

# The 7 Core Strategies to Heal the Gut Lining and Manage Leaky Gut

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##### A Simple Health Blueprint to Maintaining the Intestinal Lining Naturally

A strong gut mucosa barrier is critical to a healthy gut.

The mucosal barrier separates our gut lining from the billions of microbes in our gut & protects it from pathogens & harmful proteins.

When the mucosa breaks down - it invites gut inflammation, infection and immune activation ([1](https://www.ncbi.nlm.nih.gov/pubmed/29619131)).

### Gut Mucosa Dysfunction and Disease

Altered production of mucus, immunoglobulins, antimicrobial peptides, & other immune-modulators is a common finding of Inflammatory Bowel Disease (Crohn's and Ulcerative Colitis), Irritable Bowel Syndrome, and celiac disease ([2](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5879757/); [3;](https://www.ncbi.nlm.nih.gov/pubmed/29614738)[4)](https://www.ncbi.nlm.nih.gov/pubmed/20078218/%29).

The same imbalance modulates diseases beyond the gut.

For instance, diabetes is regulated by immune cells that live in the mucosal layer of the intestine ([5](https://www.ncbi.nlm.nih.gov/pubmed/29713241)).

Chronic inflammation from mucosal damage fuels the progression of every major disease. Fixing the gut is a keystone strategy to improved health & quality of life.

Below, I discuss common causes of mucosal dysfunction in the first place - and then outline the most common strategies used for repair.

## 7 Key Strategies to Keep the Gut Mucosa Healthy:

#### 1. Prevent Damage in the First Place2. Coat and Heal3. Bind or Digest Toxins and Irritants4. Kill Overgrowth of Bacteria, Fungi, or Viruses5. Support Gut Lining Directly6. Re-Establish Healthy Bacteria7. Feed Healthy Bacteria

#### ****Bonus Strategy:**** Support Nerve Health in the Gut

### ****Strategy #1: Prevent Damage in the First Place****

**"All disease begins in the gut" - Hippocrates, 460BC-375BC**

The first rule of healing the gut barrier is to keep it from being damaged in the first place.

**NSAIDs (ibuprofen or acetaminophen), alcohol, coffee, cigarettes, as well as intake of inflammatory and sugar-laden foods hurt the gut.**

**Grains, legumes, and nuts hurt the gut too when not prepared appropriately. T**raditional preparations such as soaking & sprouting nuts, legumes, and grains are best to reduce lectins and other compounds known to ease insults to the gut lining.

These ingredients are also often stored in bins for long periods of time. Moisture, mold spores, or other microbial growth may contaminate even organic & otherwise healthy products. These microbes produce toxins & elicit immune responses that are also damaging to the gut.

The harvesting of grains like wheat will also use gut-hurting compounds like glyphosphate ("Round-up").

Round-up recently made headlines as a man with terminal cancer was awarded $39 million, and Monsanto (now owned by Bayer) was fined $250 million after the ruling implicated glyphosphate as a cause of the man's disease.

Glyphosphate helps dehydrate wheat before harvesting & eases the physical process of gathering the grain. Most non-organic wheat contains glyphosphate residues.

Even if you're not gluten sensitive, or sensitive to the many other problematic proteins in wheat - you also need to contend with glyphosphate residue.

**Wheat is difficult to digest - over-consumption fatigues the gut & irritates the lining naturally - independent of an immune response.**

Non-celiac gluten sensitivity is also a clinical entity used to describe gluten-related symptoms in the absence of a conventional diagnosis.

**Dairy products are similarly inflammatory to the gut.**

Dairy contains lactose which is very difficult to digest after the age of two years old. We dramatically reduce our natural enzyme production responsible for breaking down lactose.

Loosely speaking, milk is for babies - we are the only mammal that drinks the milk of another mammal.

Dairy practices also reduce the enzymes naturally present in raw milk that would otherwise ease digestion. Cow milk may also contain additives, preservatives, & chemical residues from feed or antibiotics and hormones injected in cows to prevent infection & boost growth or milk production.

Lactose intolerance is common in adults especially in individuals of African & Asian descent. Dairy is also commonly allergenic due to reactions to whey, casein, beta-lactoglobulin & other compounds in cow milk that can increase stress on the gut.

Fermented hard cheeses tend to contain less of these proteins & can sometimes be added into a healthy diet with less trouble - while offering healthy fermentation byproducts too.

In the short-term, allow the mucosa to heal & the immune system to calm before adding "allowed" dairy products back into the diet.

Even those that are careful with dairy or gluten ingestion can still be exposed through cross-contamination at home, in shared kitchen spaces, & when eating out at restaurants.

