

How Oxalates Can Wreck Your Health

Analysis by [Dr. Joseph Mercola](#)

✓ Fact Checked

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STORY AT-A-GLANCE

- › Oxalic acid is a naturally occurring toxic, corrosive acid. When the oxalic acid has minerals attached to it, it's called oxalate, which acts as a mineral chelator
- › Oxalate forms crystals that your body has a limited capacity to process. Calcium oxalate, for example, which is oxalic acid with calcium attached, form into painful kidney stones
- › Unlike some other food-related toxins, oxalate cannot be removed by cooking, soaking or fermenting the food. You also cannot simply take a mineral supplement to address the depletion oxalates causes
- › The top three “superfoods” that are very high in oxalate and may cause trouble are spinach, Swiss chard and beet greens. Another high-oxalate food is almonds, which you can easily “overdose” on if you’re eating bread made with almond flour or drinking almond milk, or if you’re on a keto or paleo diet, as they both tend to rely heavily on almonds. Dark chocolate is another food that scores high for oxalates
- › Oxalate damages cellular membranes causing excess calcium to flood the cell, resulting in accelerated cell death and other metabolic problems that contribute to chronic disease and ill health

In this interview, Sally Norton, author of “[Toxic Superfoods: How Oxalate Overload Is Making You Sick – and How to Get Better](#),” reviews how and why even foods we’ve been told are healthy can wreak havoc on your health. As the title of the book implies, the main culprit in question is oxalate or oxalic acid, found in many plants, beans, grains, seeds and nuts, fruits, berries and herbs.¹

So, just what are oxalates, why are they so bad, and how are they hidden in these superfoods that so many people are consuming? In short, it's a naturally-occurring toxic, corrosive acid. In that state, it's called oxalic acid. When the oxalic acid has minerals attached to it, it's called oxalate.

Chemically, it's a salt, and like other salts, it forms crystals that your body innately has a limited capacity to process. Calcium oxalate, for example, which is oxalic acid with calcium attached, forms into painful kidney stones.

And, unlike some other food-related toxins, oxalate cannot be removed by cooking, soaking or fermenting the food. You also cannot simply take a mineral supplement to address the depletion oxalates causes.

How Oxalate Causes Damage in Your Body

Oxalic acid is a dicarboxylic acid, meaning it has two carbons and each carbon has an oxygen molecule attached to it. "This special carboxylic acid has all kinds of damaging toxic powers when it's near a membrane," Norton says. She explains:

"Membranes really matter to biochemistry and to our basic physiology at the cellular level. Your membranes have to have the right structure and the right materials in them to function well. You've been focusing lately on vegetable oils [linoleic acid] and how toxic they are.

It's messing up the structure of the membrane, because a membrane is this double layer of fatty acids. Well, it needs a certain structure to work.

Now, the membrane does all kinds of intellectual communication processes in the cell, helps the cell decide what to do next in any situation, and you need to have certain fatty acids only on the inside of the membrane. It's two layers. So, there's what we call the inner leaflet and the outer leaflet.

On the inner leaflet, there is a phospholipid called phosphatidylserine ... What's getting into your body and causing trouble is the free oxalic acid ion, this single

little molecule that easily transverses your gut because it just floats in the water between the cells. We call that paracellular trans ...

When oxalate's around, it causes membrane damage to the point where that innate structure where the phosphatidylserine is now showing up on the outside of the membrane. That's bad news. For many cells, that means the cell is now in line to be removed because it's damaged. It's a signal to the immune system, hey, take away the cell. It's been harmed.

So, you lose your structured membrane. That creates all kinds of headaches for a cell. Often it cannot function properly. This is especially true of the cells that line the vascular system. So, the endothelial lining that is this giant organ of physiology, metabolism and maintenance of the body can be in trouble after, say, a spinach smoothie."

