



SIBO/IMO VERSUS IBS VS LEAKY GUT

What You Really Have,
and What to Do About It

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Gut Health: The Foundation to Overall Wellness

We are sicker than we've ever been. Sorry to start off with such a depressing comment. Let's do a reality check.

More people have chronic illness, autoimmune diseases, and gut health concerns than ever before. (Just take it from the 25,000 in my [SIBO SOS® Community Facebook group](#) alone!)

So what's the cause of this? Is it poor diet, genetics, or environmental toxins? Perhaps it's the medications we are using or the incredible stress we're under?

No matter the cause, one thing is clear: gut health is vital to our wellness. Without gut health, we don't have a foundation to build on. It's like trying to build a house on a cracked foundation with muddy soil. It's unstable and useless... and could even be dangerous!

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WHY GUT HEALTH MATTERS



Gut health affects your overall health in seven really important ways, backed by research.

1


Gut health affects your immune system

Your gut is home to 70% of your immune system¹. The gut-associated lymphoid tissue (GALT) and microorganisms in the gut work together to protect you against infection and disease.

2

Gut health plays a role in digestion and nutrient absorption

A healthy gut means efficient digestion and nutrient absorption. The gut microbiota helps break down food, extract nutrients, and synthesize vitamins that the body needs. These nutrients are essential for cell growth, repair, and metabolism.

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¹ <https://pubmed.ncbi.nlm.nih.gov/33803407/>

3

Gut health is linked to mental health

There's a strong link between gut health and mental health. In fact, the gut-brain axis is a two-way street with bidirectional communication between the microbes in your gut and your entire central nervous system², which is made up of your brain and spinal cord. That means that gut health can affect mental health, and vice versa.

4


Gut health affects hormone balance

The gut microbiota produces short-chain fatty acids (SCFAs) that help regulate appetite and energy storage. SCFAs also play a role in gut-hormone communication³. This gut-hormone communication is important for maintaining a healthy weight, and for overall digestive and immune-modulatory function in the body.

5

Gut health protects against inflammation

Chronic inflammation is linked to many diseases, such as obesity, diabetes, heart disease, and cancer. A healthy gut microbiota helps reduce inflammation by producing anti-inflammatory compounds and modulating the immune system.⁴

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² <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5641835/>

³ <https://pubmed.ncbi.nlm.nih.gov/32238208/>

⁴ <https://pubmed.ncbi.nlm.nih.gov/33086688/>

6

Gut health affects blood sugar levels


The gut microbiota helps regulate blood sugar levels by producing short-chain fatty acids and modulating gut hormone communication. This gut-hormone communication is important for maintaining healthy blood sugar levels.⁵

7

Gut health affects vitamin and mineral absorption

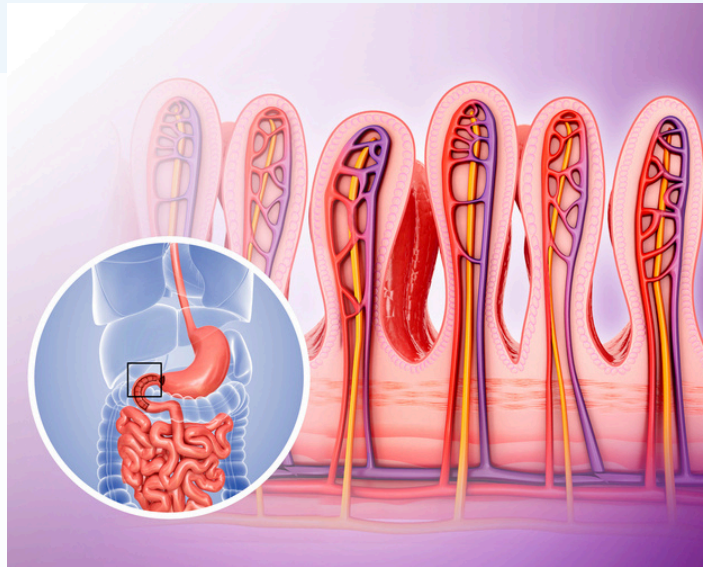
The gut microbiota synthesizes vitamins and minerals that the body needs (most notably, Vitamin K and B vitamins).⁶ These vitamins and minerals are essential for cell growth, repair, and metabolism. The gut microbiota also helps break down food, extract nutrients, and synthesize vitamins that the body needs.

If you want to improve your overall health, a great place to start is with your gut!

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⁵ <https://pubmed.ncbi.nlm.nih.gov/34165440/>

⁶ <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5847071>




What Exactly is Leaky Gut?

Leaky gut syndrome is a condition that occurs when the lining of the intestines becomes weakened or damaged. This can allow toxins, bacteria, and other harmful substances to leak through the intestines and enter the bloodstream, which can lead to a variety of health problems.

Intestinal permeability, in layman's terms, is leaky gut.

While a leaky gut may sound like a minor issue, it can actually cause serious health problems. When the intestinal barrier is damaged, toxins and bacteria can leak out into the bloodstream and cause inflammation. This can lead to a whole host of health problems like autoimmune diseases, food allergies, and even depression. It's important to be aware of the causes of leaky gut and to take steps to heal the gut.

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SO HOW DOES OUR GUT BECOME “LEAKY?”

There are a few different things that can cause intestinal permeability. One is a diet high in refined sugars and processed grains, which can feed bad bacteria and lead to inflammation. Another is chronic stress, which can also contribute to inflammation. And lastly, certain medications like antibiotics and non-steroidal anti-inflammatory drugs (NSAIDs) can also cause leaky gut. All of these things can damage the intestinal barrier and lead to a leaky gut.

The human gut is lined with **a single layer of cells** known as epithelial cells. These cells are held together by **tight junctions**, which form a barrier that prevents the contents of the gut from leaking into the bloodstream.

Leaky gut occurs when the tight junctions between epithelial cells become damaged or weakened, allowing bacteria and other toxins to leak through.

Tight junctions are important for keeping the gut barrier intact and preventing leaky gut.


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Dr. Ilana Guerich describes what happens when we have gut inflammation and intestinal permeability:



“When you have intestinal permeability, the tight junctions are porous and inflamed. That means food, which should be staying in the lumen [small intestine], is able to come through into the lymph system and into the body. Then what you have is a ton of food intolerances because all of a sudden your lymph system is exposed to large particles of food that it should never be exposed to, therefore it treats it like it’s a pathogen, like a bacteria, a fungus or a virus. Then you eat something and your immune system says oh, there’s that bug that I’m fighting and it starts mounting a response but you’re eating it constantly so you’re constantly inflamed or sick or worn out.”