I use special digestive enzymes to help protect from these micro-exposures that can still have a detrimental effect on sensitive & intolerant individuals.

I have used [**Gluten Manager by Integrative Therapeutics**,](https://www.shop.dralexrinehart.com/products/gluten-manager-integrative-therapeutics) [**Intolerance Complex by Enzyme Science**](https://www.shop.dralexrinehart.com/products/intolerance-complex-enzyme-science-30-and-90-capsules), & [**Gluten-Dairy Digest by Pure Encapsulations**](https://www.shop.dralexrinehart.com/products/gluten-dairy-digest-capsules-pure-encapsulations) to mitigate gluten & dairy exposures during the gut healing process.

### ****Strategy #2: Coat and Heal****

There are strategies to help soothe an irritated gut lining.

Many botanicals or herbal extracts have mucus-like properties that help to coat the irritated mucosa.

Aloe is one of the best-known home remedies for an irritated gut.

Aloe is recognizably very mucus-like & for its "cooling" effect. It physically coats damaged areas of the lining, prevents future irritation - allowing healing to begin. Coating the gut lining also blocks the ability of pathogens to adhere to exposed areas - helping to reduce or manage infections.

Aloe extracts also contain a wealth of plant chemicals that have antioxidant & balancing qualities. Use the oral gels short-term as they may create dependence on it as a laxative. For this reason, I generally stick to "aloe leaf extract" found in powders and capsules.

Deglycyrrhizinated Licorice (DGL), Marshmallow root, Slippery Elm, Mastic gum, Mullein, Okra, and Comfrey also have mucus-like properties that aid in a coating & calming effect on the gut lining.

Products like [**GI Revive by Designs for Health**](https://www.shop.dralexrinehart.com/products/gi-revive-powder-designs-for-health)and **[GastroMend HP by Designs for Health](https://www.shop.dralexrinehart.com/products/gastromend-hp-designs-for-health%22%20%5Ct%20%22_blank)** combine a variety of these herbal extracts.

#### ****Quell Mucosal Inflammation****

Another strategy to promote healing is to reduce excess inflammation.

**Sometimes the gut is too inflamed to respond to the best of diet and supplement strategies.** You cannot rebuild something that is still smoldering. Healing strategies work better when we cool off this inflammation

Curcumin is a wonderful anti-inflammatory extract of turmeric - and is one of the most researched botanical extracts in the world.

In addition to its anti-inflammatory properties, [curcumin](https://info.dralexrinehart.com/articles/nutrition-benefits/benefit-of-turmeric) helps improve integrity of the gut lining & promote detoxification. I turn to it often for personal and professional use.

I use **[Theracurmin HP by Integrative Therapeutics](https://www.shop.dralexrinehart.com/products/theracurmin-hp-integrative-therapeutics%22%20%5Ct%20%22_blank)** as it is the most bio-absorbable form of curcumin available - shown in 3rd party research to be 27x (2,700%) more absorbable than other versions. It is always my first-choice for curcumin supplementation.

For long-term maintenance, I also use [**Curcumin BCM-95 by Progressive Labs**](https://www.shop.dralexrinehart.com/products/curcumin-bcm-95-progressive-labs-60-capsules) - an alternative & well-absorbed form of curcumin (~7x more absorbable than other types). [**Meriva by Thorne**](https://www.amazon.com/gp/product/B01D8V075U/ref%3Das_li_tl?ie=UTF8&camp=1789&creative=9325&creativeASIN=B01D8V075U&linkCode=as2&tag=coahea-20&linkId=1b2a01b75bc517d1a2e3e99d0e315078)is also a well-regarded form of curcumin.

### ****Strategy #3: Bind or Digest Toxins and Irritants****

Infections contribute to mucosal degradation in two ways.

First, the virulence of an infection directly irritates the lining & escalates inflammation.

Second, acute and chronic infections release toxins and byproducts that damage, inflame, and set off domino effects in other areas away from the site of infection.

"Binding" up these toxins decreases virulence, assists in their removal, & opens a time-window for mucosal healing.

#### ****Immunoglobulins - Nature's First Defense****

Naturally, the body produces immunoglobulins such as secretory IgA that is a first-line defense against pathogens and foreign proteins ([6](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5977230/))

Others immunoglobulins include IgG or IgM.

Immunoglobulins are antibodies that bind to outside antigens (from food, infections, or human-made chemicals). Upon binding, the antibodies neutralize & help the immune system target the toxins for elimination.

Natural immunoglobulins are often deficient in states of immune-compromise, chronic infection, & leaky gut. One of the earliest signs of leaky gut & gastrointestinal dysfunction is a deficiency of secretory immunoglobulin A (IgA).

