



Oxalates: When Healthy Lifestyle Choices Create Illness



Dr. Kate Thomsen and Silky

Imagine not feeling well. It has come on gradually—the muscle pain, the abdominal pain, the vulvar pain. Some doctors suspected you had endometriosis but the pelvic ultrasound only showed uterine fibroids. Some days you think you'll never stop urinating and it burns but there is no urinary tract infection. Your symptoms were intermittent at first but have become more persistent now. Your doctor asked if you are "taking anything" for your symptoms. You report that you don't like to "take things" to mask symptoms and that you have changed your diet for the better in hopes that it would help. You used to take antibiotics for acne but you stopped them 6 months ago when the abdominal bloating and gas was diagnosed as intestinal yeast overgrowth. Gradually you had transitioned your high carbohydrate diet to a more plant-based diet, increasing vegetables to protect against possible vitamin and mineral deficiencies. You even started to make green smoothies every morning hoping the fresh, raw spinach would supply even more vitamins and minerals. But your symptoms got worse. You had an episode of dizziness like vertigo last month that lasted several weeks. You were disappointed that your bone density decreased on your recent scan despite increasing the calcium and magnesium you take before bed to help with sleep. You are frustrated!! Everything you have been doing is supposed to be health promoting and yet you keep getting new symptoms on top of your original symptoms. It's just a downward spiral and you are feeling depressed.

More and more I have been hearing patient stories like this one. I had not appreciated, until recently, the damaging effects that oxalate dysregulation can

cause in people; people who are doing "everything right". So what are oxalates? Oxalates are a natural substance found in the leaves, roots and tubers of certain plants. These plants produce calcium oxalate crystals in response to surplus calcium or in response to heavy metal stress. Additionally the crystals can support plant skeletal structure and act as a defense mechanism against herbivory. In this last instance, an animal eating plants containing sharp and pointed calcium oxalate crystals will likely experience tears in the soft tissues of the throat, an inflammatory reaction that may last for weeks and, per the plant's strategy, not come back for seconds. While humans may not be herbivores, we certainly have the ability to eat an abundance of high oxalate foods, all day long, all year long – potentially to our detriment as well.

To humans, oxalates are considered an anti-nutrient; a compound that interferes with the body's ability to absorb nutrients. Soluble oxalate in plant foods will combine with dietary minerals in our intestines and prevent the body from absorbing them. Most minerals will bind to oxalate especially calcium, magnesium, zinc and iron. That is why a high oxalate diet may contribute to mineral deficiency conditions like osteoporosis, muscle cramps, fatigue, brain fog, irritability, depression, high blood pressure, PMS, irritable bowel syndrome, and anemia.

In addition to the mineral deficiency state, the sharp needle-like crystals formed when oxalate binds with minerals can cause irritation and inflammation in the tissues where they are deposited. In the lung, they can cause pulmonary fibrosis, in the eye—cataracts, in the uterus—fibroids, in the inner ear—vertigo, in the muscles—fibromyalgia. In the gut, the needles can cause hyper-permeability (leaky gut) and set the stage for mast cell activation and histamine symptoms. The most well-known condition associated with calcium oxalate crystals is kidney stone formation. The possible damage caused by oxalates seems endless.

Oxalates are transported around the body using sulfate carriers. They can also bind to

sulfate receptors on cells. By removing these sulfates from their original purpose, oxalates can create functional sulfate deficiency. The body will not have adequate sulfates to use for detoxification, producing bile, carrying and storing hormones and producing the regulatory form of cholesterol.

Plants are not the only way to be exposed to oxalates. Oxalate is also formed in the human liver through the metabolism of glycine, glyoxylate, and ascorbic acid. Mutations in certain genes will cause Primary Hyperoxaluria (types 1 – 3) where persons are more susceptible to the harmful effects of oxalates. Aspergillus and Penicillium molds and perhaps Candida yeast colonized in the body are capable of producing oxalates. There is also a beneficial bacteria in the gut that degrades oxalates - oxylobacter formiges. Lack of this bacteria can allow for oxalate related symptoms. Dietary fat malabsorption (when dietary fats are not emulsified) will allow fats to combine with calcium in the gut making soap. Soluble dietary oxalates will find no calcium left in the gut to bind and so oxalate is absorbed from the gut into the tissues. Other risk factors for high oxalate conditions include: leaky gut, low sulfates, low citrates, and sometimes, a heavy metal detoxification program.

