

How to Assess Your Biochemical Individuality

Analysis by [Dr. Joseph Mercola](#)

✓ Fact Checked

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STORY AT-A-GLANCE

- › Functional genomics testing looks at the single nucleotide polymorphisms (SNPs, pronounced “snips”) of genes
- › The urine organic acid test (OAT) can provide valuable insight into your biochemical individuality, and combined with genomics testing can help chart a course for healing complex, chronic health problems
- › G6PD insufficiency, the most common enzyme insufficiency in the world, can result in a significant loss of NADPH, thereby increasing inflammation and decreasing mitochondrial function
- › Elevated oxalate is a common cause of chronic pain and fibromyalgia. One way to lower your oxalate level is to take Epsom salt baths, as the sulfate will displace the oxalates
- › If you suspect oxalates are part of your health problems, combining high-oxalate food with calcium-rich foods or a calcium supplement will prevent the oxalate from causing a problem by binding to the calcium in your digestive tract

Emily Givler¹ is a functional genetic nutrition consultant with the NutriGenetic Research Institute and Tree of Life, founded by Robert Miller, a traditional naturopath and trailblazer in the field of functional genomics, which looks at the single nucleotide polymorphisms (SNPs, pronounced "snips") of genes.

Here, Givler discusses the benefits of the urine organic acid test (OAT) – a little-known test that can provide you with valuable insight into your biochemical individuality.

"We're all living in this super toxic world, so everyone is being confronted by insult and injury to their bodies every day. Even those of us who are in this field can tweak things based on our biochemistry to make things work better for us," she says.

"There's not one right answer for everybody. We've got to find what makes us unique and find those places where we're a little bit more vulnerable and support those areas appropriately."

Givler's Personal Story

Givler's own health challenges were in part what drove her into the field of functional nutrition. She explains:

"I started with chronic pain and pretty excessive fatigue as a teenager ... I had test after test and really got no answers. It took about five years before I got a fibromyalgia diagnosis. At the time, it was reassuring to know that this wasn't all in my head. Other people felt this way too.

But where I got frustrated was the only recommendations I was given were narcotic painkillers or antidepressants ... I was still a teenager. I decided I wanted to have a liver and kidneys by the time that I was 40, so I did not go down that route.

But I really had to carve out my own path to try to regain my health. I definitely had some missteps along the way. I stopped eating meat. I started eating a lot of spinach, beets and Swiss chard. Sounds good, right? I was eating these three meals a day, seven days a week and just felt worse and worse.

My rheumatologist told me to plan on being disabled by the time I was 30. I was about 20 at the time and thinking, 'Boy, I knew to expect disability, but I didn't think it would happen this fast.'

It turned out I was really dealing with extremely high levels of oxalates, which cause crystalline precipitates to form in the muscle and connective tissue. This was causing much of my pain and depleting my nicotinamide adenine dinucleotide phosphate (NADPH), which was zapping my energy. I looked like I had fibromyalgia. I really think a lot of people who have that label are probably dealing with something similar.

The healthy foods I was eating, the spinach and the beets, are sky-high in oxalates. I don't want to suggest that no one should eat them, but I was poisoning myself with these healthy foods ... The lowest my pain level ever got was an 8 out of 10.

I can say that now, almost two decades later, it's completely managed with no painkillers ... There are too many people who suffer every day. They think they're doing the right things. On paper, they're doing the right things. But what's right for one person may be totally wrong for them, [and] there are ways you can figure this out rather than just fumbling through the way I did."

SNP and OAT Testing Are a Powerful Combination

The irrefutable evidence Givler needed was found in her OAT test. She'd also done Miller's functional genomics test, which further supported her conclusion that her fibromyalgia was related to an excess of dietary oxalates.

Indeed, the combination of functional genomics testing and OAT can be very powerful. When I had the SNP test done, it revealed I have a genetic variant that is essentially equivalent to celiac disease, with the crucial difference that it does not cause any noticeable gastrointestinal issues. Still, this genetic flaw means I must abstain from gluten to optimize my health and avoid autoimmune problems. Turns out I have a problem with oxalate as well.