Not only will a *leaky gut* cause digestive issues, but it will also cause your *immune system to activate*... leading into a potential *cascade of health issues* and stress for you.

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Symptoms of Leaky Gut

- Chronic inflammation: This is often characterized by fatigue, brain fog, and joint pain.
- Digestive issues: Leaky gut can lead to digestive problems like bloating, gas, constipation, and diarrhea.
- Skin problems: Eczema, psoriasis, and other skin conditions are often linked to leaky gut.
- Autoimmune disease: When the gut is leaky, it can allow toxins and bacteria to enter the bloodstream, which can trigger an autoimmune response. Autoimmune diseases like Crohn's disease, celiac disease, and rheumatoid arthritis have been linked to leaky gut.
- Neurological symptoms: brain fog, difficulty concentrating
- Fatigue
- Migraines
- Confusion
- Burning sensation in the gut
- Painful indigestion
- Muscle and joint pain



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Some Things to Consider...

Is It SIBO, Leaky Gut, or Something Else?

It's important to note that leaky gut can look like food sensitivities, Small Intestine Bacterial Overgrowth (SIBO) or Intestinal Methanogen Overgrowth (IMO), and a variety of other diseases and conditions. You should also know that leaky gut can occur with other issues - for instance, a person can have SIBO and leaky gut, or Celiac disease and leaky gut.

Later in this e-book, we'll discuss what testing markers can indicate intestinal permeability specifically, but it's also important to work with a trained clinician who can properly diagnose and treat you.

That's exactly why you're here, though - to learn more! You're a warrior and I'm here to encourage you as you take your health into your own hands and become your own best gut health advocate.

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Other Causes of Intestinal Permeability

Intestinal permeability can be affected by a range of environmental stresses and shocks, including NSAIDs, high sugar diet, food intolerances like gluten or lactose, excessive alcohol, stress, or others.


In a case like Celiac Disease, constant irritation to the small intestines causes swelling and is known as enteropathy. **Enteropathy** can be caused by other root issues, but Celiac Disease is the most common.

Ongoing damage or irritation and swelling alters the gut lining (intestinal barrier), which in turn causes improper nutrient absorption and metabolism.

Gut bacteria and food particles then can cross through the intestinal barrier and induce inflammation, which further destroys the gut barrier, leading to a vicious, repetitive cycle.

Increased intestinal permeability and barrier failure like in leaky gut can in turn cause irritable bowel by activating mucosal inflammation and immune abnormalities.

In regards to cognition and brain health, changes in bacteria and inflammatory markers can disrupt the gut-brain axis and cause many other symptoms. This is why inflammation is so critical to address.

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INFLAMMATION AS A ROOT CAUSE OF LEAKY GUT

Inflammation is a major contributing factor to gut health issues.


It affects gut integrity, balance of microbes, and keystone species⁷. It can also lead to overgrowth of pathogens and other gut disorders. Symptoms of gut inflammation include abdominal pain, diarrhea, and constipation. If left untreated, gut inflammation can seriously damage the gut and lead to more serious health problems.

Gut inflammation is also a common cause of leaky gut. As gut inflammation increases, the gut becomes more permeable or “leaky”. This allows substances that would normally be confined to the gut lumen (the space within the gut) to enter the bloodstream. These include toxins, bacteria, undigested food particles and other antigens that would normally be kept out by a healthy gut barrier.

When these substances enter the bloodstream, they can trigger an immune response and cause inflammation throughout the body.

Endotoxemia is a medical term used to describe the presence of endotoxins in the blood. Endotoxemia occurs when endotoxins, which are toxins released by bacteria when they die, build up in the blood.

LPS, or lipopolysaccharide, are a type of endotoxin that can cause inflammation and damage to the gut lining, leading to leaky gut.

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⁷ <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4108331>

LPS are a major factor in endotoxemic and can contribute to gut inflammation.

Kiran Krishnan, Microbiologist and co-founder of Microbiome Lab, describes the connection between SIBO, leaky gut, and LPS:




“The cause of their SIBO is that they have leaky gut, [which allows the endotoxin] LPS to leak in all the time, and that’s disrupts the movement of the bowel. You’re getting overgrowth because the cleansing activity is not working. If you have SIBO, you have a lot of inflammation in the bowel

(especially, of course, the small bowel), and that inflammation can drive this leakiness, can drive LPS going in, and then make the problem worse.”

LPS causes inflammation by stimulating the body's immune system. When endotoxins like LPS are present in the blood, they bind to **toll-like receptors (TLRs)** on immune cells. This binding activates the TLRs, which then triggers a series of events that leads to inflammation.

LPS also damages the gut lining, the barrier that separates the inside of the gut from the rest of the body. When this barrier is damaged, endotoxins and other toxins can leak out of the gut and into the bloodstream. This can cause systemic inflammation and a host of other problems.




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Dr. Ilana Gurevich agrees, the studies and research back up the fact that leaky gut and its root causes can then potentially lead to other symptoms and health issues. *“There’s a lot of studies on endotoxemia. This is one that just talks about elevated lipopolysaccharides (LPS). And remember, that’s that layer that’s on the gram-negative bacteria that causes a lot of inflammation. It causes increased gut permeability. It increases blood pressure. It increases triglycerides. So, all of these things today are really endemic in our population as people are getting sicker and sicker.”*

Leaky gut syndrome is becoming increasingly common, particularly in developed countries where diet and lifestyle factors are thought to play a role. Poor gut health has been linked with a number of chronic diseases including inflammatory bowel disease (IBD), celiac disease, allergies, asthma, eczema, psoriasis, autoimmune diseases, diabetes, and obesity.

There are many different gut disorders that can be caused by inflammation, in addition to leaky gut. Some of the more common ones include:

Irritable bowel syndrome (IBS): IBS is a gut disorder that is characterized by abdominal pain, bloating, constipation and/or diarrhea. It is thought to be caused by a combination of factors including gut inflammation, gut microbial imbalance and stress.

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Crohn's disease: Crohn's disease is a type of IBD that causes inflammation of the gut lining. Symptoms include abdominal pain, cramping, diarrhea, weight loss and fatigue.

Ulcerative colitis: Ulcerative colitis is another type of IBD that causes inflammation and ulcers in the gut lining. Symptoms include abdominal pain, cramping, diarrhea, weight loss and fatigue.