You can supply some of these immunoglobulins via oral supplement & help the body bind up harmful antigens and toxins.

I use [**Mega IgG2000**](https://www.shop.dralexrinehart.com/products/mega-igg2000-microbiome-labs) and **[MegaMucosa](https://www.shop.dralexrinehart.com/products/megamucosa-microbiome-labs%22%20%5Ct%20%22_blank)** by Microbiome Labs which supply dairy-free immunoglobulins to support mucosal health & inflammation.

#### ****Charcoal & Systemic Enzymes****

Other means of binding and digestion might include activated charcoal or proteolytic enzymes.

* [**Activated charcoal**](https://www.shop.dralexrinehart.com/products/activated-charcoal-integrative-therapeutics) is a porous substance that "mops" up toxins. It also can bind up minerals too - so it's great for short-term use yet not ideal as a long-term option.
* [**Proteolytic enzymes**](https://www.shop.dralexrinehart.com/collections/systemic-enzymes) help to physically digest up poorly digested proteins, damaged cells, as well as toxins & cell debris. Once broken down - they are not available to trigger inflammation or immune reactions in the body.

I use [**Enzyme Defense Pro by Enzyme Science**](https://www.shop.dralexrinehart.com/collections/systemic-enzymes/products/enzyme-defense-pro-enzyme-science), **[MyoMend by Enzyme Science](https://www.shop.dralexrinehart.com/collections/systemic-enzymes/products/myomend-enzyme-science%22%20%5Ct%20%22_blank)**, or **[Interfase Plus by Klaire Labs](https://www.shop.dralexrinehart.com/collections/systemic-enzymes/products/interfase-plus-klaire-labs-capsules%22%20%5Ct%20%22_blank)**.

When taking proteolytic enzymes take them 30 minutes before a meal or two hours after eating so that the enzymes work systemically & are not used up by food digestion.

### Strategy #4: Kill Overgrowth of Bacteria, Fungi, or Viruses

What came first, the chicken or the egg?

The concept applies to infections and the gut. Infections can cause gut dysfunction. Gut dysfunction also creates an immune environment that invites infection. In either case, when an infection is present, it must be dealt with appropriately. A lingering infection delays & blocks healing from occurring.

As I mentioned earlier, it's tough to rebuild something that is still smoldering. A hidden infection can be a cause of the smoldering.

Here are a number of infections worth discussion when it comes to mucosal health in the gut.

#### ****Epstein-Barr Virus (EBV):****

EBV infection can linger & reactivate chronically years after acute infection or exposure.

EBV is in the same family of viruses as Herpes Simplex Virus (HSV1 or HSVII), Herpes zoster (Shingles), Cytomegalovirus (CMV) & others. All of these viruses share an "envelope" or "lipid capsule" as part of their viral structure.

Lipid-coated viruses such as EBV are implicated in chronic disease, fatigue, & inflammation throughout the body - including the gut mucosa.

EBV lives in your lymphocytes which are highly present in the gut-associated lymphoid tissue (GALT). It turns lymphocytes into a "zombie" like state where they stick around in the body much longer than intended.

EBV also ramps up production of viral proteins that exert inflammatory effects on the body. EBV-infected lymphocytes may also initiate more inflammation than is necessary to take care of daily immune activities. As such, [EBV contributes to autoimmunity](https://info.dralexrinehart.com/articles/health-topics/epstein-barr-virus-autoimmunity-and-cancer) & altered cell development.

When inflamed by other infections at the same time (including Helicobacter pylori and others listed below) - EBV adds insult to injury.

Monolaurin is known to break down the structure of viral envelopes. It may help suppress infection and minimize a virus' interaction with "co-infections." It is my first choice for natural anti-viral support.  I use **[Lauricidin by Med-Chem Labs](https://www.shop.dralexrinehart.com/collections/best-sellers/products/lauricidin%22%20%5Ct%20%22_blank).**

#### Helicobacter pylori ****(****H. pylori****):****

H. pylori is prevalent in the Western world. High antibiotic use the US population may increase its incidence compared to other parts of the world.

H. pylori may be a normal resident of the gastric flora with possible health benefits.

**It is OVERGROWTH of H. pylori that causes problems.**

H. pylori lives in the stomach wall - it produces chemicals that weaken & degrade mucosa.

When overgrown - these H. pylori byproducts degrade a bigger patch of mucosa than the body can tolerate. Stomach acid now splashes on the exposed area - setting the stage for inflammation & gastric ulcers.