Top 'Superfood' Oxalate Offenders

The top three vegetable "superfoods" that are very high in oxalate and may cause trouble are spinach, Swiss chard and beet greens. Another high-oxalate food is almonds, which you can easily "overdose" on if you're eating bread made with almond flour or drinking almond milk, or if you're on a keto or paleo diet, as they both tend to rely heavily on almonds. Dark chocolate is another food that scores high for oxalates.

"There's a peak at about four hours after you eat it where the level of this oxalic acid in your blood is really quite high. So, now that your cells have damaged membranes and ... your poor liver is flooded with oxalic acid after meals, and the liver has zero physiology to break it down, change it, make it less toxic.

The liver literally makes more oxalate, and the more inflammation in the body, the more oxalate the liver makes ... The amount that converts to oxalic acid depends on your vitamin B status. If you have enough B6 and B1, then it lowers the amount that becomes oxalic acid ...

You also have to have low inflammation. People with diabetes and obesity have higher levels of generalized inflammation, so they're likely to produce more endogenous oxalate."

Oxalate Impairs Calcium Signaling

Once a membrane is damaged, oxalic acid can enter the cell. Oxalic acid is a calcium chelator, and calcium is critical to cell function. Cells use calcium as messengers, so it's crucial for the self-management of the cell. Even before oxalate enters, which might take two hours, in the first 15 minutes after you've got oxalate near a cell, an increased amount of calcium will move into the cell.

In short, the cell membrane damage causes the cell to take up more calcium. That's bad enough, but when oxalate follows, it lowers the effective calcium concentration from a physiologic standpoint. Norton explains what happens next:

"Now you've got cells that have too much calcium in them and too little calcium that's actually functional. So, the cell keeps bringing in even more calcium because the oxalate is lowering the functional intracellular calcium by chelating calcium ions in the cell.

But in the meantime, the mitochondria are picking up calcium because they're trying to save the cell from the excess calcium. So, this mitochondrial rescue problem kills the mitochondria and ultimately kills the cell as well. So, you've got multiple steps where the oxalate effects are kind of expanding into cell collapse ...

The oxalate penetrates the cell cytosol area and the mitochondria and sits on ... the active site of four metabolic enzymes, including the last step in glycolysis. So, the last step in glycolysis is blocked.

It also affects your ability to produce glucose and can contribute to low blood sugar, probably insulin resistance, and lots of metabolic problems because you've created an energy crisis in the cell ... and you've got enzyme

interference. Now, if your mitochondria ain't happy, you can't produce enough of the materials to even replace the cell. So, cell reproduction can be hampered.

They're dying, their lives are shortened, they're dying quicker, and they don't have enough energy to produce enough proteins and other materials they need to duplicate themselves. So, you get fibrosis instead.

Instead of getting healthy maintenance of tissues, the fibroblasts start producing more and more of this scar tissue material and you get fibrotic gunk holding you together.

If you don't have enough cells to hold the tissue together, you need this temporary stage of producing scar tissue to keep you from falling apart and suddenly bleeding out or having problems. This is a great thing the body's doing, but in the long run, you could turn into a fibrotic mess and not know why.”

Oxalate Toxicity Increases Risk of EMF Toxicity

The concentration of calcium outside the cell is 50,000 times higher than inside the cell. Research by experts like Martin Pall in electromagnetic field (EMF) damage shows that EMF allows an influx of excess calcium into the cell, which causes a cascade of increased nitric oxide, superoxide and other toxic molecules. Oxalates also cause harm through that same mechanism. As noted by Norton:

“This is the intersection of all these toxicities where the oxalate toxicity creates increased vulnerability to the EMF toxicity. We see this in my client base where they're frail and sensitive to everything.

When we get lower oxalates in the body, they're tougher again and these other stressors aren't quite as bad anymore. As you say, take control of your health. This is one place where you have more control over how much oxalate is in your diet than you have over EMF exposure in many situations.”

Symptoms of Oxalate Toxicity

Symptoms you might experience if you're exposed to excessive amounts of oxalate include the following. For more in-depth details about the mechanics behind each, listen to the interview or read through the transcript.

"The main symptom pattern is that no one can figure out what's wrong with you and you seem OK according to tests," Norton says. "That's a classic oxalate situation."

