



PILLARS OF GI HEALTH

PATIENT HANDBOOK



Heal Your Gut, Heal Your Body

The gastrointestinal tract is one of the most sophisticated systems of the human body. We often think of the GI tract for its primary role in digesting and breaking down food, but that is only a small part of a much larger role that the GI tract plays in overall health and disease. The GI tract is truly the gateway to the rest of the body; if our GI health is compromised, our overall health is compromised. That is why it is so often the best place to start when evaluating treatment strategies.

GI disorders affect more people in the United States than those who suffer from heart disease, AIDS and cancer combined. Over 74% of Americans have lived with some type of GI-related symptoms for more than six months.¹ These illnesses can range from occasional heartburn to severe, terminal illnesses. Next to the common cold, GI discomfort is the most common reason people seek medical advice or turn to over-the-counter remedies.

As in most systems of the body, the quality of GI health is highly influenced by lifestyle choices such as diet, physical activity and sleep. Convenient and inexpensive food choices often contain little nutritional value and promote an increase of toxic burden. In addition, many people cope with daily stresses by turning to alcohol, tobacco, sugar and caffeine. Over time, these lifestyle choices impair the basic functions of the GI tract and create an environment for disease development.

The Pillars of GI Health Patient Handbook provides a specialized lifestyle plan to help you begin the journey of regaining and maintaining optimal GI function.

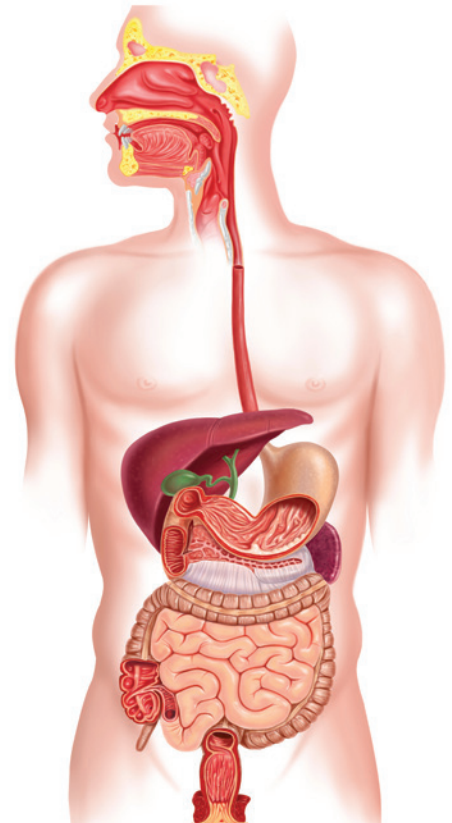


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How Macronutrients Affect GI Health

Carbohydrates

Carbohydrates are one of the most important sources of energy for your body. Carbohydrates are considered simple or complex depending on their chemical structure. Simple carbohydrates include sugars found naturally in food, as well as sugars added during food processing. Complex carbohydrates include whole grains, vegetables and legumes, all of which are good sources of fiber. Both complex and simple carbohydrates are processed in the body and turn into glucose, which is used as energy.

Dietary Fiber

Fiber is a substance found in plant food and cannot be broken down in the GI tract. Fiber is passed, intact, through the GI tract and makes up part of the stool. The two types of fiber, soluble and insoluble, are both important to a healthy diet. Fiber increases satiety, or the feeling of fullness, which can aid in healthy weight management.

Soluble fiber retains water and turns to gel during digestion. It also slows digestion and nutrient absorption from the stomach and intestines. Soluble fiber can be found in foods such as oat bran, barley, nuts, seeds, beans, lentils, fruits, and many vegetables. Soluble fiber plays a role in slowing down the absorption of fat and sugars, which can help reduce cholesterol and balance blood sugar levels.

Insoluble fiber speeds the passage of foods through the stomach and intestines and adds bulk to the stool. Insoluble fiber is usually found in foods like nuts, seeds, whole grains, vegetables and wheat bran. Insoluble fiber is effective for the treatment and prevention of constipation and of digestive disorders like irritable bowel syndrome.

Sugar

Sugars are carbohydrates found naturally in many foods, including fruits, vegetables, and dairy. The main function of sugar is to provide energy, but excess sugar can be detrimental to your health. The average American consumes around 22 teaspoons of *added sugar* daily. According to the American Heart Association (AHA), adult women should consume 5 teaspoons (20 g) of *added sugar* daily and adult men 9 teaspoons (36 g). Excess sugar consumption has been associated with obesity, type 2 diabetes, candidiasis, cardiovascular disease, certain cancers, leaky gut syndrome, tooth decay, and non-alcoholic fatty liver disease.²⁻⁶

Table 1: Calories from Added Sugar Per Serving

Food	Calories from added sugars	Added sugar (g)
Carbonated soda, 12 oz.	132.5	33 g
Starbucks Caramel Macchiato, Nonfat, 16 oz.	128	32 g
Granola, 1 cup	80	20 g
Nonfat flavored yogurt, 6 oz. container	77.5	19 g
Milk chocolate, 1 bar (1.55 oz.)	77.4	19 g
Cake doughnut (1)	74.2	18.5 g
Sweetened condensed milk, 1 fl. oz.	73.8	18.5 g
Fruit punch drink, 12 oz. can	62.1	15.5 g
Protein bar (50 g)	60	15 g
Instant oatmeal (28 g)	48	12 g
Barbeque sauce, 2 tsp.	32	8 g
Spaghetti sauce, ½ cup	28	7 g

Note: Calories listed are only from **added sugars** in the food, not the total amount of calories.

Tips for carbohydrate consumption:

- Choose whole grain
- Check label for added sugars
- Increase intake of legumes



Protein

Lean proteins are vital to a healthy diet, and can even increase satiety and promote weight loss. Meat, poultry, fish, beans, peas, eggs, nuts and seeds supply many nutrients, including protein, B vitamins, vitamin E, iron, zinc, and magnesium. Proteins function as the foundation for bones, muscles, cartilage, skin, and blood. They also play a major role in building enzymes, hormones and vitamins.

Chicken and turkey are both great lean sources of protein and, unlike red meat, contain less inflammatory fats. Cold-water fish such as salmon, mackerel, tuna, herring and sardines are not only high in protein, but are also good sources of omega-3 fatty acids.

Legumes (such as beans and lentils) and whole grains (like quinoa), in addition to being high in fiber, are also good sources of plant protein.

How Much Protein Should I Eat?

Protein needs vary based on gender, body size and physical activity level. Generally, 0.8-1 g of protein per kilogram (1 kilogram per day = 2.2 pounds) of body weight is recommended.