Ulcers can be quite serious - especially if you combine an H. pylori infection with NSAID use (ibuprofen & acetaminophen) or other irritants.

H. pylori overgrowth can become an active, smoldering fire that steals healing resources & fuels inflammation throughout the body.

[**Monolaurin**](https://www.shop.dralexrinehart.com/products/lauricidin) has also been shown in the lab to suppress H. pylori growth. [**Mastic gum**](https://www.shop.dralexrinehart.com/products/gastromend-hp-designs-for-health) is also a quite popular remedy.

Medical treatment often uses "triple antibiotic therapy" to eradicate H. pylori. I've recently detailed [probiotic support while taking antibiotics](https://info.dralexrinehart.com/articles/health-topics/digestive-wellness/probiotics-and-c-diff-probiotics-taken-with-after-treatment-antibiotics).

#### ****Candida & Fungal Overgrowth:****

Gut dysbiosis promotes a bloom in fungal growth - especially Candida.

Candida organisms have a cell wall instead of a cell membrane - they are not susceptible to antibiotics. Antifungals must be used. Fungal overgrowth complicates gut healing when not addressed properly.

Candida produce byproducts that are toxic to us. The toxins contribute to inflammation, intestinal irritation, fatigue, altered thyroid activity, mental fog, & more.

Monolaurin deserves mention yet again when it comes to Candida overgrowth.

Candida "hides" from the immune system by producing biofilm. The biofilm creates an invisibility cloak - immune cells pass by the organism like it's not even there.

[**Monolaurin**](https://www.shop.dralexrinehart.com/products/lauricidin)breaks down this biofilm - allowing monolaurin to act on the organism. Disrupting biofilm also allows the immune system to "see" the Candida cells as they are brought out of hiding.

Similar to the action of monolaurin, [**caprylic acid**](https://www.amazon.com/gp/product/B001GDGA7C/ref%3Das_li_tl?ie=UTF8&camp=1789&creative=9325&creativeASIN=B001GDGA7C&linkCode=as2&tag=coahea-20&linkId=059141c705dfb16954e7f42291d47052) is a popular supplement used to suppress a broad array of fungal, yeast, and mold growth.

#### Escherichia coli ****(****E. coli****),****Salmonella spp.****, & Food-borne Infection:****

Pathogenic E. coli can cause inflammation and structural changes to the intestinal "gates" to initiate infection & mucosal dysfunction too ([8](https://www.ncbi.nlm.nih.gov/pubmed/29442467)). A robust mucosal barrier helps prevent opportunistic infection.

To support E. Coli overgrowth, as well as food-borne pathogens like Salmonella enterica, I like [**berberine**](https://www.shop.dralexrinehart.com/search?type=product&q=berberine), [**oregano oil**](https://www.shop.dralexrinehart.com/products/oil-of-oregano-designs-for-health), and [**colloidal silver**](https://www.shop.dralexrinehart.com/products/colloidal-silver-progressive-labs-4oz-8oz-liquid). These can be used alone or in combination with monolaurin.

### ****Small Intestinal Bowel Overgrowth (SIBO):****

SIBO is such a broad subject that I'd need an entire course to discuss it.

SIBO is the result of overgrowth of healthy or pathogenic microbes in the small intestine. It can be a result of an inflammatory, high-carbohydrate diet, recurrent constipation, as well as a history of antibiotic or anti-fungal use.

**The usual suspects of H. pylori & Candida are often involved too. Surprisingly, healthy bacteria such as Lactobacilli can also become overgrown in SIBO. SIBO presents alongside leaky gut & mucosal dysfunction. Does your probiotic contain Lactobacilli strains? You may want to take a break from it in the short-term if you suspect SIBO.**

SIBO is promote, in part, by **poor motility** in the gut.

When food does not move through the gut efficiently, your gut will ferment the food earlier in the gut - leading to gas and bloating where it is not expected. This can cause both constipation and diarrhea - as well as stomach pain, distention, and excessive burping and gas.

Once SIBO is present, certain starches and fibers in healthy food can potentiate it.

[SIBO treatment](https://info.dralexrinehart.com/sibo) can involve specialized diets & you must time strategies appropriately as performing steps too early or too fast can lead to SIBO relapse.

Individuals with SIBO go through a period of killing off both good & bad bacteria and followed by a period of slowly adding back the good bacteria (and dietary starches/fibers) as inflammation calms.

If you suspect SIBO, you'll save time and money by seeking professional coaching.  A practitioner versed in functional medicine can help you navigate the steps of ridding food, killing bacteria, adding back probiotics, and maintaining gut health long-term.

For a deeper SIBO discussion, check out my collection of [**SIBO articles**](https://info.dralexrinehart.com/sibo).

