



Your Guide to Antinutrients from Plants



ingredientologist
INGREDIENTS FOR HEALTHIER HUMANS

Your Guide to Antinutrients from Plants

Wait, what? *Antinutrients*? Yes, there is such a thing, and they're so appropriately named because they oppose the action of essential nutrients, vitamins and minerals in our diet by blocking our body's ability to digest, absorb and use them properly. Not only that, but they are also the underlying cause of many gut issues like irritable bowel syndrome (IBS) and leaky gut syndrome.

While they're naturally abundant in many foods, even very healthy ones, being aware of where they are and how they function may be the step you need to take to make notable improvements to your health.

What are antinutrients?

Plants are inherently healthy, right? Yes, and no. We just expect plants to be good for us, because that's what we're told, but the truth is that we have to be careful about what we eat, no matter what the source is. Some natural compounds are poisonous to us, like arsenic, and some (too many) natural foods are contaminated with one of the most detrimental 'antinutrients'; round-up! The bottom-line is that while plants are healthy for us, some do contain natural compounds that are counterintuitive to our health. These compounds have been collectively called *anti-nutrients*. Just because plants are natural doesn't mean they're healthy.

These 'nutrient-sapping phytochemicals' are a plant's natural defense mechanism - it's their way of fighting back. As with all species on earth, plants just want to survive. In an attempt to prevent them from being eaten to extinction, plants produce natural chemicals that when eaten cause some degree of sickness which discourages us, animals and insects from eating them in the future.

Humans and animals have always and will always eat some plants in their diet, but we need to understand that plants have the ability to fight back. Some antinutrients are extremely toxic, while others have almost unnoticeable effects on our health. In most cases, the nutritional health benefits from eating foods that contain some antinutrients outweigh the negative nutritional effects, as they're also very rich in vitamins, minerals, fiber and protein.

Antinutrients are highest in grains, seeds, legumes, beans and nuts but are also in plant roots, stems and leaves. There is no way of knowing exactly how many are in each food, but we have a rough idea thanks to research. Not all antinutrients are bad, however, and we don't need to eliminate every single one from our diets - that can become a very restrictive and depressing way to live. Some can actually be beneficial, acting as antioxidants or having anticancer effects and so avoiding them completely is not recommended.

What we do know is that people vary by how sensitive they are to antinutrients and what types affect them. You guessed it, that means a little bit of self experimentation is required to narrow in on which, if any, antinutrients are having negative impacts on your health.

The best way to identify whether you're particularly sensitive is to observe how you feel after eating certain foods. You need to be intuitive and perhaps record how you feel regularly. Symptoms vary, but if your body is reacting to a certain antinutrient in a food, you'll experience things like:

- Fatigue
- Nausea
- Brain fog
- IBS
- Diarrhea
- Bloating & gas

While antinutrients are hard to avoid completely, we can reduce the amount we consume and their impact. Two of the best ways are:

- *Carefully preparing foods:* Most antinutrients can be deactivated or removed by cooking, soaking, sprouting or boiling foods that contain them. For example, fully cooked beans usually contain between 200 and 400 units while the same raw kidney beans contain from 20,000 to 70,000 lectin units.
- *Focus on variety:* Avoid eating a lot of one type of high antinutrient-containing foods in one meal. Rather than eating a large serving of whole grains for example, have a smaller amount and combine it with other vegetables. Aim to increase your variety of foods at each meal and throughout the day to avoid 'overloading' with antinutrients.

- *Focus on timing:* Meal timing can be helpful too because antinutrients interfere with the absorption of certain nutrients. For example, only drink tea in between meals instead of with meals to avoid decreasing iron absorption from your food.

Hopefully, we're all aware that many health fads come and go. They gain a lot of traction and hype, sweeping across the media, and then naturally they fade away because, in reality, there's no one diet that will work for everyone. One particular buzzword that has seemed to linger for longer is 'gluten-free'. Gluten-free diets have worked wonders for many people, improving weight loss and solving many health issues from IBS and leaky gut to joint pain and fatigue.

What many people don't know is that gluten is an antinutrient. But, it is only one of many that scientists have uncovered and while gluten may be one of the major players in many health problems and weight gain, it is only part of the problem. There are other antinutrients that most people aren't aware of and these guys may just be the culprits.

The main antinutrients we have to look out for are gluten, lectins, phytates and oxalates. Let's take a look at each one to better understand what they're doing in our bodies.