120 lbs. = 44-55 g
150 lbs. = 55-68 g
180 lbs. = 65-82 g

Food	Calories	Protein (g)
Chicken breast (4 oz., boneless, skinless)	184	36
Salmon (3 oz., wild caught)	196	22
Shrimp (3 oz.)	84	18
Egg (whole, boiled)	77	6
Yogurt (1 cup, plain, whole milk)	149	9
Lentils (1/4 cup)	57	4.5
Almonds (1/4 cup, dry roasted)	206	7.5
Chia seeds (2 Tbsp.)	137	4

Fats

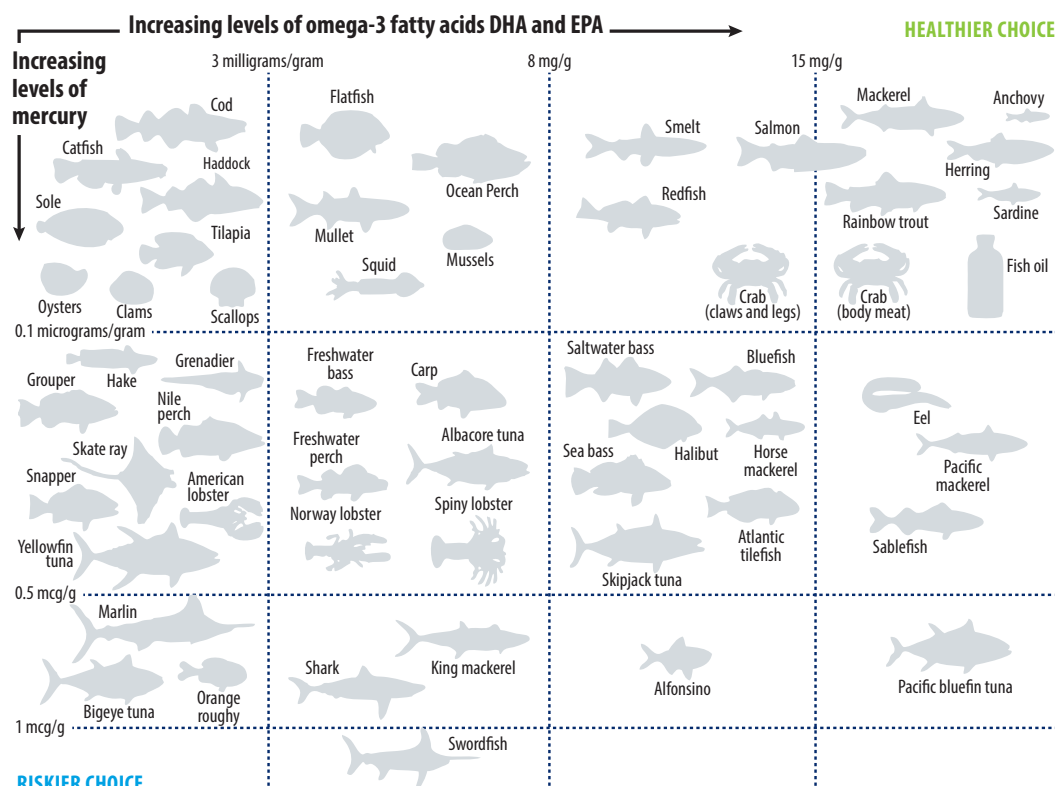
Over the past two decades, fats have been given a bad reputation. And although certain fats, such as trans fats from fried foods, can have harmful effects on your body, certain fats are critical for your body to function at an optimal level. For example, omega-3 fatty acids, found in foods such as salmon, sardines and walnuts, are considered essential because they cannot be made by the body and must be consumed through your diet. Omega-3 fatty acids have numerous health benefits, and have been shown to reduce inflammation, support mood regulation, hormone production, and can lower your risk for heart disease. They also positively affect the microbial environment in the GI tract, which plays a critical role in gastrointestinal and overall health.

Instead of focusing strictly on a low-fat diet, carefully evaluate the types of fats you consume.



Good Fats		Bad Fats	
• Cold-pressed extra virgin olive oil • Flaxseeds • Sardines • Wild-caught salmon • Chia seeds	• Avocado • Avocado oil* • Coconut oil* • Hemp seeds • Macadamia nut oil*	• Trans fat • Hydrogenated or partially hydrogenated oil • Bacon • Sausage • Corn oil	• Soy oil • Sunflower oil • Safflower oil • Cotton seed oil • Palm oil • Margarine

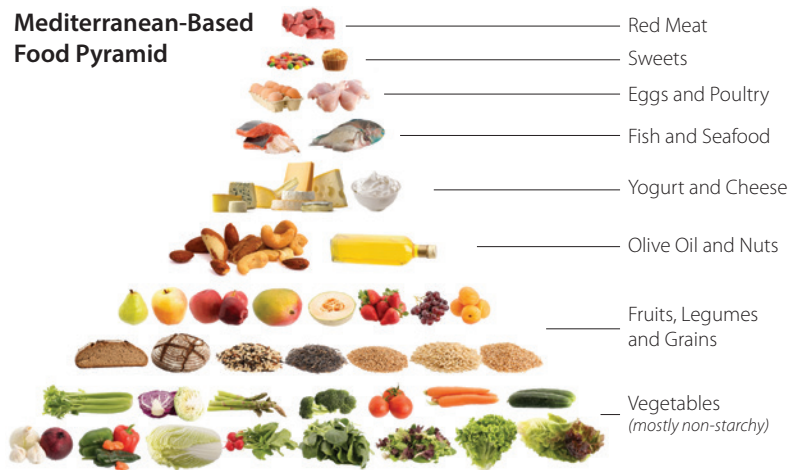
* Oils with higher smoke points are more suitable for cooking.



Creating an Ideal Meal

One of the healthiest dietary patterns comes from the Mediterranean region. The Mediterranean diet consists of a high intake of olive oil, nuts, seeds, fish, plant proteins (legumes and lentils), fruits, non-starchy vegetables, herbs and spices, moderate consumption of wine, and dairy (mostly in the form of yogurt and cheese).

The Mediterranean diet also consists of minimal meat consumption, particularly red meat, refined carbohydrates, sugars and processed foods—foods that have been shown time and time again to have harmful effects on the body.



Following a Mediterranean diet is a simple way to select healthy foods and avoid harmful foods that can negatively affect the digestive system. This will also help ensure the foods you consume consist of the most beneficial macronutrients (fats, proteins, carbohydrates) and micronutrients (vitamins, minerals, antioxidants).

Another element of the Mediterranean lifestyle includes eating meals in a relaxed, family-style atmosphere. Rather than rushing through meals or grabbing food on the go, mealtime, particularly dinner, is a time to slow down, laugh and reconnect. Taking the time to relax and digest food properly also supports GI health. For the past 50 years, scientists have studied the eating patterns of people native to the Mediterranean region and found that they are associated with long, healthy lives with minimal chronic disease.