In addition to antimicrobial and probiotic strategies, motility support is an essential component of preventing relapse and recurrence of SIBO. Motility support is one of the most important missing links in SIBO care.

Candida overgrowth can be present alongside SIBO in as much as two-thirds of cases. If strategies are strictly focused on bacteria - yeast growth will bloom. I mentioned monolaurin & caprylic acid above as natural options to support normal yeast growth. Saccharomyces boulardii (a strain found in **[RestorFlora](https://www.shop.dralexrinehart.com/products/restorflora-saccharomyces-boulardii-bacillus-clausii-bacillus-subtilis-hu58-microbiome-labs%22%20%5Ct%20%22_blank)**) is also supportive. I detail spore probiotics in Strategy #6.

For motility support, I use **[MotilPro by Pure Encapsulations](https://www.shop.dralexrinehart.com/products/motilpro-capsules-pure-encapsulations%22%20%5Ct%20%22_blank)**. **[Iberogast](https://www.amazon.com/gp/product/B0060A2SBI/ref%3Das_li_tl?ie=UTF8&camp=1789&creative=9325&creativeASIN=B0060A2SBI&linkCode=as2&tag=coahea-20&linkId=fb87ac9ac1fd99ec59802fe82c2996b8" \t "_blank)** is an herbal mix used by many practitioners for motility too.

### Strategy #5: Direct Gut Lining Support

Think of the gut as a 3-layered tube.

Gut microbes comprise the inner area of the tube.

Here, they interact with the non-sterile slurry delivered from the stomach.

The slurry can contain pathogens and harmful proteins.

The middle layer is the mucosa - this is the connective cushion that contains immune cells and "food" for gut microbes and fuel for immune cells and our gut lining.

The next inner layer of the tube is the cells of intestinal lining ("intestinal epithelial cells").

The absorptive folds known as "villi" provide surface area for absorption. Between the cells of the folds are microscopic junctions. T

hese tight junctions comprise the physical "gates" that control what gets into the blood & what stays out. "Leaky gut" refers to the unintended opening of these gates.

The intestinal lining is the last layer of defense between the outside environment and the inside world of the bloodstream. It also coordinates cross-talk between the mucosa, the immune system, & bacteria ([9](https://www.ncbi.nlm.nih.gov/pubmed/29716793)).

#### ****Mucosal Lining Support****

L-glutamine is a first-line option for mucosal support. It fuels the growth of intestinal cells and immune cells.

While it is readily available in most diets - L-glutamine is conditionally essential - meaning it is the first to go when we are stressed or immune-compromised. This is partly why your gut tends to take a beating when under stress.

Supplementation supports healing when in any compromised state. When healing the gut I take L-glutamine at 10g three times per day. I may go higher in individuals with larger body size.

Many doses will contain just 3-6g of L-glutamine per serving - and so increase the intake as you may see fit. Here are the[**L-glutamine products**](https://www.shop.dralexrinehart.com/pages/search-results-page?q=l-glutamine) I recommend most often.

L-glutamine is just part of the story. You can still have compounds actively irritating the mucosa & delaying healing. You also need the amino acid building blocks (L-proline, L-serine, L-threonine, & L-cysteine) that are necessary for mucosal repair.

[**MegaMucosa by Microbome Labs**](https://www.shop.dralexrinehart.com/products/megamucosa-microbiome-labs)is a pleasant-tasting powder that contains immunoglobulin, polyphenols, & four building-block amino acids to support mucosal repair. [**Mega IgG2000**](https://www.shop.dralexrinehart.com/products/mega-igg2000-microbiome-labs) is also useful as an additional source of immunoglobulins in capsule-form.

**Here's a summary of how these nutrients work to support mucosal repair:**

* **L-Glutamine** directly supports the growth of immune & intestinal cells.
* **Immunoglobulins** grab and bind irritants - neutralizing them and preparing them for elimination.
* **Polyphenols (citrus bioflavonoids)** help reduce inflammation and support microbial diversity.
* **Amino acids (L-proline, L-serine, L-threonine, & L-cysteine)** supply the raw construction materials necessary for new mucosa.

### ****Strategy #6: Re-Establish Healthy Bacteria****

Healthy bacteria in the gut activate immune signals that are essential to the production of healthy mucus in the gut & intestinal cell maintenance.

The mucosa and gut flora work symbiotically. Each works to maintain the other.

When this symbiosis breaks down, the gut becomes impaired & "leaky" - leading to the nutrient & electrolyte imbalance, as well as susceptibility to pathogens & the absorption of harmful proteins. Adding back probiotics improves the important selectivity of the gut lining to invaders.