Left untreated, gut inflammation can lead to a number of serious health problems, including:

Leaky gut syndrome: when the gut epithelium is damaged, it becomes more permeable. This allows bacteria, toxins and other harmful substances to “leak” through the gut wall and into the bloodstream, where they can trigger inflammation throughout the body. This is what we're covering in this book!

Autoimmune diseases: gut inflammation has been linked with autoimmune diseases like celiac disease, Crohn's disease and ulcerative colitis.

Nutritional deficiencies: gut inflammation can lead to malabsorption of nutrients, which can lead to deficiencies in vitamins and minerals.

Mental health problems: gut inflammation has been linked with anxiety and depression.

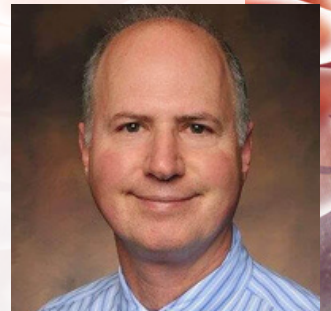
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The Gut & Inflammation

The gut is particularly vulnerable to inflammation because it's lined with a thin layer of cells, called the **gut epithelium**, which acts as a barrier between the gut contents and the rest of the body. This barrier is semi-permeable, meaning some things are able to pass through – like water, electrolytes and nutrients – but other things, like bacteria and toxins, are kept out.⁸

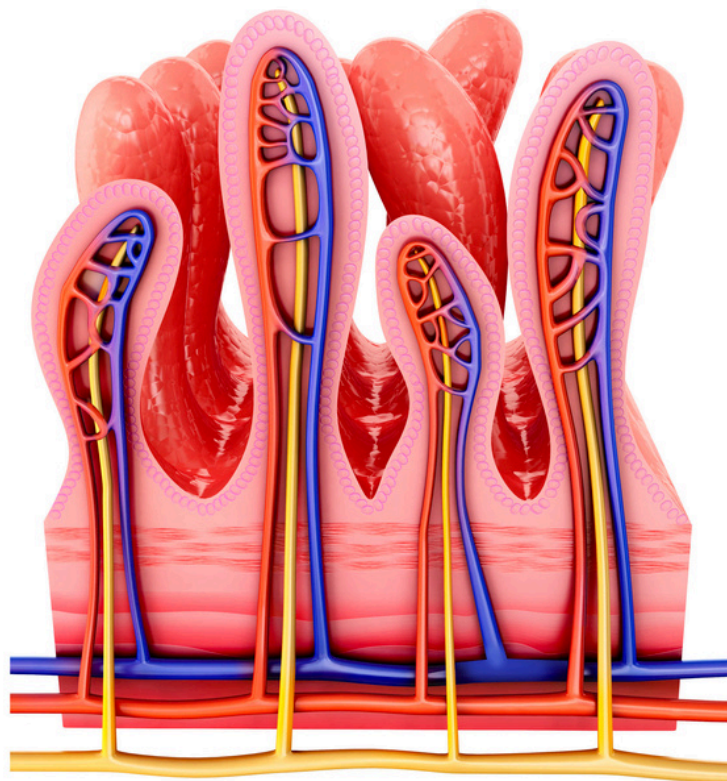
According to **Dr. Leonard Weinstock, MD**, a board-certified gastroenterologist:


“When [the gut barrier is altered], there's abnormal absorption of nutrients and abnormal metabolism. The gut lining is destroyed and there can be an alteration of gut bacteria, and gut bacteria moving into the lining can cause inflammation, which then damages the gut barrier even further, leading towards a vicious cycle. This leads to diarrhea, abdominal discomfort, bloating, and urgency. [You may be wondering] how do you get, perhaps, let's say irritable bowel syndrome out of this abnormal mucosal permeability?”



⁸ <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6790068/>

“Well, you can have a variety of things happening. Increased intestinal permeability and barrier dysfunction can lead to irritable bowel in part through sensory and motor disturbances on the right, and activation of mucosal inflammation and immunity disturbances on the left. Then, going up towards the brain, at the top, one can have alteration in the types of bacteria, the variety of inflammatory markers that are going on, which then can alter the brain-gut axis, which is part of some cases of irritable bowel syndrome. What holds the gut together? Well, the cells that are held together are the tight junctions near the lumen.”



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Gut Dysbiosis & Inflammation


These tight junctions and the gut microbiota – the community of trillions of microbes that live in your gut – also play a role in gut health and inflammation. In a healthy gut, these microbes are in balance. But when there's an imbalance – known as **dysbiosis** – it can lead to inflammation. Studies have shown that dysbiosis is associated with inflammatory bowel disease (IBD), irritable bowel syndrome (IBS) and other gut disorders.

Inflammation is actually acutely helpful in cases where the immune system needs to activate and take care of a foreign invader. When inflammation persists for weeks, months, or years, that's when problems start.

Low-grade inflammation has been linked with just about every degenerative disease you can think of – from heart disease and stroke to cancer, Alzheimer's, and diabetes.⁹

One study found how gut inflammation can affect the gut microbiota, leading to gut dysbiosis. In this study, researchers gave rats a gut inflammation-inducing drug and found that it changed the composition of their gut microbiota.



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⁹ <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6790068/>

The rats had an increase in inflammatory gut bacteria and a decrease in “good” gut bacteria. This gut dysbiosis led to increased gut permeability and inflammation. The epithelial barrier of the intestine and the **gut-associated lymphoid tissue (GALT)** protect the host against luminal pathogenic micro-organisms by increasing **T-lymphocytes**.¹⁰

Other studies have looked at how gut inflammation can affect the gut epithelium.¹¹ In one study, researchers found that **gut inflammation can cause changes in the structure of the gut epithelium, making it more permeable**. This allows harmful substances to “leak” through the gut wall and into the bloodstream, triggering inflammation throughout the body.

Gut inflammation can also lead to the overgrowth of harmful gut bacteria. In one study, researchers found that gut inflammation can promote the growth of pathogenic gut bacteria like *Clostridium difficile*. This gut bacterial overgrowth can lead to gut disorders like IBD and IBS.

Inflammation can be a vicious cycle. It can be the root cause of a number of other diseases and affect a range of body systems. This is why it's vital to address inflammation as a root cause, not only in gut health concerns like leaky gut, but just for your overall health and wellness!