Herbs and Spices that Promote Digestive Health

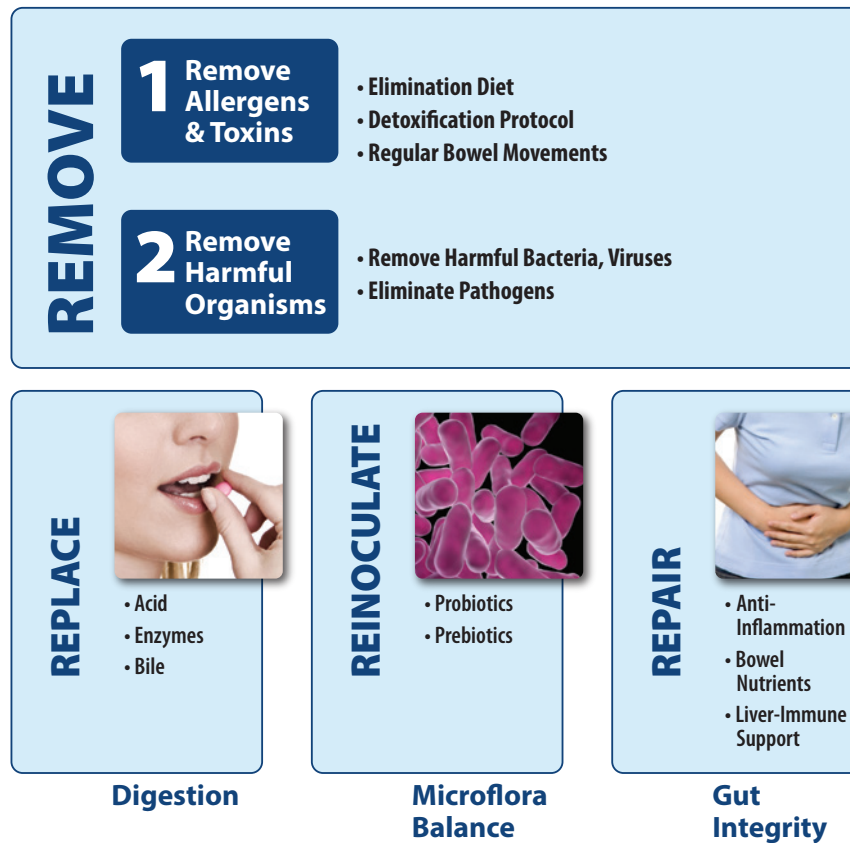
Many herbs and spices naturally have anti-inflammatory, detoxification and antioxidant properties. Historically, herbs and spices have been considered priceless for their flavor-enhancing and health-promoting benefits. Incorporating fresh herbs and spices into salads, soups and other dishes can provide anti-inflammatory and antimicrobial properties and enhance digestion. The table below outlines some of the health-promoting properties of various herbs and spices you might consider incorporating into your meal planning.

Table 2: Herbs and Spices that Boost Gastrointestinal Function

Garlic	• Allicin component has antibacterial benefits • Sulfur compounds support detoxification
Ginger	• Stimulates digestion • Reduces inflammation • Supports glutathione, the body's major antioxidant and detoxification molecule
Turmeric	• Curcumin component has potent antioxidant and anti-inflammatory properties • Protects the liver from toxins
Coriander	• Contains anti-diabetic properties • Contains antibacterial compounds • Has been shown to be effective against <i>Salmonella</i>
Fennel Seed	• Stimulates gastric motility • Helps ease abdominal pain and promotes healthy digestion • Promotes secretion of digestive and gastric juices • Eases stomach and intestinal inflammation, preventing gas and bloating • Increases absorption of nutrients
Oregano	• Activates glutathione to support detoxification • Inhibits growth of microbes, such as <i>Staphylococcus</i>, <i>Giardia</i> and <i>Herpes</i>

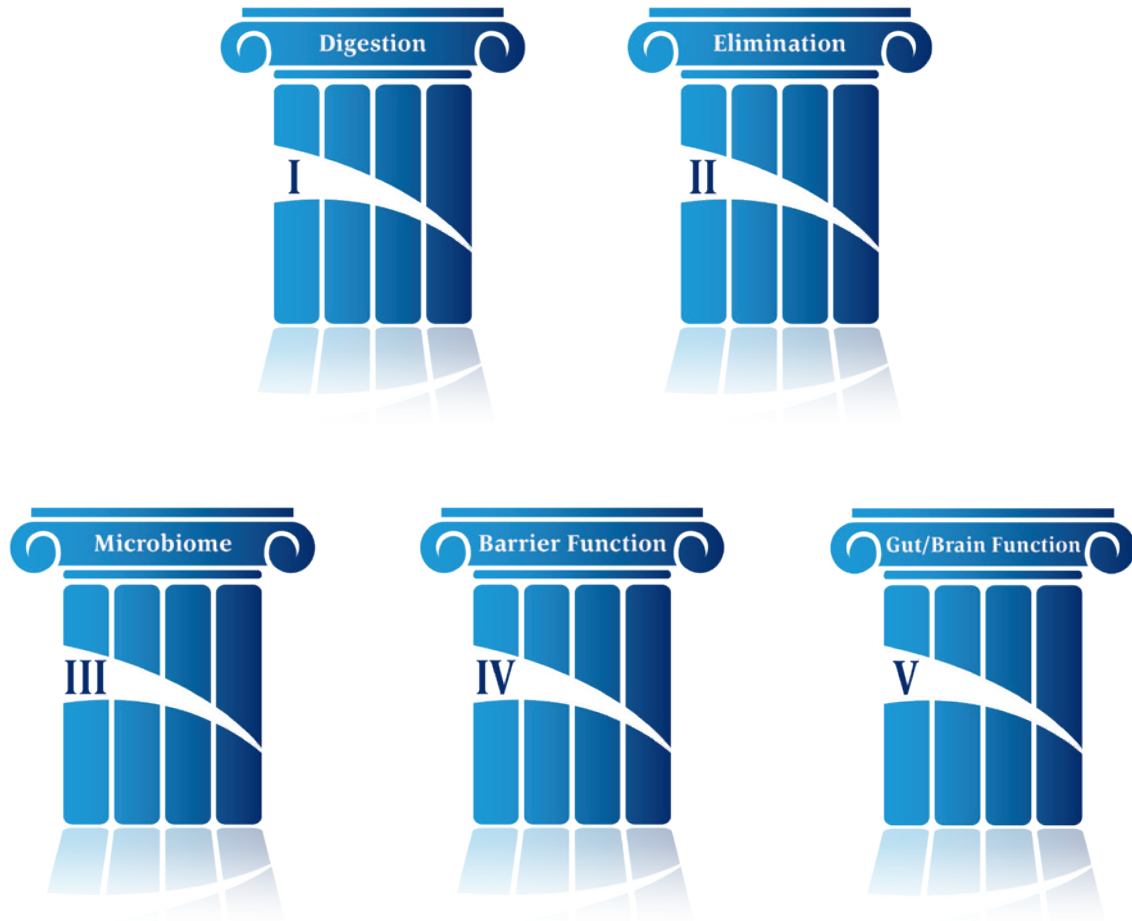
The 4R Approach to Managing GI Dysfunction

Your health care provider has many tools to assess and treat GI dysfunction. One of the popular functional medicine approaches for GI-related conditions is the 4R approach: **Remove, Replace, Reinoculate** and **Repair**. The Remove step restricts toxic, pro-inflammatory and potentially allergic foods from the diet, and eliminates harmful organisms. The traditional approach is to add a prescription medication to the body, but often the best medicine for our GI tract is in elimination and allowing the system to rest. After the critical Remove step, your health care provider can then help you address the need to Replace with digestive aids, Reinoculate with probiotics, and Repair a damaged GI tract.