I personally have struggled with a challenging itchy rash for 15 years that defied any diagnosis by multiple dermatologists. I finally realized that it was due to oxalates and it has dramatically improved by lowering my oxalate consumption. I also used to struggle with dental plaque and that seems to have also improved with oxalate reduction and using a dental scaler.

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| Calcium oxalate kidney stones (which comprise about 80% of all kidney stones) | Itchy rashes |
| Interstitial cystitis (frequent urination and bladder pain) | Poor or slow wound healing |
| Frail skin that bleeds easily (as your connective tissues are being damaged) | Joint pain |
| Osteoporosis (as the oxalates are extracting minerals from your bones) | Calcium deposits |
| Digestive problems | Neurological problems ranging from bad mood and klutziness to tremors |
| Poor sleep | Rheumatologically muscle pains like |

fibromyalgia

Vision problems such as near-sightedness, cataracts and poor night vision

Dental plaque or tartar

The Hazards of Excessive Vitamin C

Vitamin C and ascorbic acid can also lead to problems if your body is already loaded with oxalates as it is metabolically reduced to oxalic acid during breakdown. Norton explains:

“The major source of internal oxalate is ascorbic acid or vitamin C ... There are lots of case studies of train wrecks from supplements, and lots of case studies about problems with intravenous vitamin C. Let me tell you my personal story. I had vitamin C chelation ... I didn't know I had an oxalate problem ...

By the third time, I became harder and harder to stab for the IV needle because now my veins were ropier and rollier and would run away from the needle. That's fibrosis ... I only had IV vitamin C maybe 10 times. But the doctor and the nurse took no notice of this side effect of the treatment – that I was becoming more fibrotic and harder to puncture ...

It's hubris to say, ‘Oh, well, it's fine. All my patients are doing great on my vitamin C IVs when you're not open to seeing the side effects. One of the studies demonstrated that just with oral supplementation, for not all that long, once they stopped the vitamin C, the level of oxalate in the urine went way up.

So, while the body's being assaulted by too much vitamin C, it's busy sequestering the oxalate that's forming and holding onto it and protecting the kidneys from devastation, from excessive oxalate load. Once you stop producing or eating too much oxalate, this holding pattern can let go, and now you see much higher oxalate levels in the blood and the urine.”

For these reasons, if you take vitamin C on a regular basis, Norton recommends limiting it to 250 mg a day. This is enough to meet your nutritional requirements and is unlikely to cause oxalic acid-related trouble. The exception would be if you are septic, in which case large doses of IV ascorbic acid can save your life.

The Antidote to Oxalate

The good news is there's an "antidote" to oxalate that can be helpful if you're struggling with oxalate toxicity or just happened to eat a high-oxalate meal. That antidote is citrate. I take citrates every day: magnesium citrate, calcium citrate and potassium citrate, typically with meals. This way absorption of any oxalate in the meal will be impaired.

"You definitely need calcium and magnesium with high oxalate meals," Norton says. "But the bigger issue is this long-term toxicity, because we all grow up on high-oxalate foods. Peanut butter is high, wheat bran is high, potatoes are high. Oat bran is variable. Rice bran is high, wheat bran's high."

The citrates in the minerals are especially important for this long tail of getting over the chronic illness of having an oxalate overload in your body. So, if you're past the age of 10 and grew up on standard foods, you've got some degree of deposits in your bone marrow, your joints and glands ...

The biggest biohack is calcium [citrate] because calcium promotes the clearing [of oxalate]. Some people can't even tolerate the calcium because their body is so eager to upchuck this mess from its tissues that calcium gives it too much permission. Some people are so deficient in minerals.

The long term high-oxalate diet really sucks you dry of electrolytes and minerals, and you're really fragile without the minerals. That's slowing down the excretion from the tissues. The expulsion from the tissues requires a certain amount of metabolic heft and some access to electrolytes so the tissues can do what they need to do.