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¹⁰ <https://pubmed.ncbi.nlm.nih.gov/20576204/>


¹¹ <https://pubmed.ncbi.nlm.nih.gov/25593900/>

A study published in 2005 in the *New England Journal of Medicine* found that inflammation plays a role in atherosclerosis¹² – the buildup of plaque in arteries that leads to heart attacks and strokes. People with high levels of inflammation (measured by a blood test for C-reactive protein or CRP) were twice as likely to have a heart attack or stroke as people with low levels of inflammation.

A study published in the *Journal Nature* in 2011 found that inflammation is also a key player in Alzheimer’s disease. The study showed that people with high levels of inflammation (measured by CRP) were more likely to develop Alzheimer’s disease than people with low levels of inflammation.

And a study published in the journal *Annals of African Medicine* in 2019 found that inflammation may play a role in cancer development.¹³ Other studies show that people with high levels of inflammation (measured by CRP) were more likely to develop cancer than people with low levels of inflammation.¹⁴

These studies – and many others – suggest that chronic inflammation may be the link between some of the most serious diseases in the Western world. And gut inflammation may be the starting point.

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¹² <https://www.nejm.org/doi/full/10.1056/nejm200507283530425>

¹³ <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6704802/>

¹⁴ <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7727277/>


MODERN EPIDEMIC: CAUSES OF GUT INFLAMMATION

It seems like nearly everyone in our society has some sort of digestive issue today: from Crohn's disease and ulcerative colitis, to more common gut problems like IBS, heartburn and indigestion. Even those who don't have any specific gut disorder often complain of gut-related symptoms like bloating, gas, pain, cramping, or constipation. So what's going on? Why are our guts so inflamed? Is it our lifestyles, the food we eat, genetics... or something else?

It turns out, it could be a combination of many factors.

One theory is that gut inflammation is the result of a build-up of toxins and other waste products in the gut. Toxins in this case could mean anything from the residues of food additives and pesticides to gut-dwelling bacteria. Other waste might be undigested food particles or old, dead cells lining the gut.

The gut inflammation could also be caused by an imbalance in the gut microbiota, which could be due to a poor diet, antibiotic use, gut infections, or other root causes.¹⁵

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¹⁵ <https://pubmed.ncbi.nlm.nih.gov/23782146/>

10 Common Causes of Gut Inflammation


You're probably thinking, 'How did I get gut inflammation or develop leaky gut in the first place?' There are many possible causes of gut inflammation, but here are eleven of the most common ones:

1

Food sensitivities or allergies: Common food allergens include gluten, dairy, soy, eggs, corn, and peanuts. If you're eating a food that your body is sensitive or intolerant to, it can cause gut inflammation. There are tests you can take to determine if you have any food sensitivities. It's also important to note here that the food you eat can play a vital role in your gut health, though for many, fixing your diet won't solve all your issues. A diet high in sugar, refined carbs, and processed foods can promote gut inflammation. These foods can upset the balance of gut bacteria and lead to gut microbiota imbalance. Healthy foods for gut health include high-fiber vegetables, fermented foods, and probiotics.

2

Dysbiosis: This is an imbalance in the gut flora, or the healthy bacteria that live in our gut. When there's too much bad bacteria and not enough good bacteria, it can lead to gut inflammation. The gut microbiota is the community of microorganisms that live in our gut. These microorganisms play an important role in our health, helping to break down food, produce vitamins, and protect us from infections. Important keystone species include Lactobacillus,

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Akkermansia, and Bifidobacterium. Lesser known strains like Bacteroides fragilis and Bacteroides stercosis¹⁶ have also been shown to be important for gut health, especially impacting the structure of the microbial communities. You can promote growth of the "good" bacteria by eating fermented foods, taking a probiotic supplement, or consuming more fiber or prebiotics to feed the probiotics.

3

Infections: Both viral and bacterial infections can cause gut inflammation. Common culprits include H. pylori (a bacterium that infects the stomach) and various types of food poisoning. There are many bacteria that affect the gut: Clostridium perfringens, Staphylococcus, and Escherichia coli, and many others. Common viruses that affect gut health are rotaviruses, adenoviruses, and noroviruses. These gut infections can lead to gut inflammation and other gut-related symptoms.

4

Low stomach acid: Stomach acid is important for gut health because it helps to kill off bad bacteria and other pathogens that can cause gut inflammation. It also helps to break down food so that the nutrients can be properly absorbed. If you have low stomach acid, it means that these gut-protective functions are not working as they should, which can lead to gut inflammation.¹⁷ Improve stomach acid by avoiding

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¹⁶ <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4108331>

¹⁷ <https://my.clevelandclinic.org/health/diseases/23392>

¹⁸ <https://pubmed.ncbi.nlm.nih.gov/34586038/>




processed foods and eating more gut-friendly foods like fermented vegetables, bone broth, and probiotic-rich foods. You can also take supplements to increase stomach acid, such as betaine HCl or apple cider vinegar.

6

Autoimmune disease: When the body's immune system attacks healthy cells, it can cause gut inflammation. Common autoimmune diseases that specifically affect the gut include celiac disease, Crohn's disease, and ulcerative colitis. How do we get autoimmune diseases? What's interesting is that it's unclear how gut inflammation is thought to play a role, but there could be a connection. Genetics, gut infections, and leaky gut have all been implicated in the development of autoimmune diseases. So which came first? The gut inflammation or the autoimmune response? One thing has been found in studies: people with leaky gut have a higher incidence of autoimmune diseases like Multiple Sclerosis and lupus.¹⁹

7

Medications: Some medications can cause gut inflammation as a side effect. Common offenders include nonsteroidal anti-inflammatory drugs (NSAIDs), antibiotics, and acid-blocking drugs²⁰. Antibiotics affect the gut microbiome immensely, killing off both good and bad bacteria. This can lead to gut inflammation, especially if the

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¹⁹ <https://www.health.harvard.edu/diseases-and-conditions/leaky-gut-putting-a-stop-to-this-mysterious-ailment>

²⁰ <https://pubmed.ncbi.nlm.nih.gov/29094594/>

good bacteria are not replaced. NSAIDs work by inhibiting the production of inflammatory compounds in the body. While this may be helpful for pain relief, it can also lead to gut inflammation.


8

Stress: Both physical and emotional stress (and depression, actually) can contribute to gut inflammation.²¹ Stress has also been implicated in gut inflammation in many studies! When you're stressed, your body produces more of the stress hormone cortisol. This hormone has many effects on the body, one of which is to increase gut inflammation. So if you're already dealing with gut inflammation, stress can make it worse. Avoiding stress or learning how to manage it better can help to reduce gut inflammation. Chronic stress can disrupt the delicate balance of the gut microbiome. These toxins can irritate and inflame the gut lining, causing leaky gut.