The Pillars of GI Health

The GI tract is responsible for extracting the nutrients you need to thrive and maintain an appropriate balance of helpful and harmful microbes, while at the same time working with the immune system to prevent the entrance of harmful substances into the bloodstream. The GI tract has four core functions, called the Pillars of GI Health. The health of your digestive system is built upon these pillars and their interrelationship.





Digestion and Absorption

One of the main functions of the GI tract is to digest food and absorb nutrients from it. Digestion begins in the brain, when we see and smell food. Saliva and gastric juices are released while preparing for the meal, well before the first bite of food. This is why it is so important to spend time preparing our food, as this process plays a major role in healthy digestion. When you eat a meal, your mouth, by chewing, physically breaks down large food pieces into smaller molecules. Once the nutrients have passed the intestinal barrier, they enter the bloodstream and circulate to all your cells and tissues. These nutrients work to maintain organ function, energy production, and the growth and repair of new cells and tissues. Ultimately, food and their nutrients provide the energy for every cell in your body.

Different digestive juices are found in various areas of the GI tract. In the mouth, salivary glands release salivary amylase to moisten food and break down starches, helping food move down the esophagus. When food is chewed thoroughly, the body is better able to digest and absorb nutrients.

Digestive enzymes, hydrochloric acid in the stomach, and muscle contractions of the GI tract all play a critical role in breaking down large food particles into macronutrients (carbohydrates, fats and proteins) and micronutrients (such as vitamins D and B12, zinc, iron and iodine) that are easily absorbed into the body.



Stomach Acid

Many people experience heartburn after eating a meal. Acid reflux, or gastroesophageal reflux disease (GERD) is a common illness that affects 25 to 35% of the US population. Many times, it is not excessive stomach acid causing the problem, but rather decreased stomach acid.

The appropriate amount of stomach acid is crucial for optimal health. Stomach acid is necessary for proper protein digestion and the absorption of vitamin B12 and minerals such as calcium, magnesium, copper and zinc. In addition, stomach acid is a primary defense against food poisoning, *H. pylori*, parasites, and other infections. Some common symptoms of low stomach acid include:

- Bloating, belching, burning and flatulence immediately after meals
- A sense of fullness after eating
- Indigestion, diarrhea or constipation
- Undigested food in stool
- Upper digestive tract gassiness

When we do not consume enough nutrients, or when our body cannot process those nutrients, maldigestion or malabsorption can occur. Maldigestion and malabsorption can result in low energy, slow metabolism, mental fog, fatigue, and an increased susceptibility to chronic illness. It is vital to have an adequate amount of digestive enzymes in the body to break down food into nutrients. If there is a decrease in enzyme activity, large food particles will not be broken down, resulting in symptoms ranging from indigestion and food allergies to vitamin deficiency.

To improve your digestion and feel better, consider the following methods:

1. Spend more time with food

- Preparing and cooking food is becoming a lost art in our fast-paced world.
- Digestion begins when you see and smell food. Saliva and gastric juices begin while preparing for the meal, well before the first bite. Small appetizers can also be helpful before large meals.
- Chew foods thoroughly. The smaller the food particles and the more interaction with salivary enzymes, the better the digestion process.
- Relax while eating. Reduce the number of times that eating takes place while driving, working, etc.

2. Socialize around food

- In most cultures, eating with others is an important and regular social event—this slows the eating process and increases enjoyment of food.
- Eating alone often promotes poor food choices.
- Eating with others allows for sharing of the cost/time in preparation of foods.

3. Eat regular meals

- Breakfast is especially important in normalizing blood sugar levels.
- Eat healthy snacks throughout the day to maintain energy.

Digestive Aids

In order to evaluate the cause of maldigestion or malabsorption, your health care provider must first rule out poor dietary habits and more significant, underlying conditions. Once these have been ruled out, the most common solution for digestive insufficiencies is to supplement with digestive aids. Digestive enzymes, bile or bile stimulators, hydrochloric acid, or a combination of these components are available as capsules or tablets. These products may be used as temporary aids to overcome deficiencies while other therapies are pursued, or they may be used daily, before meals, to improve digestion.

Table 3: Types of Digestive Aids

Digestive Aid	Types	Benefit	Dosing
Bitters	Gentian, artichoke leaf, endive and bitter greens (dandelion leaf, wild lettuce, milk thistle, chicory)	• Help stimulate saliva hydrochloric acid and bile production • Help produce enzymes in the mouth, stomach and pancreas	100-150 mg before meals
Hydrochloric Acid	Betaine HCl	• Helps support digestion and absorption by lowering gastric pH • Serves as body's primary mechanism against food pathogens	300 mg before meals
Pancreatic Enzymes	Pancreatin (protease, amylase, lipase)	• Help to digest starch, protein and fat and enhance enzyme activity to support digestion	350 mg before meals
Plant Proteases	Papain, bromelain	• Help digest wheat gluten and render it harmless in those who are gluten-sensitive • Aid in the digestion of protein and has been shown to help maintain normal levels of inflammation	100 mg before meals
Bile/ Bile Stimulators	Ox bile, extracts of artichoke (<i>Cynara</i>) leaf, dandelion root, barberry, milk thistle or peppermint	• Aid in the digestion of fat and help the body to excrete waste	120-225 mg/day



Elimination and Detoxification

Exposure to the air we breathe, the stress we feel and the food we ingest can add up to over 14 pounds of pesticides, herbicides, food additives and preservatives per year for the average American. The liver, together with the GI tract, is responsible for removing these toxins through a process called detoxification. The function of elimination and detoxification involves removing the unusable portions of the food you eat, as well as toxins. It is essential that both be completely eliminated from your body through urine and stool; otherwise, toxins build up and are stored in your tissues. A good measure of the health of the elimination pillar is how often you have bowel movements on a day-to-day basis. Ideally, you should have two to three well-formed bowel movements per day.

The digestive system is responsible for breaking down food, absorbing useful compounds, and eliminating the rest. A well-functioning gastrointestinal tract, together with the liver, works to remove toxins from the body. Toxins invade the body from three main sources: the environment, personal lifestyle, and the body's own metabolic processes. Polluted air, prescription drugs, processed foods, and even stress can increase toxins in the body. Eliminating pathogenic organisms (bacteria, viruses, fungi, parasites), toxic burden and negative food reactions can have a profound impact on numerous GI and non-GI-related conditions.

Poor dietary habits play a fundamental role in bowel health and regularity. Lack of adequate fiber and water are the biggest causes of regular constipation. Lack of physical activity can also contribute to chronic constipation. The stool removes many liver-processed toxins, so extended bowel transit times allow these toxins to be reabsorbed.



Detoxification/Biotransformation

When the GI tract is not functioning optimally, additional burden is placed on the liver. When incoming toxins exceed the liver's ability to remove them, it is termed toxic burden. It is important to periodically restore the body's ability to cleanse itself and eliminate toxins through detoxification. This is usually accomplished by going through a detoxification program, in which you eliminate food sensitivities from your diet, including alcohol, gluten and sugar. Removing these inflammatory foods from your diet can help alleviate symptoms of mental fog, fatigue, digestive dysfunction, headaches, and food allergies.

