconine and alpha-solanine where present simultaneously.

In addition low levels of glycoalkaloids are required in order to produce a desired flavor. More bitter varieties contain excess solanine and other SGA's and are more toxic as well.

Solanine levels above 14mg/100g are bitter in taste. Cultivar with greater than 20mg/100g cause a burning sensation in the throat and mouth. The second most abundant steroidal glycoalkaloid in potatoes is alpha-chaconine.

In ruminant animals, potato glycoalkaloids are hydrolyzed to solanidine. Solanidine is then further metabolized into 5,6 dihydro analog.

**The Solanine Content of Potatoes**

The solanine content of tubers varies depending on numerous factors. Most commercial varieties contain less than 12 mg/100g and are normally between 2 and 13 mg/100g. Of the many factors affecting solanine content in potatoes: variety, greening, and maturity seem to cause the largest variation. The conditions which vary the solanine content differ depending on what particular tuber is being discussed.

A large level of variability in solanine content of potatoes can be attributed to differences in variety of the tuber. A certain variety may increase or decrease in solanine content with maturation, and increase or decrease or remain unaffected by fertilization. Other varieties may be affected greatly or slightly by storage conditions. Some varieties have shown increased solanine content upon storage.

Sprouting potatoes contain greater amounts of solanine, with higher concentrations found near the skin. Solanine amounts decrease toward the center of the tuber.

One variety of potato with significantly high solanine levels is Lenape. The level in these potatoes is approximately 30mg/100g.

Solanine can also be found in other poisonous solanumae including nightshade (Solanum nigrum and S. americanum), eggplant (Solanum melongena), and green peppers (Capsicum anum). The common nightshade can contain as much as 7.6 to 8.2 mg/100g. Common peppers from 7.7 to 9.2mg/100g of solanine. Eggplant solanine content varies from 6.1 to 11.33mg/100g.

Potato vines also contain solanine but they are a valuable feed for livestock. One might ask how the vines can be ingested when they too contain a high level of solanine. When the vines are harvested, it is done before the vines dry out and die. At the point of harvest the vines are non-toxic and serve as a nutritious food source for ruminants. The practice of harvesting the vines also minimizes the transfer of
viruses from the vines to the tubers. The main problem with this feeding practice is the cost of the machinery needed to do the harvesting.

**The Mechanism of Action**

Solanum alkaloids are cholinesterase inhibitors which result in neural function impairment. A cholinesterase inhibitor is a chemical compound that inhibits acetylcholinesterase from removing acetylcholine from neuromuscular junctions. Acetylcholine is the neurotransmitter of the parasympathetic nervous system.

It is released from the terminal bouton of the preganglionic nerve fibers when action potential frequencies reach a sufficient level. When an inhibitor of acetylcholinesterase such as solanine is present in the cleft acetylcholine accumulates. The presence of acetylcholine in nerve tissue or organs is responsible for the neurological signs associated with solanine poisoning.

**Other Glycoalkaloids in Potato Tissues**

Other glycoalkaloids that are known to accumulate in tissues of the body and tend to concentrate most significantly in the liver. High concentrations have also been found in other major organs such as the kidney, heart, lungs, and in the brain.

**Toxic Concentrations in Potatoes**

Contents as high as 100mg/100g have been measured in the skin along with lethal amounts in the sprouts. The ability to have such high levels has led to several cases of potato poisoning. Since they contain not just solanine but also other glycoalkaloids, it is likely that the symptoms of potato poisoning are due to a combination of alkaloids.

In humans the oral dose of 28mg/kg body mass may cause both neurological impairment in the form of hyperesthesia, dyspnea, itchy neck, and drowsiness. These symptoms can be accompanied by gastrointestinal effects such as diarrhea and vomiting.

Regulations have been planned to limit the legally allowable level of solanine in commercial potatoes. New varieties are screened and glycoalkaloid levels must be less than 20mg/100g.

**Human Symptoms of Glycoalkaloid Toxicity**

In the human alpha-solanine and alpha-chaconine (another glycoalkaloid in potatoes) toxicity begins with gastrointestinal disturbances, vomiting, diarrhea, abdominal pain, then followed by neurological disorders at higher doses, low blood pressure, fever, rapid weak pulse. The symptoms listed are associated with sub-lethal doses

Little information is available on the chronic toxicity of glycoalkaloids. There are indications that alpha-solanine and other potato glycoalkaloids can accumulate in tissues.
Solanine "poisoning" has a variety of symptoms. These symptoms may include: nausea, diarrhea, abdominal cramps, fever, headache, weak pulse, rapid breathing, hallucinations, delirium, and induce a coma.

**Reasons for Low Oral Toxicity**

Despite the effects this chemical has, it's oral lethal dose is relatively high in animals; it has a low oral toxicity. This low oral toxicity is a result of how the compound of how the compound is dealt with by the body.