9

Nutrient deficiencies: Not getting enough of certain nutrients can also lead to gut inflammation. Common deficiencies include zinc, vitamin D, and omega-3 fatty acids. Zinc is critical for gut health because it helps to repair




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²¹ <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7213601>

the gut lining. Vitamin D is important for gut health because it helps to regulate the immune system. Omega-3 fatty acids are anti-inflammatory and are essential for gut health. You can get these nutrients from food or supplements.

10

Genetically modified foods (GMOs): “GMOs basically means that the farmer who is growing genetically-modified organisms something called RoundUp-ready—or glyphosate is the term that’s considered sort of the active compound in that pesticide. So, one of the main things that glyphosate is that it’s actually been patented as is as an antibiotic. So, it does actually deprive acidophilus of manganese. It actually basically is also—it’s an antibiotic, but it’s also a dessicant. So it basically takes all of the minerals out of everything.” It’s clear that if glyphosate can have such a devastating and strong impact on the crops, why wouldn’t it also affect the human body upon consumption (including increasing intestinal permeability)²²?


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²² <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3678139/>

Other Causes of Leaky Gut

There are a few other potential causes of leaky gut:

- ⊙ Insults from the environment
- ⊙ Genetic factors
- ⊙ Mycotoxins
- ⊙ Small Intestinal Fungal Overgrowth (SIFO)
- ⊙ Small Intestinal Bacterial Overgrowth (SIBO)
- ⊙ Radiation damage

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LEAKY GUT, LEAKY BRAIN

Leaky gut is a condition in which the lining of the gut becomes damaged, allowing bacteria and other toxins to leak through into the bloodstream. This can lead to inflammation and a whole host of other health problems.

Most practitioners are talking about how leaky gut manifests with gut-specific symptoms, which makes sense. But leaky gut can affect the whole body... even the brain!

The **blood-brain barrier (BBB)** is a semi-permeable membrane that protects the brain from toxins and harmful substances in the blood. When the gut is leaky, it can allow toxins and bacteria to enter the bloodstream and cross the BBB, leading to inflammation and cognitive problems²³.

Dr. Ilana Gurevich explains how the blood-brain barrier can get compromised: "As we get more vascular permeability, the next thing that gets more permeable is the blood-brain barrier. We used to think of the blood-brain barrier as being a pretty tight system. But the more studies that we're doing on the brain and understanding of the brain, we're realizing that it's not. It can actually be very prone to infections and other things getting across it that we didn't think even 20 years ago or 10 years ago that it could.

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²³ <https://pubmed.ncbi.nlm.nih.gov/30340384/>

“So, with the increase in just generalized vascular permeability, that’s also going to compromise the blood-brain barrier. And so now you have all these toxins and heavy metals and other things that were in the gut that should’ve stayed in the gut that should’ve been leaving the gut getting back into the body, and then potentially getting into the brain.”

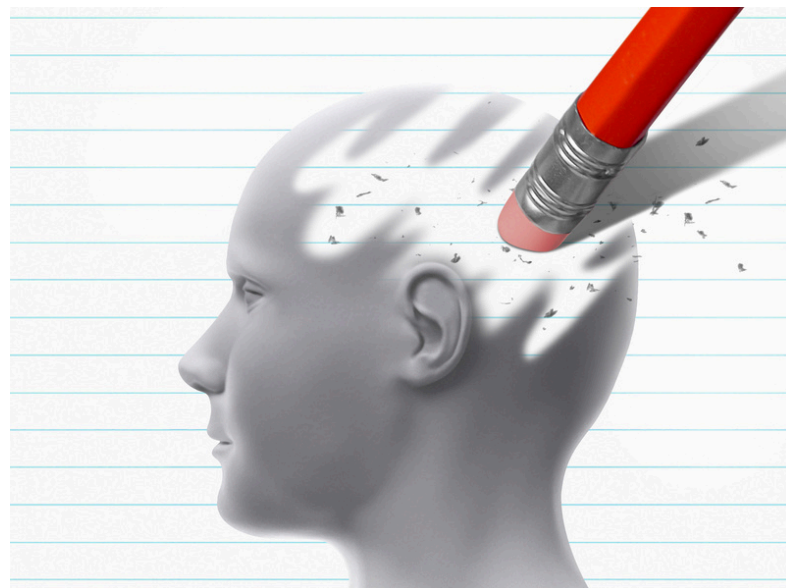
Leaky brain permeability is similar to leaky gut permeability in a way, in that it refers to a situation where the blood-brain barrier becomes damaged, allowing toxins and inflammatory molecules to enter the brain.²⁴ This can lead to cognitive problems, mood disorders, and even neurological conditions like Alzheimer's disease.


There is growing evidence that gut health plays a significant role in cognitive function and overall brain health.

In fact, studies have shown that individuals with leaky gut are more likely to experience cognitive decline and memory problems than those without this condition.

One study even found that treating leaky gut can improve cognitive function in patients with Alzheimer's disease²⁵. Another study found that individuals with leaky gut were more likely to develop depression and anxiety.

So, how exactly does gut health affect the brain? And why should you care?



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²⁴ <https://pubmed.ncbi.nlm.nih.gov/30231628/>

²⁵ <https://pubmed.ncbi.nlm.nih.gov/27604604/>

Studies have shown that inflammation in the gut can lead to inflammation in the brain. This is because inflammatory molecules produced in the gut can travel through the bloodstream and reach the brain.