Healthy gut bacteria also compete with pathogens for resources & lessen the risk of acute infection with species like [Clostridium difficile](https://info.dralexrinehart.com/articles/health-topics/digestive-wellness/probiotics-and-c-diff-probiotics-taken-with-after-treatment-antibiotics), E. coli, and Salmonella enterica ([10](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5731444/)).

**1.) The presence of unhealthy bacteria (or absence of healthy bacteria) promotes inflammation.**
**2.) Inflammation invites leaks in the mucosa.**
**3.) The leaks fuel systemic disease (**[**11**](https://www.ncbi.nlm.nih.gov/pubmed/29441049)**).**

Gut-friendly bacteria produce prebiotic compounds of their own & crowd out competing microbes - allowing a broad array of diverse flora to flourish naturally.

A gut reboot requires aspects of both adding back healthy flora - while also supporting the mucosa.

### ****Four Essential Rules to Follow for Probiotics****

##### ****Rule #1:**** ****Probiotics need to make it through the stomach acid alive.****

We are colonized as infants with gut flora through development, birth & breastfeeding in the first two years of life.

When our gastrointestinal system matures, the stomach pH acidifies into a much more protective barrier. The newly acidic stomach now kills the majority of "live" probiotics. The stomach acid kills supplemented probiotics before they ever reach the intestines.

Once colonized as babies, we maintain the flora we received from birth and breastfeeding by consuming different fibers and starches in our diet.

If we eat a limited diet, stress ourselves out, take antibiotics, eat sugar, or drink lots of alcohol as adults - we beat down our flora and lose diversity - and ultimately degrade our gut mucosa!

I use Master Supplements probiotics like **[Theralac](https://www.shop.dralexrinehart.com/products/theralac-capsules-master-supplements%22%20%5Ct%20%22_blank)**, **[Trubifido](https://www.shop.dralexrinehart.com/products/trubifido-probiotic-colon-formula-capsules-master-supplements%22%20%5Ct%20%22_blank)**, and **[Truflora](https://www.shop.dralexrinehart.com/products/truflora-capsules-master-supplements%22%20%5Ct%20%22_blank)** to re-establish gut flora. The company has a patented "Acid Proof Delivery" method that allows the probiotics to be delivered alive - deep into the intestines.

Other name-brand probiotic brands can be high quality - but you need high dose per each probiotic strain (I use 10 billion CFU, per STRAIN) to provide the right probiotic support.

This worry is irrelevant with [**Master Supplements**](https://www.shop.dralexrinehart.com/collections/master-supplements) products. They boast fantastic dosage and quality control measures.

##### ****Rule #2: Spore probiotics live in the soil. These soil-based organisms are gut microbes that use dirt as the vector into our body.****

All mammals confer immune benefits from spore probiotics. Our ancestors had daily interaction with dirt from foraging, hunting, outdoor activity, and living in less sanitary living environments.

Spores germinate to live organisms and reside in our small intestine for 7-21 days. Then, they turn back into spores - allowing for elimination from the body. They remain in spore form in the soil for years until they are picked up by another host.

Modern lifestyles are deficient in exposure to soil-based microbes & spores. Regular intake of spore probiotics resupplies this missing stimulation.

Spores help crowd out unwanted organisms, promote diversity of other flora, and produce organic acids, short-chain fatty acids (SCFAs), B vitamins, and [vitamin K2](https://www.shop.dralexrinehart.com/products/megaquinone-k2-7-60-capsules) for our body.

A leaky gut leads to the absorption of endotoxins in the systemic circulation as well as increased risk of inflammation and altered metabolic signals.

**A clinical trial conducted at the University of North Texas demonstrated that 30-day supplementation of spore probiotics significantly reduced blood endotoxins ("metabolic endotoxemia") by a net 78% difference (p=0.011) & triglycerides by a net 19% (p=0.011) compared to endotoxin & triglyceride levels in the placebo group.**

The spore treatment group also had significantly lower inflammatory markers & ghrelin (a hunger hormone) than the group not receiving the probiotic ([12](https://www.ncbi.nlm.nih.gov/pubmed/28868181)).

Because of the natural 7-21 life cycle of spore probiotics - supplement with them on a "three days on, seven days off" basis indefinitely to maintain their levels in the body. Initially, take them for 30-60 days straight before moving to the "Three on, seven off" schedule. Start low & work up to the dosage at first.

##### ****Rule #3: Dietary starches and fibers do not feed spore probiotics (as they do Lactobacilli or Bifidobacteria)****

Since most of us do not play in the dirt regularly or eat soil-dusted food like our ancestors, I recommend supplementation with spore probiotics to assure we're receiving the gut and immune benefits of soil based organisms.