First, solanine levels in the blood are low after ingestion due to poor absorption by the gastrointestinal tract. Second, it is removed from the body fairly rapidly in both the urine and the feces, usually within 12 hours, preventing accumulation in the tissues. Third, intestinal bacteria aids in the detoxification by hydrolyzing the glycoside into solanidine (aglycone), which is less toxic than solanine and also poorly absorbed.

**Other foods to fight FUNGUS- might add to soup for flavor:**

Aloe

- “plant of immortality,” by the Egyptians 6,000 years ago.
- Native Americans the “Wand of the Heaven.”
- aloe vera produces at least six natural antiseptics, which kill mold, bacteria, fungi, and viruses.
- Anti-ulcer, laxatives, anti-inflammatory, bactericidal effect, analgesic, sedative effect; enhanced visceral functions, stability and function of the endocrine system; strong heart, promote blood circulation, detoxification, anti-allergic effect, has anti-cancer properties and destroy abnormal cells.

**Uses:**

- Internal: indigestion, blood sugar control, detoxes
- External: Insect bites, minor burns, scrapes, skin viruses, cuts, rashes, athletes foot

Fungal infections can happen to anyone, no matter how strict your hygiene regimen is, or how healthy you are. We live in a world filled with bacteria, toxins, and most of us have a history with poor eating habits that can set us up for developing fungal
infections more easily. For instance, high amounts of processed foods, (specifically sugar), meat and other animal-based foods, along with junk and fast food all contain additives, chemicals, hormones, pesticides, and more that damage our gut bacteria and weaken our bodies’ immune systems. Antibiotics and prescription drugs only contribute to this problem, therefore we’re not able to fight off fungi we encounter every day like we normally would. Or, if you come in contact with spoiled food, some type of dangerous bacteria in the environment, or drink bacteria-laden water, you might also develop a fungal infection. The possibilities are endless, and though you needn’t walk around scared all the time, it’s still helpful to know how to fight fungal infections more naturally with your diet as much as possible. The healthier you eat, the better chance your immune system has for thriving.

Here are some especially powerful anti-fungal foods to add to your regimen:

1. Coconut

Coconut is one of the best anti-microbial foods you can eat that also comes with many other benefits too. It’s high in lauric acid and caprylic acid that have been shown to fight candida yeast in the body, which we all have in our digestive systems, but when it grows and becomes out of control it cause symptoms like a rash or breakout, an itch, chronic fatigue, sugary cravings and even moodiness and depression. Coconut’s lauric acid content also helps boost immunity and its healthy fats improve your liver function. Try to use whole coconut meat (or coconut butter) versus just the oil in your foods, then apply the oil on your skin to protect your skin from unhealthy bacteria you encounter through the environment. It also makes for a great non-toxic lotion and shaving cream.
2. Garlic

Another popular natural bacteria-fighting food is garlic, but not garlic powder or pre-minced garlic at the store – fresh garlic cloves. Garlic contains vitamin B6, potassium, it detoxifies the body, boosts immunity, strengthens the liver, and promotes a healthy heart. Garlic specifically fights bacteria in the digestive tract and helps build good bacteria since it's a natural prebiotic food. Use a clove a day to get the benefits; this is easy to do if you put a little fresh garlic onto a salad, in some roasted veggies or in soup, or if you eat raw, the cloves are easy to purée into raw soups and sauces. Here are some easy tips to grow your own garlic if you'd like to try that too.

3. Oregano

Many people use oregano oil to fight bacteria, but the whole leaf is also a smart choice. Oregano is one of the easiest herbs to grow yourself and also one of the most nutritious. A few leaves (about a tablespoon worth) contains more antioxidants than a whole cup of blueberries! It helps fight bacteria in the body, strengthens the immune system and even reduces stress due to high levels of vitamin B6. Oregano is also a natural source of chlorophyll that also fights bacteria and acidity. Plus, let's be honest – it's pretty delicious!
4. Pumpkin Seeds

Pumpkin seeds are especially helpful at fighting parasites (which yes, are very easy to encounter through food, water, and even contact with animals and the general public!). They contain properties that bind to parasites and help excrete them through the digestive tract. Pumpkin seeds are also a wonderful source of plant-based protein, providing 13 grams in just 1/4 cup. Try to buy fresh, raw pumpkin seeds (organic is optimal) instead of roasted varieties with oil and salt for the most benefits. Pumpkin seeds are also an overlooked source of omega-3 fatty acids. Omega-3’s help improve your thyroid and can relieve dry skin that’s often associated with rashes due to skin fungal infections. Eat 1/4 cup of the seeds a day for the benefits to see how they work for you. You can use them in oatmeal, in or on top of a smoothie, top soup with them, or snack on them raw instead of unhealthy chips or candy.

5. Onions

A cheap and humble food, onions are a great addition to your diet, not just for flavor, but also for your health. Like garlic, they are healthy for your liver and heart, help fight the growth of bacteria, and are perfect to use whether you have a mild cold or even something more serious like a fungal infection. One reason is because they’re so high in immune-boosting properties. They’re a great source of vitamin C, vitamin B6,
antioxidants, and potassium. You can use them raw or put them into a homemade broth to drink daily or use as a base for a healthy soup.