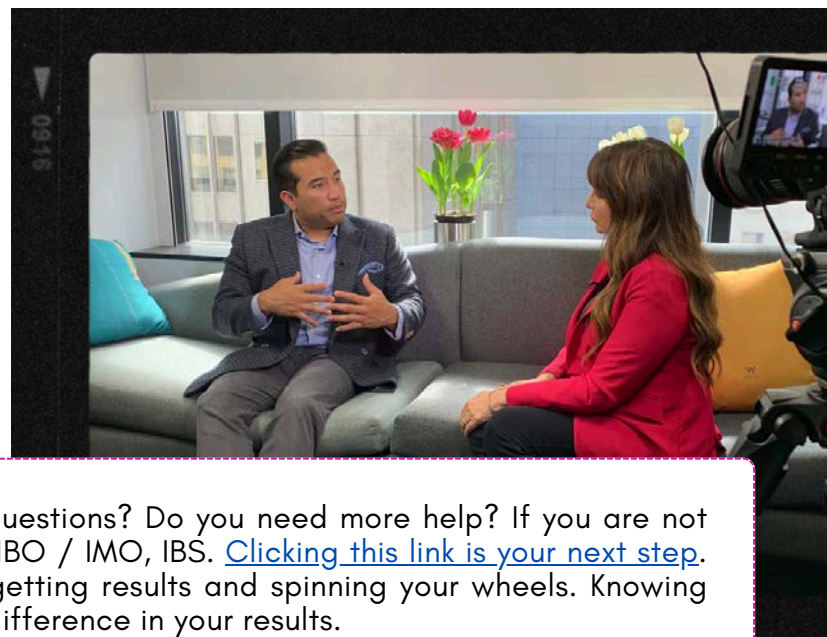



According to Kiran Krishnan, this could have something to do with LPS. “LPS has the ability to get in and disrupt the communication between the gut and the brain. And that leads to something called leptin resistance.”

Leptin resistance is a condition in which the body does not respond properly to leptin, a hormone that helps regulate appetite and metabolism. Leptin resistance can lead to obesity and other health problems. Leptin resistance is thought to be caused by a variety of factors, including inflammation, hormones, and diet. Some research suggests that gut bacteria may play a role in leptin resistance.

Leptin resistance has been linked to several health problems, including obesity, type 2 diabetes, heart disease, and Alzheimer's disease.

It's clear that gut inflammation can affect the body systemically (including changes in brain function and potentially the development of neurological disorders!) This is why it's important to discover and treat on your healing journey.



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Short-Chain Fatty Acids, Gut Health & Brain Health

It's also been shown that healthy gut bacteria are necessary for proper cognitive function. This is because these bacteria produce **short-chain fatty acids (SCFAs)** that are essential for brain health.

SCFAs help to protect the brain from inflammation and also help to promote the growth of new nerve cells. One study even found that SCFAs can improve memory and learning²⁶.

Thus, it's clear that gut health plays a significant role in brain health. When the gut is healthy, the brain is more likely to be healthy as well. However, when the gut is unhealthy, it can lead to problems with cognitive function and mood.

The gut-brain axis is a complex system that involves many different communication pathways between the gut and the brain. This system helps to regulate everything from digestion to mood.


One of the key ways that gut health affects the brain is through the production of short-chain fatty acids (SCFAs). SCFAs are produced when beneficial bacteria in the gut break down dietary fiber. Research has shown that a diet rich in SCFAs can help to protect against leaky brain by reducing inflammation and promoting the growth of new cells.

One of the key ways that SCFAs benefit brain health is by helping to maintain the integrity of the blood-brain barrier. They also support the health of the entire nervous system.

These fatty acids have also been shown to play a role in cognitive function, protection against neurodegenerative diseases, and regulation of inflammation.²⁷

²⁶ <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7005631/>

²⁷ <https://pubmed.ncbi.nlm.nih.gov/35596843/>

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THE MICROBIOME- GUT-BRAIN AXIS

As we just discussed, the gut-brain axis is a complex system that involves many different communication pathways between the gut and the brain. One of these pathways is known as the microbiome-gut-brain axis.


The **microbiome-gut-brain axis** is a communication pathway between the gut and the brain that is mediated by the gut bacteria. These bacteria produce short-chain fatty acids (SCFAs) that help to protect the brain from inflammation and promote the growth of new nerve cells.

Studies have shown that a diet rich in SCFAs can help to improve cognitive function and memory and also protect against neurodegenerative diseases. Therefore, a healthy gut microbiota is essential for a healthy brain.

This connection allows information to be exchanged between the gut microbiota and the central nervous system. An imbalance in gut bacteria has been linked to dysregulation of this communication pathway, which can lead to leaky brain.

Gut health is essential for cognitive function and overall brain health... and now we know that a healthy gut microbiota is necessary for a healthy brain.

So if you're looking to protect your brain health, it's important to take care of your gut health as well!

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HOW TO TEST FOR LEAKY GUT

So now that you know how gut inflammation and leaky gut affect your body (and brain!), how can you test to see if it's an issue for you?


Testing for **inflammatory markers** can be useful for understanding leaky gut. One of those most important markers is zonulin.

Zonulin is a protein that helps regulate the permeability of tight junctions between cells in the lining of the gut. It plays a role in regulating the size of gaps between cells in the gut wall. When zonulin levels are high, these gaps can become enlarged, which is known as "leaky gut." This can allow toxins and other harmful substances to enter the bloodstream, leading to inflammation and potentially contributing to conditions like leaky brain.

A "leaky gut" occurs when these junctions are disrupted, allowing bacteria and toxins to pass through the lining into the bloodstream. This can lead to inflammation throughout the body. Therefore, testing for zonulin can help assess gut permeability and identify leaky gut.

There are several ways to test for zonulin. One method is the zonulin ELISA test, which measures zonulin levels in a sample of blood. Another method is the zonulin antibody test, which measures levels of antibodies against zonulin in the blood. This test can be used to diagnose zonulin-related conditions, such as celiac disease.

[Click here to get the GI-Map with Zonulin Test through Rupa Labs.](#)

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Zonulin is thought to be involved in the development of several chronic diseases, including celiac disease, Crohn's disease, type 1 diabetes, and multiple sclerosis. Researchers are still working to understand exactly how zonulin contributes to these conditions, but it is clear that it plays an important role in gut health.

Treatment for zonulin-related conditions typically focuses on reducing inflammation and repairing the gut lining. Probiotics and other supplements may also be recommended to promote gut health²⁸.

It's important to note that no single marker can give a definitive diagnosis of leaky gut. Zonulin is the closest clinical marker as the protein itself works to break down intestinal permeability. However, there are many other markers that can give your clinician a better indication of what your specific gut-related cause could be.

Aside from zonulin, the other top markers for inflammation in the gut are:



Lipopolysaccharide-binding protein:


Lipopolysaccharide is a type of bacterial cell wall component. When there is leaky gut, more of these molecules are able to pass through into the bloodstream, where they bind to lipopolysaccharide-binding protein.




Fecal calprotectin: Calprotectin is a protein found in stool. It is a marker of inflammation and can be used to assess gut health.





C-reactive protein: C-reactive protein is a marker of inflammation. It is found in the blood and is used to assess overall inflammation levels in the body.