"As clinicians, we tend to get into the habit of wanting to put people on a protocol. We find something that works and we push it. It may work for a lot of

people, but there are always going to be people who slip through the cracks because there are differences in our biochemistry," Givler says.

"Whether it's differences because of genetic predispositions that may make us metabolize things, like oxalates, histamine or glutamate, differently than the average person, or because of particular environmental insults that we're exposed to, either because of our occupation or because of our geography – those things pile up and may make us fall outside of that normal box.

If we can use genetics as kind of the framework around which we build our protocols, and then use functional testing like the urine organic acid testing, we can more precisely target the types of dietary choices or nutritional, supplemental interventions, and in some cases, lifestyle changes, we need to implement to really propel us towards health ...

I think histamine foods are a really good example. We can read volumes about how good fermented foods are for your gut ... and how we should be eating these things every day. But if you can't clear histamine, or if you're dealing with excessive mast cell activation, and you bring these foods into your diet, you may set off a catastrophic cascade of events and make your symptoms exponentially worse.

Too often then, you're going to be told, 'You're just having die-off. Just keep going. You're just not doing enough of it,' when actually you may be making yourself sicker. Getting the right guidance with the right functional testing can really make a huge difference in people getting on the right plan for themselves."

The Most Common Genetic Disorder in the World

Givler's SNP test also revealed she has glucose-6-phosphate dehydrogenase (G6PD) insufficiency, which is one of the most common enzyme insufficiencies in the world.

"This is where things get complicated," she says. "Very few of us are dealing with just one thing. We have to see where these patterns of weakness kind of pile up ... G6PD insufficiency ... can result in a significant loss of NADPH. That can increase inflammation in the body and decrease mitochondrial function.

That, piled on top of my genetic predispositions to over-absorb oxalates, which will also deplete NADPH, really gives me a one-two punch when it comes to energy ... [Dr. Mercola] and I have spoken pretty extensively about things I can do to rebuild my nicotinamide adenine dinucleotide (NAD) and NADPH levels. That has really helped me to propel my health to the next level as well."

NADPH may in fact be as important as adenosine triphosphate (ATP), because while it lowers inflammation, it's also the primary source of electrons in your body to internally recharge antioxidants such as glutathione, vitamin C and vitamin E. If that's not working, it's very difficult to get healthy.

The good news is there are simple and inexpensive ways to improve your NADPH, such as glycine supplementation. The bad news is you won't know you have a serious NADPH problem unless you do these two tests.

In my view, doing genomic and OAT testing can go a long way toward figuring out what you need to do if you have a chronic complex problem and not getting better, and Givler is quite skilled in interpreting these tests. In my case, she also detected a B2 insufficiency. She explains:

"So few people are thinking about B1, B2 and B6, but they are critical. For you, for true metabolic flexibility, getting adequate B2 to work with the level of fat that you're eating was a big piece of it. Interestingly, with the gluten, it was not just the SNP test that showed it. That was reflected on the organic acid test as well. It took about four months, being strictly gluten-free, for you to get that metabolite back in line ...

It's amazing how much insight we can get from looking at the right functional testing. These two are just a one-two punch for figuring out, 'Is it some inborn

issue that you need more of a certain nutrient than someone else, or is it just poor dietary choices for you? Is it an environmental toxin?' When we pair [SNP and OAT] together, so many of those pieces really come to light."

Is Glyphosate Exposure Affecting Your Health?

There are several different labs where you can order glyphosate screening for yourself and your pets, for example, EnviroScience's ELISA (enzyme linked immunosorbent assay) method, which utilizes an antibody specific for glyphosate,² and my preferred lab, Health Research Institute, whose testing kits I include in my online store.

According to Givler, certain patterns in your OAT results can also be indicative of a problem with glyphosate exposure.

"We can see patterns when there is high level of glyphosate exposure," Givler says. "Glyphosate's very disruptive for the gut microbiome but it doesn't kill all species uniformly.