The two phases of detoxification, known as phase I and phase II, occur in the liver. Phase I detoxification is responsible for converting fat-soluble toxins, which lodge themselves in your fat cells, into water-soluble substances, which are easily eliminated through the urine. In phase II detoxification, these intermediates become further biotransformed by specific enzymes, called conjugases. These enzymes attach to certain nutrients, such as taurine, glutamine and glycine. Some research has even begun to validate the idea that some chronic neurological symptoms, such as those in Parkinson's disease, may result from the body's impairment of detoxification abilities.⁷

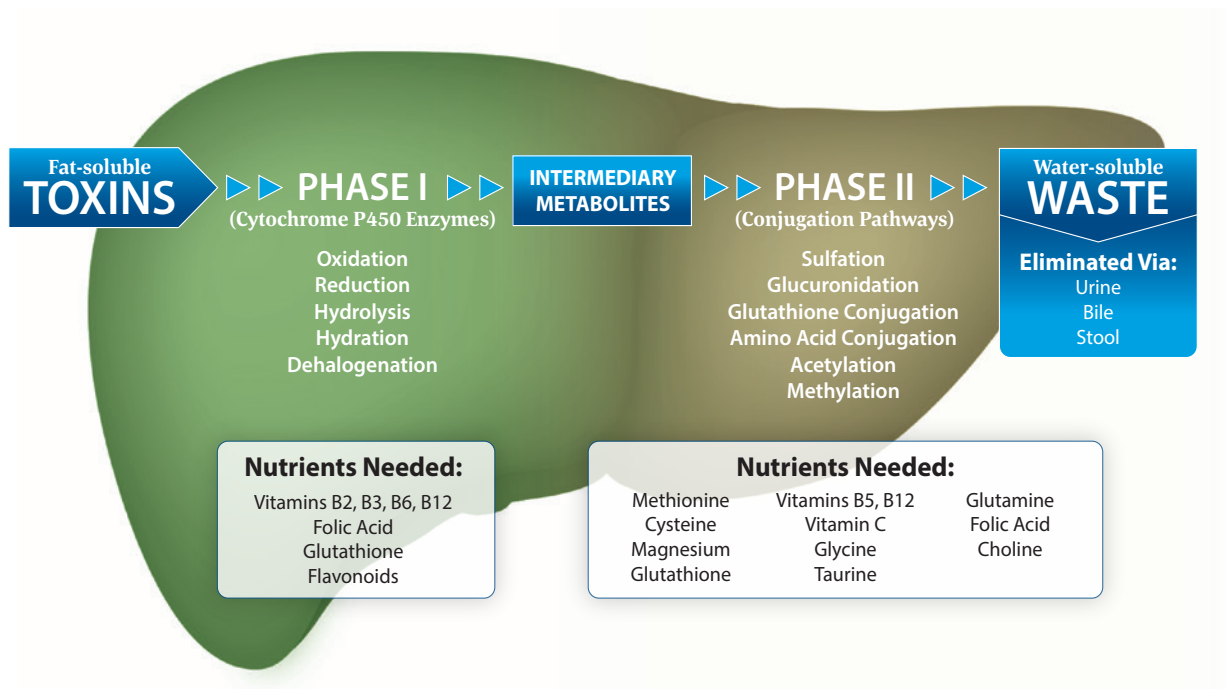


Table 4: Types of Toxins

Environmental Toxins	Lifestyle Toxins	Internal Toxins
• Pollution • Auto exhaust • Solvents (paint, cleaning products) • Heavy metals • Pesticides, herbicides, insecticides • Radiation • Inhalants	• Dietary choices (fast foods, fried foods) • Cosmetics • Nicotine • Alcohol • Caffeine • Prescription drugs • Over-the-counter drugs • Artificial food additives, colorings and preservatives • Meats containing hormones and antibiotics • Refined foods and sugars	• Bacterial, yeast, fungal overgrowth • By-products of metabolic reactions (such as carbon dioxide and ammonia) • Undigested food • Stress • Unresolved trauma or abuse • Unhappy relationships

Table 5: Nutrients that Assist in Elimination

Nutrient	Function	Dosing
Fiber (Psyllium husk)	• Helps increase stool output and improve symptoms of constipation while increasing abdominal comfort	9 g – 1-2x/day
Magnesium	• Helps restore magnesium levels to encourage natural stress relief and healthy bowel movements	200 mg/day on Day 1, slowly increase to 200 mg-4x/day by Day 3
Cape aloe	• Helps soften stools and increase stool bulk	250-450 mg/day

Table 6: Nutrients that Assist in Detoxification

Nutrient	Function	Dosing
N-acetyl cysteine (NAC)	• A precursor to glutathione, NAC is an essential intracellular antioxidant that supports cellular detoxification	250-500 mg/day
Milk thistle	• An antioxidant that assists in liver cell regeneration, protects cells from exposure to chemical and industrial pollutants	260 mg 2x/day
Artichoke	• An antioxidant that supports liver health	300 mg/day
Dandelion	• Increases liver and biliary function	450 mg/day
Methionine and Choline	• Regulate fat metabolism and increase bile flow	Methionine - 280 mg/day Choline - 370 mg/day

Foods that Increase Detoxification

Fruits Raspberries Strawberries Blueberries Bananas Apples Any other fresh or frozen fruit	Vegetables Broccoli Cabbage Cauliflower Brussels sprouts Watercress Arugula Kale Bok choy Radish Turnip Beans and lentils Garlic Onion	Grains and Similar Wild rice Brown rice Quinoa Gluten-free oats Millet Amaranth Buckwheat Tapioca	Nuts and Seeds Almonds Cashews Walnuts Sunflower seeds Sesame seeds	Milk Products Non-dairy milks such as unsweetened coconut, almond or hemp milk	Proteins Wild-caught fish Organic or pasture-raised chicken and turkey Grass-fed beef
Fats and Oils Extra virgin olive oil Flaxseed oil Coconut oil Sunflower oil Sesame oil Nut oils (other than peanut oil)	Beverages Purified water Sparkling water Organic herbal or green tea	Spices and Condiments Turmeric Garlic Ginger Rosemary Cocoa Pink Himalayan salt	Sweeteners Stevia Xylitol Erythritol	Plant Proteins and Legumes All except non-approved. Canned beans are acceptable as long as the can states "BPA-free"	

Foods that Slow Down Detoxification

Fruits Canned fruit packed in syrup High-sugar or artificial berry juices Oranges	Vegetables Corn Canned vegetables in sauces Soybean and soy-based foods	Grains and Similar Refined flours Gluten-containing: -Wheat -Spelt -Kamut -Rye -Oats* -Barley <i>*Look for gluten-free oats</i>	Nuts and Seeds Peanuts	Milk Products Cow dairy: -Milk -Cheese -Ice cream -Yogurt -Frozen yogurt	Proteins Conventional beef Pork Luncheon meats Hot dogs Sausage Bacon Eggs Shellfish
Fats and Oils Margarine Butter Hydrogenated oils Cooking sprays Mayonnaise Shortening Corn oil Canola oil Vegetable oil	Beverages Coffee Black tea Soda Alcohol Energy drinks Sweetened beverages	Spices and Condiments Ketchup Mustard Relish Soy sauce Barbeque sauce Chocolate Iodized salt	Sweeteners White or brown sugar Honey Agave nectar Maple syrup Corn syrup Sucralose Aspartame Saccharin Artificial colors, flavors and preservatives	Plant Proteins and Legumes Soybeans Tofu Miso Edamame	



Elimination Diet

An elimination diet involves removing potential allergens, toxins or intolerances from your diet for at least three weeks. Afterwards, slowly reintroduce the foods one at a time and monitor your symptoms for possible reactions. If over the next 48 to 72 hours you do not experience any symptoms, you may reintroduce the next food, and so on, monitoring any symptoms or discomfort.