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²⁸ <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6996528/>


 **Elastase:** Elastase is an enzyme that breaks down elastin, a protein found in connective tissue. Increased levels of elastase in the stool can indicate leaky gut.


 **Lactoferrin:** Lactoferrin is a protein found in mucus, tears, and sweat. It binds to iron and helps transport it through the body. Increased levels of lactoferrin in the blood can indicate leaky gut.


 **Secretory IgA:** Secretory immunoglobulin A (IgA) is an antibody that helps protect mucous membranes from infection. Increased levels of secretory IgA in the stool can indicate leaky gut.

 **Alpha-1 antitrypsin:** Alpha-1 antitrypsin is a protein that protects the lungs from damage. Increased levels of alpha-1 antitrypsin in the blood can indicate leaky gut.

 **Occludin:** Occludin is a protein that helps to seal the spaces between cells in the gut. When levels of occludin are decreased, it indicates leaky gut.

 **Eosinophils:** Eosinophils are a type of white blood cell. They are increased in leaky gut (but also in many other conditions) and can be measured through a blood test.

 **Platelet-activating factor:** Platelet-activating factor is a molecule that helps to regulate blood clotting. Increased levels of platelet-activating factors in the blood can indicate leaky gut because of the increased inflammation.

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IgA and IgM antibodies against food antigens:

Increased levels of these antibodies in the blood can indicate leaky gut. Food antigens means any substances in food that can cause an immune reaction.



Anti-Saccharomyces cerevisiae antibodies (ASCA):

ASCA are antibodies that are produced in response to an infection with the yeast *Saccharomyces cerevisiae*. They can be used to diagnose Crohn's disease, but they can also be increased in leaky gut.



Perinuclear anti-neutrophil cytoplasmic antibodies (pANCA):

pANCA are antibodies that are produced in response to an infection with the bacterium *Escherichia coli*.



Anti-endomysial antibodies (EMA):

EMA are antibodies that are produced in response to an infection with the yeast *Candida albicans*. They can be used to diagnose celiac disease, but they can also be increased in leaky gut.



Reverse T3:

Reverse T3 is a hormone that is involved in metabolism. Increased levels of reverse T3 can indicate leaky gut because of the increased inflammation. Poor gut function can affect the thyroid.



Anti-gliadin antibodies (AGA):

AGA are antibodies that are produced in response to an infection with the yeast *Candida albicans*. They can be used to diagnose celiac disease, but they can also be increased in leaky gut.

A stool test you may be interested in is a GI Map with Zonulin, [click here](#).



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HERBS AND SUPPLEMENTS FOR LEAKY GUT SUPPORT

If you're struggling to heal your leaky gut on your own, there are a few supplements that can be helpful. These include probiotics (especially spore-forming strains), glutamine, collagen, and many others.


It's important to work with a practitioner to test (and not guess), and to put together a protocol that works for you and your body.

Probiotics help replenish the good bacteria in your gut, while glutamine provides nutrients that support gut health. Collagen is also beneficial for restoring the lining of the digestive tract.

 **L-glutamine:** If you're in a healing phase, L-glutamine can be very good for leaky gut, IBS and SIBO. It's basically supporting the gut lining and healing the gut lining. One study shows an effective treatment for leaky gut is a combination of probiotics, glutamine, and collagen. This combination can help heal the gut lining and reduce leaky gut symptoms.

Glutamine helps heal the gut by:

- ✓ Reducing inflammation
- ✓ Supporting the immune system
- ✓ Enhancing nutrient absorption
- ✓ Promoting cell growth

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It's important to be careful when using L-glutamine because it can be overstimulating for some.

Glutamine: An amino acid that's essential for gut barrier integrity, nutrient absorption, and gut motility.


Glutamate: A neurotransmitter that helps cells communicate with each other.

Sometimes it's easy to confuse glutamine vs. glutamate. After all, they do sound very similar that even I get them confused sometimes!

Glutamine and glutamate are both amino acids that are important for gut health and needed for the proper function of the digestive system.

Glutamine: Glutamine is involved in the production of stomach acid and helps to protect the lining of the gut. What glutamine does is help gut cells repair and regenerate. Glutamine is also a major source of energy for gut cells. Glutamine is the most abundant free amino acid in your body, comprising more than 60% of the free amino acids in skeletal muscle and greater than 20% of all circulating amino acids. It's synthesized in your muscles and organs from glutamate, and then transported to your gut, where it plays an important role in gut health. The body can make glutamine, but it is also found in foods such as meat, fish, and dairy products.

Glutamate: Glutamate is involved in the absorption of nutrients from food. Glutamate is also the most abundant neurotransmitter in the nervous system and is involved in

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nerve cell signaling. In essence, glutamate helps gut cells communicate with each other. Glutamate is found in foods such as vegetables, fruits, and grains.

Glutamate is formed directly from glutamine by a process called deamidation. Deamination is the removal of the amine group from glutamine (NH₂) to form glutamate (COOH).

Glutamate can also be formed from other amino acids by a process called transamination. Transamination is the transfer of an amino group from one amino acid to another.


So what does this have to do with gut health?

Well, glutamine is essential for gut barrier function and gut integrity. It helps maintain the structural and functional integrity of the intestinal epithelial cells that line your gut, and it's also involved in nutrient absorption and gut motility. In other words, glutamine is key for a healthy gut.

Glutamate, on the other hand, has been shown to have the opposite effect on gut health. High levels of glutamate have been associated with gut inflammation and leaky gut syndrome.

Therefore, it's important to maintain a healthy balance of glutamine to glutamate in your gut.

While the body needs both glutamine and glutamate for overall health, too much of either one can be harmful. An imbalance of these amino acids can lead to gut disorders such as irritable bowel syndrome (IBS).

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Glutamate can also affect not only the gut, but also your brain.

Dr. Ilana Guerich explains “The reason why probably a lot of you have brain fog, is because of the toxins. But then also, how the body responds to toxins in the brain is it increases glutamate.


“And what glutamate does is it actually helps to bind to these toxins that are damaging the nerves in the brain or the neurons. But when you have a high amount of toxicity, basically what happens is our body doesn’t know how to stop creating more glutamate. So glutamate, in and of itself, that is actually neurotoxic.

“So, kind of have all of this stuff compounding on one another. And that is why the gut is really so important for so many issues that we’re looking at in medicine today and so many chronic diseases, so much chronic disease and SIBO and all of that stuff. So, that’s a gist of how it all breaks down.”