I use  **[Megasporebiotic](https://www.shop.dralexrinehart.com/collections/best-sellers/products/megasporebiotic%22%20%5Ct%20%22_blank)**, **[Restorflora](https://www.shop.dralexrinehart.com/collections/best-sellers/products/restorflora-saccharomyces-boulardii-bacillus-clausii-bacillus-subtilis-hu58-microbiome-labs%22%20%5Ct%20%22_blank)**, [**HU58**](https://www.shop.dralexrinehart.com/collections/best-sellers/products/hu58-high-potency-bacillus-subtilis-microbiome-labs), and to a lesser degree, **[Truflora](https://www.shop.dralexrinehart.com/collections/master-supplements/products/truflora-capsules-master-supplements%22%20%5Ct%20%22_blank)** to support this diversity - [**Microbiome Labs**](https://www.shop.dralexrinehart.com/collections/microbiome-labs) is the industry leader for spore probiotics & have created a fantastic, clinically-studied suite of products for the gut.

##### ****Rule #4: You cannot supplement with some healthy bacteria in the gut as the gut is naturally an anaerobic (no oxygen) environment. Anaerobic bacteria cannot survive the oxygen-rich environment of a capsule powder.****

Use PREbiotics to promote the growth of these strains. I discuss prebiotics in the next section.

### ****Strategy #7: Feed Healthy Bacteria****

Fibers and starches in our food cannot always be broken down by us. Gut microbes ferment and break them down for us.

In return, they produce invaluable substances such as Short Chain Fatty Acids (SCFAs), [B vitamins](https://www.shop.dralexrinehart.com/products/energize-plus-pure-pack-packets-pure-encapsulations), and [**Vitamin K2**](https://info.dralexrinehart.com/vitamin-k2-benefits).

SCFAs support healthy mucosa by promoting the production of mucus & regulating immune cell development locally in the gut ([13](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5879757/)).

[**Spore probiotics**](https://www.shop.dralexrinehart.com/collections/spore-probiotics)**increase SCFA's by as much as 40% - and clinical research being readied for publication demonstrates that spores also nearly double the diversity of other gut flora (likely due to enhanced production of SCFA's).**

In the absence of sufficient fibers & starches, healthy bacteria starve & microbial diversity drops. Yeast & opportunistic organisms also grow & take up more areas in the gut.

#### ****Importance of Adding & Maintaining Diet Diversity****

Ancestral diets were rich in food diversity. It wasn't until the advent of modern agriculture that our diets became less diverse.

Human ancestors consumed numerous varieties of plants, animals, insects, and roots and tubers. Now, we eat a much more limited array of foods in our diet. The modern diet is unnaturally high in monocultures of wheat, dairy, corn, and soy.

There used to be thousands of varieties of these foods - but now we eat limited variety with industry-friendly, hybridized versions of the same food.

The lack of diet diversity leads to a lack of microbial diversity in the gut. It also increases the chances of developing sensitivities & intolerances to foods.

**If adding food diversity leads to too much gas, bloating, or general discomfort - chances are you need to eat less starchy food for the time being & address the balance of gut flora either by killing overgrowth - and/or adding probiotics.**

Symptoms are a sign that you are lacking the bacterial balance in your gut to ferment these tough-to-digest foods.

Focus on ridding the gut of overgrowth, reconditioning the gut & promoting keystone strains of bacteria like Akkermansia muciniphila, Faecalibacterium prausnitzii, & Bifidobacteria spp.

Be careful of Lactobacilli spp. early in recovery as these probiotic strains can be overly immune-stimulating & be contraindicated in overgrowth profiles (at least in the short-term).

**Use products like**[**Megaspore**](https://www.shop.dralexrinehart.com/products/megasporebiotic)**, [RestorFlora](https://www.shop.dralexrinehart.com/collections/30-60/products/restorflora-saccharomyces-boulardii-bacillus-clausii-bacillus-subtilis-hu58-microbiome-labs%22%20%5Ct%20%22_blank),**[**HU58**](https://www.shop.dralexrinehart.com/collections/30-60/products/hu58-high-potency-bacillus-subtilis-microbiome-labs)**, & [Trubifido](https://www.shop.dralexrinehart.com/products/trubifido-probiotic-colon-formula-capsules-master-supplements%22%20%5Ct%20%22_blank) and "graduate" to other formulas like [Theralac](https://www.shop.dralexrinehart.com/collections/10x-rewards/products/theralac-capsules-master-supplements) and [TruFlora](https://www.shop.dralexrinehart.com/products/truflora-capsules-master-supplements%22%20%5Ct%20%22_blank) as your system tolerates.**