You might also look into some natural skin care creams for fungal infections that include tea tree oil, oregano, and natural substances versus chemical-based options at the store. Be sure to keep your diet as healthy as possible emphasizing clean, fresh foods and avoid animal products, refined sugar and grains, yeasty foods like bread, beer, baking (brewer's) yeast, processed foods and fast foods. Avoid energy drinks, sodas, processed drinks, and consume water and herbal tea instead. If you must drink coffee, try to use fresh beans and buy organic since coffee is a highly sprayed crop coated with chemicals.

Try adding these foods to your diet and check our 5 Tips on How to Improve Your Gut if you need more tips on how to fight fungi and viruses more naturally.

A Candida diet must eliminate some of the foods that you will normally eat on a healthy diet, but the basis of a healthy diet remains the same. A Candida diet should consist of 80% fresh, raw, organic produce, more vegetables than fruit. Choose a wide variety of nutrient dense foods. If you eat meat, make sure you choose organic meat. You do not want to eat meat from diseased animals that were fed hormones and antibiotics. Avoid processed foods, and do not eat any foods with artificial flavorings, colorings, preservatives, MSG, or trans fats. Avoid all GMOs. This is easy to do if all of your food choices are organic.

This is a prebiotic diet. Raw produce is high in fiber, which is essential for gut health. Fiber not only moves toxins through the bowels, it provides the perfect environment for healthy bacteria to thrive. Many conventional sites that talk about a diet for Candida warn against eating fermented foods. We make the opposite recommendation, eat lots of fermented foods. Fermented foods such as sauerkraut, kimchi, kombucha, and kefir provide the healthy bacteria needed in the gut—the bacteria that will ultimately crowd out Candida. Foods that kill fungi include onions, leeks, green apples, ginger, pomegranates, and citrus fruits. Along with diet, there is an arsenal of natural treatments for Candida. It isn't necessary to take supplements to kill Candida, but it does speed up the process faster than diet alone.
What to Avoid

Juices, gluten, GMOs, sugars, ketchup, mushrooms, refined foods, toxins that disrupt gut balance from antibiotics, vaccines, and alcohol should all be avoided if possible. Conventional meats should also be avoided due to widespread prophylactic antibiotic use, which can damage our beneficial bacteria. Also it is important to limit intake of starches. Red potatoes and sweet potatoes are good choices when eating potatoes. These restrictions are temporary. After healthy gut bacteria are well established and symptoms of Candida overgrowth are gone, some flexibility in diet will return. Should symptoms reappear, just strictly adhere to the diet for a few weeks to a few months.

Anti-Fungal Foods

A diet high in produce with more vegetables than fruits is crucial for healing Candida. There are, however, some foods that have particular anti-fungal or probiotic qualities that will speed up Candida's demise. If you take away the foods that Candida thrive on, yeast infections will be a thing of the past, even the low-lying kind that saps you of your energy and focus.

These foods contain potent anti-fungal properties, so they do a remarkable job of killing Candida. They should make up a substantial portion of any Candida detox diet, which should also include other low-sugar, high fiber vegetables. High fiber raw produce creates the right environment for beneficial bacteria to thrive.

- Green Apples
- Pomegranates
- Garlic
- Oregano
- Onions
- Leeks
- Coconut
- Rutabaga
- Turnips
- Olive Oil
- Lemons & Limes
- Pumpkin Seeds
- Broccoli
- Brussels sprouts
- Arugula
- Watercress
- Cabbage

These spices also have potent anti-fungal properties. Try to work them into your meals every chance you get.

- Thyme
- Turmeric
These probiotic foods are very beneficial if you can get them with live cultures. Consuming these foods will help increase the numbers and effectiveness of your beneficial bacteria. Take care to check the labels in order to avoid MSG, artificial flavors, and other questionable ingredients that are sometimes found in these foods.

The problem with many of the aforementioned foods is that the stomach acid typically kills most or all of the beneficial bacteria. Some yogurts are designed with bacteria strong enough to survive stomach acid, and high quality probiotic capsules are typically designed get through acid and release in the gut.

If you want to heal from Candida faster, these herbal supplements can help to speed up the process.

Conclusion
Candida fungal overgrowth is incredibly common. A diet high in starches, sugars, preservatives, and processed foods feeds Candida while a diet high in raw produce feeds Candida's competition. Once you kill off the Candida, you'll be amazed by the clarity you gain and the difference in how you feel. In addition, the dietary changes you make will provide the foundation
for a vital, healthy life. If you’re dealing with a body full of Candida, be sure to check into undecenoic acid supplementation. It’s an incredibly efficient and powerful fungal killer that does not let Candida adapt like it does with other protocols. For more information on Candida, and balancing natural flora, check out the first two sources and see Gluten, Candida, Leaky Gut Syndrome, and Autoimmune Diseases and Kill Candida and Balance The Gut Quickly.

References