So there you have it – a quick overview of the difference between glutamine and glutamate, and why they’re both important for gut health. Keep these amino acids in mind next time you’re thinking about gut health!

 **Prebiotics:** Prebiotics can be helpful by acting as “food” for the good bacteria in the microbiome. However, they can aggravate symptoms of IBS and SIBO because they are highly fermentable. This means they may not be right for everyone.



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📍 **Collagen:** Collagen provides the gut with the building blocks it needs to repair itself. It also helps reduce inflammation and supports digestive health. Research shows that taking a collagen supplement can help heal leaky gut.

Other Helpful Supplements

- 📍 [Total Gut Restore Kit](#)
- 📍 [HoloZymes](#)
- 📍 [MegaIGG - Serum bovine immunoglobulin](#)
- 📍 [Tributylin-X™](#)
- 📍 Licorice root
- 📍 Marshmallow
- 📍 Aloe vera
- 📍 Zinc
- 📍 Carnosine



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Spore-based Probiotics for Leaky Gut Support

We've all heard that probiotics can be beneficial to gut health.

Probiotics help heal the gut by:


- Replenishing good bacteria
- Reducing inflammation
- Enhancing nutrient absorption
- Supporting the immune system

Spore-based probiotics like MegaSporeBiotic are the most effective at helping to heal leaky gut. This is because they can survive the stomach acid and reach the intestines, where they can start to repopulate the gut with good bacteria.

Spore-based probiotics are also more resistant to antibiotics and other medications, making them ideal for leaky gut sufferers.


The most popular spore-forming strain is Bacillus.

If you're looking for a natural way to heal your leaky gut, consider spore-based probiotics. These powerful supplements can help replenish the good bacteria in your gut, reduce inflammation, and support digestive health. Spore-based probiotics are different than other probiotics for five reasons:

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1. Spore-based probiotics are more resistant to stomach acid and can reach the intestines alive. This is because they have an endosporic coat that can protect them from harsh conditions.
2. Spore-based probiotics can survive antibiotics and other medications. This makes them ideal for leaky gut sufferers who may be taking these medications.
3. Spore-based probiotics are more effective at colonizing the gut than other probiotics. This means they can start to repopulate the gut with good bacteria more quickly.
4. Spore-based probiotics are more resistant to heat and cold than other probiotics. This means they can be stored for longer periods of time without losing their efficacy.
5. Spore-based probiotics have been shown to be more effective than other probiotics at reducing leaky gut symptoms. This is because they help heal the gut lining and reduce inflammation.



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LIFESTYLE FACTORS FOR HEALING LEAKY GUT

Fasting for Leaky Gut Support


There is growing evidence that fasting can be helpful for gut health, including reducing inflammation and promoting healing. One of the mechanisms by which fasting may help is by reducing leaky gut.

Fasting has been shown specifically to help reduce inflammation and promote healing of the gut lining. In one study, intermittent fasting was found to be as effective as a specific diet in reducing leaky gut syndrome. One study shows that fasting can help to reverse gut damage caused by alcohol consumption.

Reducing Stress for Leaky Gut Support

It's well-known that stress can have a negative impact on our gut health. But why is this? And how can de-stressing help improve gut issues and leaky gut?

There are two main ways in which stress can impact our gut health. Firstly, stress can lead to changes in our gut flora, also known as the microbiome. This is the collection of microbes that live in our gut and play an important role in gut health. Changes in the microbiome have been linked to a number of gut disorders, including inflammatory bowel disease (IBD) and irritable bowel syndrome (IBS).

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Secondly, stress can also cause changes in the permeability of the gut barrier. This is a thin layer of cells that line the gut and help to keep harmful bacteria and toxins out. This can lead to a number of gut-related problems, such as food sensitivities, inflammation, and even autoimmune disease.


So, how can de-stressing help?

De-stressing through techniques like meditation, yoga, and deep breathing can help to reduce gut inflammation, repair the gut barrier, and improve gut health overall. In addition, de-stressing can also help to boost the immune system and improve brain health. So, if you're struggling with gut issues or leaky gut, don't forget to add some stress-relief techniques into your gut-healing protocol!

By reducing stress levels, we can help to improve our gut health in two ways. Firstly, by reducing the impact of stress on the microbiome, and secondly, by helping to heal the gut barrier.

There are a number of ways to de-stress, including exercise, meditation, and spending time in nature – I especially like forest bathing!



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Gut Health is a Lifestyle!


The first step to healing from leaky gut is to first understand what it means and potential root causes. Then, you have to assess if this is one of your personal root causes! As mentioned, there are a few other similar “differential diagnoses” that could be affecting you, like SIBO/IMO, SIFO, or IBS, to name just a few.

Step one is to work with a practitioner you trust to give you a clear diagnosis and run any recommended labs (like [zonulin](#)) to confirm.

Then, at home, you can remove any foods that may be irritating your gut. This includes inflammatory foods like gluten, dairy, soy, and sugar. You'll also want to avoid processed foods, as they can contain harmful additives that can damage the gut lining. Instead, focus on eating plenty of nutrient-rich whole foods like vegetables, fruits, meat, and fish.

In addition to changing your diet, you'll also need to make some lifestyle changes. This includes reducing stress, getting enough sleep, and exercising regularly.

Finally, you can also try supplementation to support your intestinal barrier function. Making these changes can help improve gut health and reduce leaky gut symptoms, but also, improve the health of your brain and your entire body!

 **Footer Note: There is hope.** Do you have questions? Do you need more help? If you are not confident in your next steps dealing with your SIBO / IMO, IBS. [Clicking this link is your next step.](#) It is hard to stay motivated when you are not getting results and spinning your wheels. Knowing what to do and in the right order makes all the difference in your results.

A Note from Shivan

I know that was a ton of information! I hope you are not overwhelmed. I know, I know - it is a lot! Breathe. Better? What is your next step? A test? Good idea! [Click here to get the GI-Map Test \(with Zonulin\) through Rupa Labs...](#) and then get treating! If you are ready, the masterclass we did with Dr. Leonard Weinstock covers so much more of this topic and it's excellent. I hope you will join us to learn more!

There is hope and there are answers!

You deserve to be well,

Shivan Sarna



*Ready to dive deeper?
Get instant access to
Dr. Leonard Weinstock's
**Increased Intestinal
Permeability
(aka Leaky Gut)
Masterclass***

 **GET THE MASTERCLASS**