If there are elevations in clostridia species, yeast and depleted beneficial bacteria, that is one pattern you can see with glyphosate exposure, because it'll kill the lactobacilli and the bifidobacterium and leave some of the more opportunistic organisms, which will make you more vulnerable to lipopolysaccharides.

Glyphosate also breaks down into oxalate. For some people who are not dealing with the genetic predisposition but are dealing with the secondary hyperoxaluria, that may be a result of glyphosate as well. If we see a lot of mineral depletions – since glyphosate is a mineral chelator – that may be an indicator that there are some problems.

High succinate on the OAT test also can be an indicator, because succinate and glycine combine to move into the heme pathway. Without the glycine, if it's being disrupted by glyphosate, that level may be elevated. If you're seeing high

oxalates, high succinate, high clostridia and low good bacteria, I would start looking for glyphosate exposure."

A Clinical Example: My Personal OAT Results

To give you an idea of what OAT might tell you, I share my own test results in this interview, which Givler interpreted for me. My first OAT was in August, and the results shocked me. It was not at all what I expected considering how strict I am about living a healthy lifestyle and eating a healthy organic diet.

"There were definitely some things out of line," Givler says. "One of the first things that I always tell my clients is this is a written explanation for why you're feeling how you're feeling. Sometimes when people see things out of line, they get really upset about it ...

But if we don't know what's wrong, then we don't know how to bring you back into balance. I'm a data lover. The more data we can collect, the better. This showed us that your gut was not in the best of shape. You were maybe overdoing it on good bacteria. I recommend that you slow down on your probiotics."

Turns out I had small intestinal bacterial overgrowth, also known as SIBO. Interestingly, I'm a huge fan of [molecular hydrogen](#), as it has a long list of health benefits. Alas, SIBO type C is one of the few, if not the only, clinical conditions where molecular hydrogen may actually do more harm than good, as it feeds the bacterial overgrowth.

SIBO-C is typically caused by an overgrowth of archaea, which feed on hydrogen. Now, I had SIBO type D. But SIBO-D will often progress to SIBO-C, because the overabundant bacteria that cause the diarrhea produce hydrogen, which then feed the archaea, which then produce the methane, which then causes the constipation.

"That's why many people see evolving gastrointestinal issues that start in one way and end up another way," Givler says. "If you take hydrogen water and you

get gassy, bloated, constipated or brain fogged, there is a really good chance that there's an overabundance of organisms in your digestive tract."

In my case, the therapy was cutting down on fiber and eliminating gluten. Elevated hippurate also revealed that my phase II liver detox was not keeping up with phase I. Givler explains:

"Phase I was moving too fast for phase II. Phase I takes those fat-soluble toxins and turns them into intermediary metabolites, which are more toxic than those toxins when they were sequestered in fat cells ... They should move right onto phase II to move into one of our six conjugative pathways of detoxification so they turn into a water-soluble form to leave the body.

When hippurate is elevated, it's often an indicator that you're getting stuck with those more toxic intermediary metabolites. Phase II needs a little bit of assistance."

My last test, in February, revealed the bacteria in my gut had rebalanced, but I still need to improve my phase II detox pathway. This test also revealed a mold marker suggestive of black mold exposure, which makes sense, as I had a small leak in my laundry room that had gone unnoticed for perhaps a year or more. Some of the wood behind the wall was rotted through by the time I discovered the problem.

Oxalates May Be a Problem Even if Test Results Are Negative

As mentioned, one thing that's an issue for both of us are the oxalates. Interestingly, oxalates may be a problem even if your test is normal. Givler explains:

"[In your] first test we saw an overt elevation. There were oxalates physically leaving your body. The oxalic acid was elevated. But if you are storing oxalates, if they're all aggregated in connective tissue, in the lungs or the pelvic griddle, in your brain or in your eyes ... then they don't necessarily show up in unprovoked urine tests.