THE DARK SIDE OF PLANTS

MANY PLANTS ARE HEALTHY FOR US

BUT SOME CONTAIN "ANTINUTRIENTS" THERE ARE 3 TYPES:

LECTINS ARE...
indigestible protein that travels through the gut unchanged. High quantities will damage your gut wall (may lead to leaky gut). They also bind to several nutrients and decrease their absorption.
Gluten is the most well-know example!

OXALATES ARE...
found in many plants. They also bind to minerals and inhibit absorption, which can lead to kidney stones.

PHYTATES ARE...
the main storage form of phosphorus in seeds. They bind to minerals and stop their absorption.

Gluten

The most well known antinutrient by far is gluten. Gluten is actually a family of proteins called glutenin and gliadin found in cereal grains such as wheat, barley and rye. While they offer wonderful functional benefits in the culinary industry giving bread a soft and chewy texture, gluten can wreak havoc on certain people's health. There are varying degrees of gluten sensitivity. They include:

- *Celiac disease*: A serious autoimmune condition where a person's immune system attacks gluten fragments (partially digested gluten) within the small intestine after eating gluten. Genetic and environmental factors (such as feeding patterns as a baby) influence incidence of the disease and severity of symptoms.
- *Non-celiac gluten-sensitivity*: It is uncertain what the underlying cause for adverse reactions to gluten is here, but some individuals experience symptoms similar to celiac in response to gluten-containing products.

Symptoms of celiac disease include skin problems (eczema; rashes), gut issues (inflammation; diarrhea; pain) and neurological issues (fatigue; confusion; depression).

Everyone knows somebody who is either celiac or has a 'gluten sensitivity' in the absence of celiac. Any sensitivities in those who are negative when tested for celiac disease may be due to other proteins present in grain-based products, such as lectins. As the interest in gluten-free diets increases in the general population, more and more food options are appearing which make a celiac's life a lot easier. But, gluten-free diets are becoming trendy and people are opting for gluten-free products simply because they appear to be healthy when, in fact they contain ingredients that are often worse for our health.



There is no human protein or enzyme that can properly break down gluten. That is a fact. So when we eat gluten, these partially broken clumps of gluten protein are floating in our bloodstream, and our immune system reacts with them, launching a cascade of immune responses and leading to the many symptoms of gluten intolerance. What's more is that these gluteomorphins actually bind to opioid receptors in the brain, exactly like morphine does triggering the production of endorphins - the feel-good hormones! Constantly stimulating these endorphins with bread, pasta and that blueberry muffin leads to you needing more and more to get that same feel-good response. So, gluten is addictive.

Gluten doesn't necessarily bind to minerals or other nutrients to limit their absorption directly, but they cause nutrient deficiencies in other ways. Gluten can cause a lot of inflammation and

irritation in the gut, damaging the gut barrier and disrupting normal nutrient absorption. The gut microbiome is also negatively affected resulting in poor gut functioning too.

While gluten-free diets may be the answer to your health problems, some gluten-free products on the market now may be even worse than gluten-containing products. They're highly processed, and packed with more nonsense than real foods. Many products that wouldn't normally contain gluten like sauces and spice blends have gluten added to them. So, read your labels! The best gluten-free diet is one that is whole-foods based.

Lectins

One of the more well-known antinutrients, lectins have received a lot of attention in the media with several 'lectin-free' diets appearing. They're found in all plants, but raw legumes (peanuts, beans, soy, lentils) and whole grains like wheat are particularly high in lectins. The part of the plant that develops into the leaves when the plant sprouts, aka the cotyledon or the seed coat, contains the most lectins.

Many fruits and vegetables contain lectins but the main culprit vegetables are called 'nightshades' which are particularly high in lectins. This includes:

- Eggplant
- Goji Berries
- Ground cherries (not regular cherries)
- All peppers (spicy peppers, bell peppers, etc.)
- All red spices
- Potato
- Tomato

Many people with gut intolerances, IBS or leaky gut are pointed towards following a diet called the Autoimmune Protocol (AIP). The AIP diet excludes all nightshades and many people become aware of the fact that these nightshades are the cause of their autoimmune-flare. Things like swollen joints and gums, fatigue, nausea and whole body inflammation seem to disappear when they remove nightshades from their diet.