[I've seen] people who were heavy keto for three years and then went full carnivore, which is a zero oxalate diet – so, they went from super toxic high-oxalate diet to zero oxalate – which is a precipitous dive.

Some get immediately sick with more rashes ... suddenly they are sick as a dog with oxalate poisoning because it's mobilizing. All of a sudden, they've got enough nutrients and whatever. Now, the body's turning it on."

Detoxing Oxalate Takes Time

The take-home message here is that you need to go slow. It's a marathon, not a sprint. Typically, after two years to two-and-a-half years on a low-oxalate diet, you may suddenly get sicker, because your kidneys are finally cleaned up and able to excrete oxalate more efficiently.

You're then able to tap into deeper deposits. As a result, you may experience things like gastritis, migraines, anxiety attacks, gout and other kinds of toxic reactions. It can also increase uric acid, as the uric acid is replacing the oxalic acid. In this instance, it's a sign that you're clearing oxalate. Other signs of oxalate clearing include tartar buildup on your teeth, gritty eyes, gritty stools, hemorrhoids and burning stools.

Sources of Citrate

While you could take citrate supplements, raw grass-fed milk is a great option, as it's high in calcium. Other options include sardines and lemon juice. As noted by Norton:

"[Dairy] has been the traditional nutrition ... to get calcium because the only other good source is sardines and salmon bones. There is some bioavailable calcium in some of these low oxalate vegetables, but you can't eat so much cabbage. Canned sardines are good too.

Citrate is so good. It is your friend. Lemon juice is a great source of citric acid and I use lemon juice as a therapy. I recommend people get a half a cup of fresh

lemon juice, a quarter cup in the morning, quarter cup at night, and down it as a shot, or you can make a homemade lemon fizz.

It's like an Alka-Seltzer Gold where you add the potassium bicarbonate and/or sodium bicarbonate and you can alkalize, because what happens is the liver turns some of the citric acid into bicarbonate, and alkalization helps so much because oxalate's creating an acidic metabolism ...

When you don't feel good because your system is busy doing this nasty housekeeping and taking away this toxic waste out of your body, you go in acid, and the easiest answer is to juice a lemon, take Alka-Seltzer Gold or to use these citrate supplements. Citrate helps to alkalize, which is really great because now the kidney cells have an extra citric acid they can release from their own physiology into the urine, and that's a critical factor.

If you have low citrate in your urine, you're at risk for kidney stones because the citrate prevents us from getting the stones and helps to break down stones. I believe citrate's attracted to the calcium and the calcium oxalate molecule or crystal nanocrystal or microcrystal. It attaches to the calcium side of the crystal, and it has an electromagnetic pull on that calcium that weakens the bond between the oxalate and the calcium.

So, now you have a three-way love affair where the two molecules are fighting over that calcium and the citrate wins. What that does is it turns the crystal of calcium oxalate, which is firm like quartz or glass, and it turns it into more of a chalky substance that's easier to break down."

If you use a powder form of the citrates, take a quarter teaspoon twice a day with meals. Norton prefers taking calcium citrate or magnesium citrate at bedtime. Both help soothe the nervous system and improve sleep. When using calcium citrate, she recommends breaking taking one dose at bedtime and one in the morning, plus two doses spread out during the day. With magnesium, twice a day is sufficient.

More Information

Norton hopes to publish a video course on oxalates sometime in 2023, hopefully by March. She's also planning add-on training for health providers to get them up to speed. In the meantime, you can pick up a copy of of "[Toxic Superfoods: How Oxalate Overload Is Making You Sick – and How to Get Better](#)." I believe the issue of oxalates is a vitally important aspect of optimal health that many miss.

You can also find more information on [SallyNorton.com](#), including a free downloadable PDF of low-oxalate recipes. There, you can also sign up for a Zoom group.

"We keep them small so you can interact with people and meet people that are on the journey with you and do some teaching there," she says. "Eventually, when the course is out, we'll be able to do more of the chat and share and talk about individual situations as a way to get into the material."

Sources and References

- ¹ [Sally Norton Oxalate Answers](#)