Just in the same way that if you are doing an unprovoked heavy metal test, you are only seeing what's excreted and not what's being stored. There are times that the oxalic acid can show up in range, or even low, when there is truly a high body burden of oxalates.

This is where [you need to look] at the bigger picture. Is there mold? Is there yeast? Are there other types of dysbiosis? Are there genetic predispositions on genes like the alanine-glyoxylate aminotransferase (AGXT) or the glyoxylate and hydroxypyruvate reductase (GRHPR) or 4-hydroxy-2-oxoglutarate aldolase 1 (HOGA-1)?

If you find variants there and you find patterns of inflammation and pain presentations going along with it, then you may actually be dealing with retained oxalates. This is a risk for osteoporosis. It's a risk for iron deficiency anemia because the oxalates will chelate your calcium; they'll chelate your magnesium; they'll chelate your iron and form these really painful precipitates.

The most common form or the one that people are most familiar with are kidney stones because the oxalates [are] physically leaving your body ... But only 0.5% of people who have oxalate issues will actually develop kidney stones. The other 99.5% have issues, like myself, where the pain presentation or those oxalates are actually trapped in the body and creating issues.

They're linked with some really serious health conditions, as well as a pretty significant amount of chronic pain. Like myself, they may find themselves doing healthy things that are really wrong for them, but there are some really excellent, easy and inexpensive things you can do if you suspect the oxalates are an issue. Or if you have testing like this that tells you beyond a shadow of a doubt that, yes, oxalates are a problem."

How to Lower Your Oxalate Level

One way to lower your oxalate level is to take Epsom salt baths. Epsom salt is magnesium sulfate. When you eat sulfurous foods such as broccoli, cauliflower, cabbage and eggs, your body must metabolize that sulfur. The sulfur goes through a multistep process, getting converted into sulfite and then into sulfate.

When you take an Epsom salt bath or foot soak, on the other hand, it's already in the sulfate form, which your body can absorb transdermally, thereby displacing a lot of the oxalates.

"Many of your listeners probably use Epsom salt soaks for aching muscles and they think, 'Oh, the magnesium is really helping me.' I don't want to discount the role of magnesium – it's really important for that – but that sulfate the magnesium is bonded to, if there are oxalates, that's the part that's really making the difference with pain," Givler says.

"If you suspect oxalates, the Epsom salts are a pretty safe, gentle and effective way of starting to move those out of your system."

Another little pearl Givler taught me is to combine any high-oxalate food I eat with calcium-rich foods or a calcium supplement. The oxalates will then bind to the calcium in the digestive tract, preventing them from becoming a problem.

"The oxalates get into the system through the sulfate transporters, and then they attach to the sulfate receptor sites, which is part of why they're able to get into so many tissues.

We tend to think about absorption as being a function of the small intestine, but our sulfate transporters are all over the colon. If you can bind the oxalate and the minerals in the stomach, then they will bypass those transporters in the colon and be excreted in the stool without giving you any difficulty," she says.

"Bringing in any type of calcium source ... is a really good idea if you have oxalate issues."

More Information

You can learn more about Givler and/or become a client by visiting the [Tree of Life website](#).

"For many, food has become the enemy because they can't figure out what they'll actually feel good on. They don't realize they don't necessarily have to navigate that road on their own through trial and error.

We can take targeted action, eliminate a lot of the guesswork, actually make progress and save a lot of money by testing and seeing what the right answer is for you, rather than shifting through wrong answer after wrong answer," Givler says.

The NutriGenetic Research Institute also offers a 30-hour, 14-module [online certification course to become a nutritional genetic consultant](#) for health practitioners. This course will teach you what you need to know about functional genomic analysis and how to apply it in your own practice. Webinars for health practitioners are held every other Thursday.

Patients interested in more information are directed to the [yourgenomicresource.com](#) which includes a listing of doctors who have completed the training and are qualified to provide nutritional guidance based on your SNPs.

Sources and References

- ¹ [Tree of Life Emily Givler DSC](#)
- ² [EnviroScience. Glyphosate and Pesticide Toxicity Testing](#)