What to Include:

Vegetables: Broccoli, cabbage, cauliflower, onion, Brussels sprouts, watercress, arugula, kale, bok choy, radish, turnip, beans and lentils, garlic

Fruit: Raspberries, strawberries, blueberries, bananas, apples and any other fresh or frozen fruit

Protein: Wild fish, organic or pasture-raised chicken and turkey, grass-fed beef

Plant Protein and Legumes: All except soy

Fats and Oils: Extra virgin olive oil, organic coconut oil, flaxseed oil, sunflower or sesame oil

Nuts and Seeds: All except peanuts

Starches and Grains: Wild rice, brown rice, quinoa, gluten free oats, millet, buckwheat, tapioca

Milk Products: Non-dairy milk such as unsweetened coconut, almond or hemp milk

Beverages: Filtered water, herbal or green tea, sparkling water

Spices and Condiments: Turmeric, garlic, ginger, rosemary, cocoa, pink Himalayan salt

Sweeteners: Stevia

What to Remove:

Vegetables: Canned or creamed vegetables

Fruit: Canned fruit packed in syrup, high sugar or artificial juices, oranges

Protein: Conventional beef, pork, luncheon meats, hot dogs, sausage, bacon, eggs, shellfish

Plant Protein and Legumes: Soybeans, tofu, miso, edamame

Fats and Oils: Margarine, butter, shortening, hydrogenated oils, canola oil, vegetable oil, corn oil, mayonnaise

Nuts and Seeds: Peanuts and peanut butter

Starches and Grains: Gluten (wheat, barley, rye, spelt)

Milk Products: Cow's dairy (milk, cheese, cottage cheese, cream, ice cream, yogurt, frozen yogurt)

Beverages: Coffee, black tea, soda, alcohol, energy drinks, sweetened beverages

Spices and Condiments: Ketchup, mustard, relish, soy sauce, barbeque sauce, chocolate, iodized salt

Sweeteners: White or brown sugar, honey, agave nectar, maple syrup, corn syrup, sucralose, aspartame, saccharin, artificial colors, flavors and preservatives

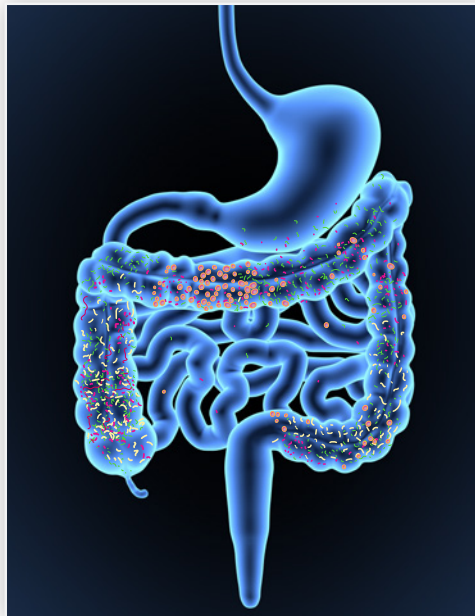
Microbial Balance

The gut microbiome is an ecosystem composed of more than 100 trillion microscopic organisms, with over 500 different strains of beneficial yeast, bacteria and microorganisms that live in the GI tract. It is primarily located in the large intestine, although there are microorganisms housed along the entirety of the GI tract and your entire body. It is one of the most metabolically active systems in your body. These organisms maintain healthy and functional digestion and absorption from the GI tract, protect against pathogens, help to regulate immune function and blood sugar levels, and assist in vitamin production.

The bacteria in the gut microbiome can have a profound effect on the health of the entire body. The microbiome aids in the production of nutrients, including vitamins B and K, but also can affect one's risk for obesity or metabolic conditions. For example, birth via C-section versus vaginally can have distinct effects on the health of the gut

and immune system. Infants born via C-section do not have the same quantity or diversity of bacteria as that of an infant born vaginally. These changes can potentially affect their long-term health by increasing the risk of certain allergic or inflammatory conditions.

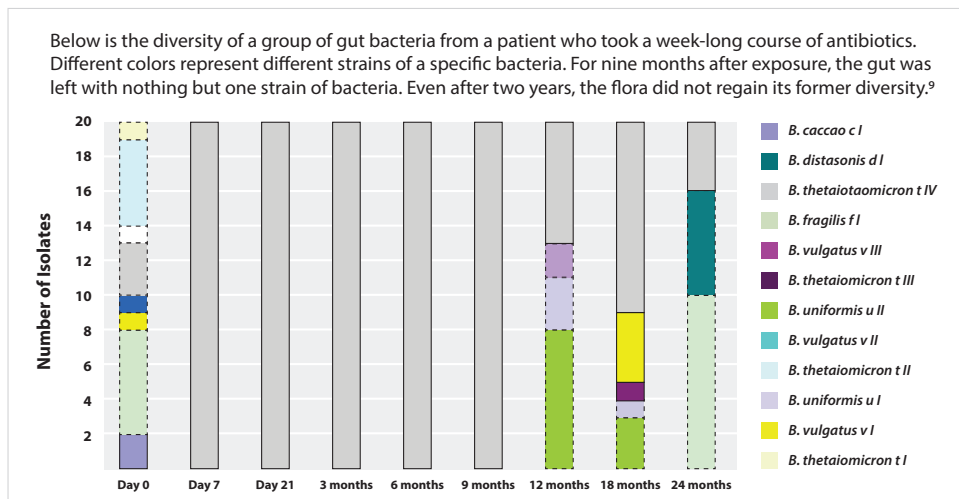
It is important to keep beneficial flora in balance and in plentiful supply to help regulate the digestive system and prevent GI illnesses. Many factors, including genetic makeup, weight and environment, influence bacteria in the GI tract. Even harmless bacteria, when in the wrong place in the body, can potentially cause illness.