**After 1-3 months of support, start feed bacteria using prebiotics such as [MegaPrebiotic](https://www.shop.dralexrinehart.com/products/megaprebiotic-a-precision-prebiotic-microbiome-labs%22%20%5Ct%20%22_blank), [TruFiber](https://www.shop.dralexrinehart.com/products/trufiber-powder-master-supplements%22%20%5Ct%20%22_blank), & [Biotagen](https://www.shop.dralexrinehart.com/products/biotagen-klaire-labs-prebiotic-powder-or-capsules%22%20%5Ct%20%22_blank).**

**The mucosa itself will slowly repair & rebuild. Smooth this process along using products like [MegaMucosa](https://www.shop.dralexrinehart.com/products/megamucosa-microbiome-labs%22%20%5Ct%20%22_blank) &**[**Mega IgG2000**](https://www.shop.dralexrinehart.com/products/mega-igg2000-microbiome-labs)**.**

As with any therapy with the gut, start SLOW, and work your way up in measured ways. Seek professional opinion as needed.

**If that is not helpful, consider a gut reboot with a full or partial**[**elemental diet**](https://info.dralexrinehart.com/articles/elemental-diets-what-is-it-when-is-it-used-how-does-it-work)**and anti-inflammatory support.**

Seek professional counsel regarding other specialized diets - low-FODMAP, specific carbohydrate diet (SCD), GAPS protocol, autoimmune protocol (AIP), or other personalized nutrition or medical instruction.

Most of these specialized plans are short-term diet interventions - not intended for long-term use. The goal is to fix the gut & mucosa, so you do not have to eat a limited diet.

### ****Bonus Strategy: Address Nerve Health in the Gut****

The gut has a vast nerve network known as the **enteric nervous system**. Irritation or altered nerve firing patterns are related to GI dysfunction. These nerves also regulate the gut mucosa.

#### ****Manage & Reduce Stress****

**The first step in addressing the enteric nervous system is to manage & reduce stress.** This will calm the "fight or flight" nervous system, and help recover & strengthen "rest & digest" functions.

Cortisol is your primary stress hormone. It acts as a natural anti-inflammatory & steroid-like compound in the body. Excess cortisol degrades the gut lining & suppresses the immune system.

This is why you can "give yourself an ulcer" when stressed out. Stress thins out the mucosa - ulcers develop at unprotected sites.

#### ****The Gut as the Second Brain****

The gut is the body's "second brain." It contains a distinct nervous system known as the "enteric nervous system."

The nerve component of mucosal dysfunction is an under-appreciated aspect of re-establishing gut health.

Stress, sugar, immune attacks, overuse, and fatigue damage the nerves of the gut too. Damage to these nerves affects motility as well as the production of enzymes & mucus.

One of my favorite nerve protectants and repair agents in [**Lion's Mane**](https://www.shop.dralexrinehart.com/collections/best-sellers/products/lions-mane-capsules-host-defense-mushrooms).

Lion's mane is a medicinal mushroom known for boosting focus and cognition - AND, it also helps [**repair damaged nerves**](https://info.dralexrinehart.com/articles/stress-benefits/roaring-brain-benefits-lions-mane-hericium-erinaceus) - including enteric nerves.

Healthy function of the enteric nervous system, specifically the vagus nerve, triggers & maintains [mucosal health](https://www.shop.dralexrinehart.com/collections/mucosal-support).

#### ****Vagus Nerve - the Master Controller of the Gut****

The vagus nerve is the master control nerve of your digestive system. It controls heart rate and breathing. Vagus nerve strengthening has been gaining popularity as an important component of gut health.

Gargling, singing, humming, cold exposure, coffee enemas, Valsalva maneuvers, and deep, diaphragmatic breathing are all evidence-based strategies used to strengthen the vagus nerve.

The vagus nerve is also subject to attack from infections like those discussed above. Bacteria, viruses, molds, and fungi all produce toxins and inflammation that can directly injure nerves - including the vagus nerve.

**Keep hidden infections in mind as you personalize a recovery strategy.**

### ****Putting a Plan in Place****

There you have it!

Seven complete strategies for supporting mucosal health & a bonus discussion on the health of the vagus nerve and enteric nervous system.

Consider these options as a toolbox - not the complete story.

Support does not need to require taking twenty different supplements at a time. Understand that you can approach the gut mucosa from many directions. Personal direction depends on the level of inflammation, immune activation, and gut dysfunction.

Supplement wisely & seek professional counsel as necessary!