Lectins are 'carbohydrate binding proteins' which simply means that they're plant proteins that when ingested, cause clumping of carbohydrates in our bodies. Whether it is in our gut, bloodstream or other tissues, lectins find any sugar molecules and stick to them. Our immune

system responds to these 'sticky' clumps which results in inflammation. By binding to cell surfaces, lectins interfere with cell-to-cell communication and disrupt normal functioning of our bodies.



Once in the gut, lectins can bind to the cells of the gut lining, damaging them and weakening the gut barrier. The result is a 'leaky gut' that allows other proteins, and lectins, to seep into the bloodstream that normally wouldn't. Our immune system detects these 'foreign' proteins in our blood, and an immune response ensues as we produce antibodies to attack them. The degree to which your immune system reacts determines your sensitivity to lectins and can vary greatly from person to person. A leaky gut also prevents normal absorption of essential nutrients.

If you're very sensitive to lectins, you'll probably know it, and will want to take extra measures to limit your intake. Eliminating nightshades from your diet is a great place to start.

Phytates

Phytate, or phytic acid, is known to have strong antinutritional properties by 'chelating calcium, iron and zinc', which means it binds to these minerals forming complexes that can't be absorbed by the gut properly, leading to mineral deficiencies. Humans can't metabolize phytates in foods because we lack the enzyme that breaks it down called phytase, which leaves it free to bind to minerals from our diet.

On top of limiting mineral bioavailability, phytates can also bind to the protein from our diet which prevents protein degrading enzymes, proteases, from being able to metabolize them. This further leads to nutritional deficiencies.

Phytates are present only in plants, with the most found in the seeds, which serve as the main storage form of phosphorus which plants use to grow when the seeds sprout. All edible seeds, nuts, grains and legumes contain phytates with small amounts in roots and tubers too. As with other antinutrients, fermenting, soaking, milling and cooking phytate-rich foods can reduce phytate content.



Iron and zinc are two minerals we get from our diet that are particularly affected by phytates in plants. The absorption of non-heme iron, the form of iron that plants provide, is influenced by phytates and so people with iron deficiency and vegans or vegetarians should take extra steps to limit eating phytate-rich foods with their meals. This is also why it is recommended that vegans and vegetarians eat more iron containing foods than omnivores.

Interestingly though, phytates are also known to have some positive health effects such as antioxidant properties, and being preventative for cardiovascular disease, kidney stones and insulin resistance. So they're not to be avoided completely, but their timing and amount should be carefully monitored.

Oxalates

This particular antinutrient is an organic compound found in raw cruciferous vegetables like kale, broccoli, cauliflower and radishes, as well as cacao, black pepper, rhubarb, nuts and beans. There are more oxalates in younger plants and fewer in older, more ripe plants. Your gut bacteria and the integrity of your gut barrier determines how much oxalate you actually absorb. People with low levels of oxalate fermenting bacteria and those with leaky gut or IBS have little control over how much oxalate gets absorbed in the gut.

Like the other antinutrients, oxalates also block mineral absorption in the body, but mainly calcium. Oxalates can bind to calcium, and other minerals like iron, in the gut when we eat food, or in our blood stream or kidneys. For example, spinach contains calcium and oxalates, and so very little calcium is absorbed from spinach.

By binding to calcium in the blood, oxalates form tiny, sharp crystals, called calcium salts, that can be deposited anywhere in our bodily tissues. These oxalate crystals can cause joint pain or burning eyes, mouth, ears and throat. They're often the hidden, underlying cause to many people's unresolved health issues, and when a concerted effort is made to limit oxalate intake, their health improves.

Kidney stones are actually formed by oxalates depositing in the kidneys. The kidneys clean our blood by removing toxins or waste and putting them into urine. When we absorb too much oxalates, they get excreted in the urine but can crystallize with calcium to form kidney stones.



It has been shamed as the real 'bad guy' especially amongst the carnivore community. If you read any material online about the benefits of a 'carnivore diet' - a diet that consists of only animal products like meat, seafood, organs and eggs - one of the main reasons for its positive effects points to the elimination of oxalates. Again, people respond differently, some may not be affected at all by oxalates, while others are extremely sensitive to their effects. The latter are the individuals who likely benefit most from the extremely restrictive nature of a carnivore diet.

Oxalates can be reduced in foods by cooking and draining the water or by soaking them in acid. Having too low dietary calcium can increase the amount you absorb because calcium can bind to oxalate in the gut, stopping it from being absorbed. Choose low oxalate vegetables, and avoid eating large amounts of raw vegetables as they're typically higher in oxalates.