Bacterial Imbalance

Dysbiosis is any microbial imbalance of the gut microbiome. When the microbiome is disturbed in any way, the body is vulnerable to many GI disorders. There are several types of dysbiosis, including *Candida*, small intestinal bacterial overgrowth (SIBO) and parasites. SIBO occurs when the bacteria normally found in the large intestine travel into the small intestine. From there, they overgrow and inhibit absorption of specific micronutrients and macronutrients. The result is uncomfortable GI symptoms such as upper GI gas and bloating after a meal. Bacterial overgrowth is most commonly caused by the use of antibiotics, poor dietary choices, chronic stress, excessive alcohol intake, acid-suppressing medications, chronic maldigestion, chronic constipation, or food allergies. The solution for dysbiosis involves colonizing the gut microbiome with healthy organisms and limiting harmful organisms from overgrowing. The best way to repair bacterial imbalance is to create a healthy environment for helpful microorganisms to flourish. Some tips to minimize dysbiosis include:

- **Avoid disrupting events:** When the balance in the gut is disrupted, it offers the opportunistic harmful organisms and chance to thrive. One of the most common disruptions is the use of antibiotics. Even if taken in childhood or adolescence, antibiotics can have a profound and long-lasting effect in gut health. Individuals who have taken antibiotics have an increased risk for dysbiosis.⁸ Other disruptions include mental and emotional stress and infections.
- **Improve immune system function:** Microbial balance and the health of the immune system are interdependent. Approximately 80% of the immune system resides in the gut, and an unhealthy gut can have serious effects on immune health. A healthy immune system can help protect the gut from pathogenic, opportunistic microorganisms.
- **Provide the gut with viable healthy organisms:** Maintaining microbial balance requires a healthy community of beneficial commensal organisms. This can be supported by adding highly beneficial, although temporary, probiotic organisms. Commercially prepared probiotics have been selected for their ability to grow in culture, withstand digestive juices, adhere to the gut wall, and support gut and overall health.





Probiotics

Probiotics are live bacteria and yeasts that promote a healthful environment in your gut. A probiotic should be thought of as an organism that, when ingested, remains viable in the gut long enough for its metabolic activity to benefit the body in some way prior to its death or removal. The use of bacterial cultures in food goes back several thousand years. Fermented milk products such as yogurt, kefir, buttermilk, cheeses and sauerkraut have traditionally been used as sources of probiotics. Fermenting acts to preserve, as well as add flavor, to foods. Science has attributed many health benefits to the use of these products, especially fermented milk products. Current research finds that bacteria in the GI tract are important for the health and longevity of humans.

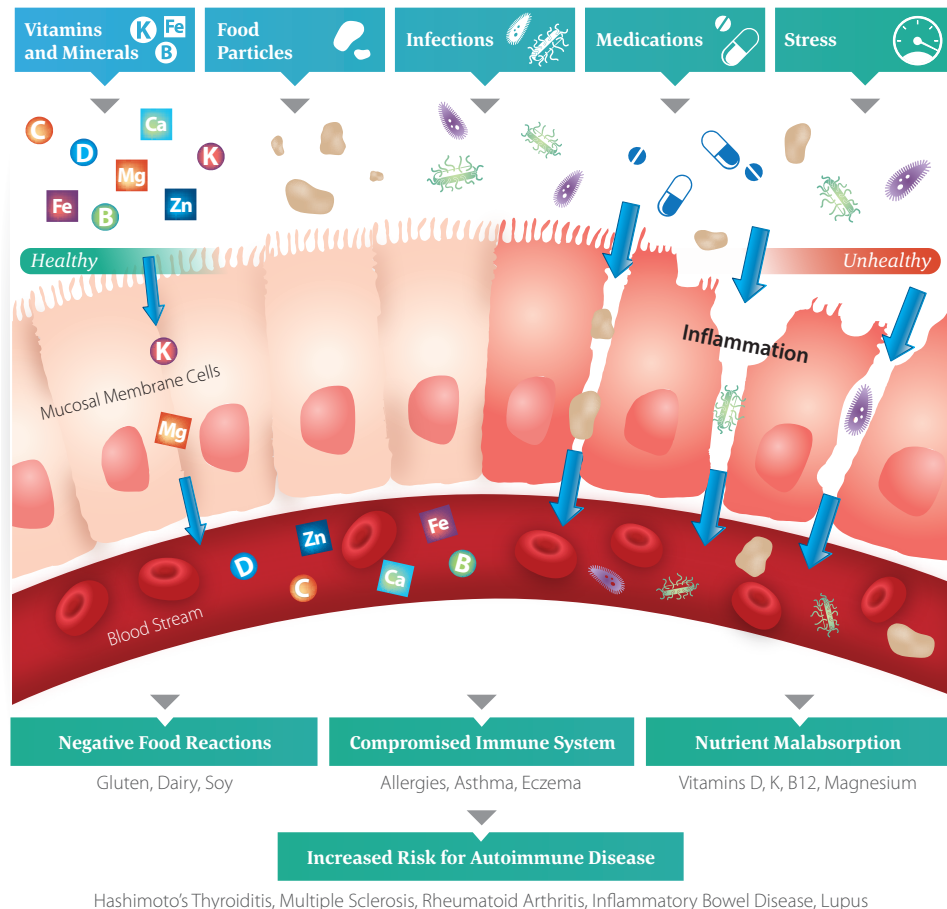
The interest in probiotics has grown in the past several decades from use in animals to use in humans, and probiotic supplements are now widely available in capsule, tablet and powder forms. Commercially prepared probiotics may stay viable in the GI tract for 1-2 weeks, or even longer. The most commonly used and researched strains of probiotics are ***Lactobacillus*** and ***Bifidobacterium*** species, although the spore-based bacteria (***Bacillus***) and the beneficial yeast (***Saccharomyces boulardii***) are becoming popular choices for probiotics in clinical practice. Probiotics have proven their efficacy with conditions such as irritable bowel syndrome (IBS), small intestinal bacterial overgrowth (SIBO), dysbiosis, inflammatory bowel disease (IBD) and GERD.

Prebiotics

A prebiotic is a non-digestible food that helps feed the beneficial strains of bacteria in the gut. These agents are typically fibers or complex, indigestible carbohydrates like fructooligosaccharides (FOS), inulin or beta-glucans. Prebiotics fermented by *Lactobacilli* and *Bifidobacterium* produce beneficial, short-chain fatty acids that promote healthy colon cell metabolism. Prebiotics can also come in a non-fiber form and be polyphenol-based. Polyphenol prebiotics feed the good probiotic bacteria, without gas or bloating symptoms. Also, polyphenol prebiotics provide antioxidant protection to the gut lining and strengthen its mucosal protective layer.

Barrier Function

The GI tract is one of the body's largest protective cell layers, serving as a barrier between the internal body and the external world. Its critical function is to allow nutrients into the body, while preventing harmful substances from passing into the bloodstream. Not only does increased intestinal permeability affect the GI tract, but also the immune, nervous and endocrine systems. There can be many causes of increased intestinal permeability, including poor diet, chronic stress, toxin overload, and dysbiosis. The GI tract houses the majority of the immune system in the body—about 80% is closely related to the GI tract and plays an essential role in barrier function. If this selective barrier function is not maintained, a number of harmful substances may enter the body, triggering immune-related responses such as Crohn's disease, celiac disease and food allergies.