When people read the List of Foods that contain oxalates, they get confused. Most plant foods contain oxalates. It is important to know which foods are actually high in oxalates. Not all people have to avoid these foods and there are other risk factors (see above) that, if controlled, will prevent increased susceptibility to oxalate damage. The important thing is to be careful of excesses – eating high oxalate foods too frequently. High oxalate foods are defined as having more than 10mg of oxalates per serving.

How do we diagnose and treat suspected oxalate syndromes? I often check a urine Organic Acids Test to check for oxalates, the precursors/genetic predisposition to them, nutrient deficiencies, and fat malabsorption. I might also check a genetic

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Foods Groups highest in oxalate include:
fruits, vegetables, nuts, seeds, legumes, grains

- High-oxalate fruits include: berries, kiwis, figs, purple grapes
- High oxalate vegetables include: spinach, rhubarb, swiss chard, beets, potatoes, okra, leeks
- High oxalate nuts and legumes include: almonds, cashews, peanuts, soy products
- High oxalate grain products include: bran flakes, wheat germ, quinoa
- Other foods high in oxalates include: cocoa, chocolate, tea



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test for mutations in genes related to oxalates and other risk factors. A 24-hour urine test for oxalates should report less than 45mg oxalates excreted/day. Obviously symptoms, while numerous and diverse, as well as contributing lifestyle factors and changes coinciding with symptom onset are the tip-off.

Treatment of oxalate syndromes is tricky. The goals are to: 1) mobilize and eliminate retained oxalate crystals in the tissues and organs and 2) prevent further absorption of dietary oxalates. It is preferred to eliminate oxalates through the colon into the toilet. If you reduce dietary oxalates or increase oxalate excretion too fast, one can experience oxalate dumping. That is when oxalates are released into the blood stream and filtered through the kidneys. This can cause damage in many tissues, most importantly the kidneys. Symptoms of oxalate dumping can last for a few days and include: dizziness, fatigue, hives or skin rashes, mood changes, painful bowel movements, painful urination, muscle cramps and trouble focusing. If this should happen, we advise the person to eat a high oxalate food to reverse the gradient. Slow and steady is the mantra for oxalate elimination.

We advise a step-wise process. First take calcium (or any minerals) only with food. Taking calcium citrate with meals will allow the oxalates present in the incoming food to bind to calcium in the gut for escort out through the colon. It is important to stay very well hydrated. After binding

oxalates with calcium for a week or so, we ask the person to start decreasing their intake of high oxalate foods. Initially we request eliminating the big 4: spinach, rhubarb, swiss chard, beets – especially beet tops. These foods have over 500mg of oxalates per serving!!! After that we recommend decreasing dietary oxalates by 5 - 10% per week. Keeping the daily intake of oxalates under 250mg may be enough restriction for most people however the goal for chronic kidney stone formers is less than 50mg/day. Soaking and cooking certain vegetables and legumes can reduce their oxalate content. Increasing mineral supplementation (taken with food) is important for mineral replacement, as the Calcium citrate dose, or other binders, are taken specifically NOT to be absorbed. Adding vitamin B6, sulfates and increasing bile flow are also helpful.

If you feel like the person described above, then seek help from your health care provider, health coach or nutritionist. You may not be aware of how some healthy lifestyle changes, in certain people, in certain conditions, can backfire.

Dr. Kate Thomsen's office for holistic health care is located in Pennington, NJ. She is trained in Family Medicine, and Board Certified in Integrative Medicine, and is an Institute for Functional Medicine Certified Practitioner. She has been practicing Functional Medicine for 23 years. For more information see www.drkatethomsen.com or call the office at 609-818-9700.