How To Reduce Antinutrient Content In Foods?

While a diet that eliminates plant foods completely sounds a little extreme, there are many people adopting the infamous 'carnivore diet' and seeing many benefits. But, you don't have to go to that extreme, and you still can enjoy your favorite plant foods by using a few cooking techniques.

There are ways to reduce and sometimes completely eliminate the antinutrient content in foods and they're nothing new; they've been culinary practices for many centuries, we've just forgotten about them. Though they're simple to do and require some time and effort to carry out, you'll thank yourself later. Here are some ways you can reduce your antinutrient exposure:

Soaking: allowing some grains, beans, legumes, nuts, seeds and even some vegetables to soak in water over night has been shown to reduce the level of antinutrients they contain. Antinutrients are often found in the skin of the food and are water soluble, so they dissolve when soaked. The efficacy may depend on the type of bean/legume etc. but one study showed a 8-16 hour soak reduced lectin content in peas by 38-50%! Soaking can also decrease oxalates in leafy green vegetables.

How? Rinse the beans/legumes/seeds. Place them in a bowl and add enough water to cover them. Soak for 8-24 hours (the time depends on the food). Rinse and add fresh water every 6 hours if possible.

Sprouting: This simply means taking the plant to a period in its life cycle called germination; when it starts to grow from the seed. It can take up to a few days and makes the nutrients in plants more bioavailable - meaning we can absorb them better in our gut. When the seed gets ready to grow, certain anti nutrients are deactivated. Phytates have been shown to be reduced by 37-81% in various grains, beans and legumes. You can do this with most seeds, nuts, beans, legumes and some grains and detailed explanations can be found on various websites.

How? Carry out the soaking process described above. After rinsing thoroughly, place them in a glass jar or sprouting vessel, away from direct sunlight. Rinse once every 8-12 hours until you see sprouts appearing.

Fermentation: In this process, natural bacteria and yeast begin to digest the carbs in foods. This degrades the antinutrients in plants. Cheese, bread, wine, beer and kimchi are examples of fermented foods. Fermenting kidney beans for 48 hours reduced phytates by 88%.

How? Make bread using a traditional sourdough starter culture, or you can soak any grains/beans/legumes as described above and leave at room temperature to start fermenting. Once again, follow guides online for specific instructions.

Boiling: The high temperatures are effective for destroying many antinutrients. Phytates are the most heat resistant of the antinutrients, but oxalates, lectins and tannins are reduced significantly.

How? The length of time will depend on the antinutrient type and the food, but longer boiling times are more effective. Simply boil the food and rinse afterwards.

A combination of the above methods is most effective for degrading antinutrients and making the nutrients in plants more bioavailable. I know boiling and soaking are so ‘last year’ and we’re into air-frying or instantizing everything, but trust me on this one. It is a good idea to make some of these techniques habits in the kitchen as they may help to take your health to the next level!

Take-away

While we get nourishment from nutrients to grow, antinutrients block our ability to absorb them. Luckily, we can lessen the impact they have by taking extra steps in preparing and processing foods or eliminating certain foods from our diet after identifying those that affect us most. Certain diets are constructed around limiting anti-nutrient intake and while many may be fads that don’t work, there is one diet I believe to be effective for overall health, including reducing anti-nutrients and that is the Paleo diet. I’ll dive deeper into the basis of the Paleo diet in upcoming guides and why it is one of the many that have stuck around for years.

Don’t forget that while antinutrients are known to cause problems, you may not be particularly sensitive to them. But, if you are, you’re now equipped with the knowledge of how to identify them and ways to limit their impact.

10 TOP ANTINUTRIENTS



CHICKPEAS
PHYTATES



ALMONDS
OXALATES & PHYTATES



PEANUTS
LECTINS & PHYTATES



POTATOES
OXALATES & PHYTATES



CORN
PHYTATES



SPINACH
OXALATES



WHEAT
LECTINS, PHYTATES,
OXALATES & GLUTEN



SOY BEANS
LECTINS, PHYTATES
& OXALATES



KIDNEY BEANS
LECTINS



TOMATOES
LECTINS



Look out for more guides coming soon where I will delve a little deeper into each of these antinutrients and how we can hack our diets to minimize their negative effects! Share this with someone you feel may benefit from knowing more about how what they're eating might be causing their health issues.

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