Increased intestinal permeability, or **leaky gut syndrome**, is a condition that occurs when inflammation causes the tight junctions between the cells lining the intestines to widen. Normally, these junctions are very tight, forcing all molecules to pass through the regulated cell membranes of the gut cell wall. Patients with leaky gut syndrome have dysfunctional digestive processes because the intestines lose their ability to filter nutrients and other substances. When this occurs, substances can enter the bloodstream through the loose intestinal junctions. These foreign substances cause inflammation within the intestines and inhibit digestive and immune function. When left untreated, leaky gut syndrome can affect the entire body.

Healing the gut and repairing the gut barrier can ultimately lead to improved health and quality of life. A critical part of healing the gut includes managing inflammation. Inflammation is the way the body handles harmful organisms and irritants and protects the body from their harmful effects. Unchecked, long-term inflammation can have a detrimental effect on the body.

Reducing the inflammatory burden can be accomplished naturally by:

- **Diet:** An anti-inflammatory diet is key to promoting proper gut integrity. Diets that increase inflammation will not only increase GI distress, but will also increase cardiovascular risk, autoimmunity risk, and nearly every other chronic disease mediated by inflammation.
- **Anti-inflammatory herbs:** Many herbs work as anti-inflammatory agents and can make a substantial impact in managing inflammation. Curcumin (or turmeric) and fish oil are considered the most potent natural anti-inflammatory agents.



Figure 1: Factors Associated with Intestinal Permeability¹⁰

Excessive alcohol consumption	Food allergies
Cancer radiation therapy	GI infections
Corticosteroids	NSAIDs
Increased mental/emotional stress	Nutrient insufficiencies
Excessive sugar intake	Premature birth

Table 7: Nutrients that Help Heal the Intestinal Barrier

Nutrient	Function	Dosing
Digestive aids such as lipases, proteases and amylases	• Help to digest starch, protein and fat and enhance enzyme activity to support digestion	350 mg before every meal
Probiotics	• Help maintain a healthy and balanced digestive tract • Help keep “bad bacteria” from overgrowing • Decrease inflammation	20-225 billion CFU – 2-3x/day
Glutamine	• Supports GI barrier health and integrity • Helps heal gut lining	4 g – 1-2x/day
Deglycyrrhized licorice (DGL)	• Provides a protective barrier over mucus membranes, which soothes irritated tissues and relieves inflammation	800 mg – 1-2x/day
Immunoglobulins	• Bind to and eliminates toxin encounters with immune system • Protect gut barrier function	1 g – 1-2x/day



Gut-Brain Connection

Exposure to stress can result in changes of gut-brain function. Combined with a lack of regular eating, sleeping, and exercising, stress may lead to the development of a broad array of gastrointestinal disorders, as well as cause issues in other areas of the body. The major effects of stress on gut health include changes in motility, digestive secretions, intestinal permeability, mucous production, and bacterial diversity. There are several strategies you can do on your own or in partnership with your practitioner to help control stress and its impact on the gut.



Making Time for Relaxation

Setting aside time to take breaks and relax allows for the body to regenerate and develops overall well-being in the body. Some research has shown that scheduling downtime allows for individuals to have more structure and become more productive throughout the day. Specific to your gastrointestinal system, scheduling time to slow down is beneficial for improving digestion and dysfunction when we are in a constant state of stress.



Mindful Eating

Eating all the right foods is beneficial, however it is important that you also eat those foods in the proper manner. Establishing mindful eating habits can have a positive impact on digestion, elimination and the nutritional impact of food.

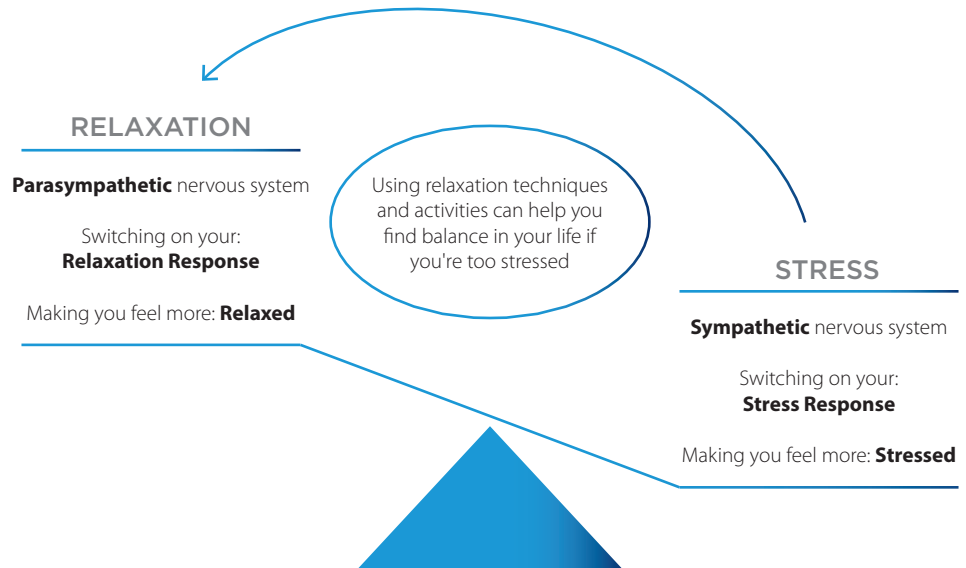
- **Spend more time with food:** Preparing and cooking food allows you to think about and appreciate the foods you are eating. Digestion begins with the sight and smell of food. Saliva and gastric juices begin flowing while preparing for the meal, and even before the first bite. It is important to chew foods slowly and thoroughly. The smaller the food particles, the more complete the digestion process will be. It is also important to relax while eating, which may include reducing the number of times eating takes place while driving, working, etc.
- **Socialize around food:** In most cultures, eating together with others is an important and regular social event. Social gatherings around food often slows the eating process and increases the enjoyment. Eating with others allows for sharing of the cost/time in preparation of foods, while eating alone often promotes fast eating and poor food choices.
- **Eat regular meals:** Breakfast is especially important because it helps provide an energy foundation throughout the day. Also, eating healthy snacks throughout the day helps maintain energy balance. It is also a good idea to keep a food diary. A seven-day food diary is a great way to keep track of your food choices and eating patterns so you may track progress.



Centering Practices

Participating in centering practices, such as deep breathing exercises, provide the mind and body an opportunity to achieve a clear and calm state, and overall improvement in digestive wellness.

- **Deep Breathing:** Diaphragmatic breathing, or deep breathing, is an exercise that contracts the diaphragm. When the diaphragm regularly receives full breaths, its range of motion is increased, and the lowest part of the lungs are able to get a full share of oxygenated air.





Heart Rate Variability/Biofeedback

Heart rate variability (HRV) is a measure of the variation in time between each heartbeat which provides your practitioner insight into the changes between the sympathetic and parasympathetic nervous system. Heart rate variability biofeedback is used primarily by your practitioner to “reset” the nervous system and can help different types of stressors. This process uses sensors attached to your body to measure normally nerve activity in your body. Parasympathetic activity is usually a component in the “relaxation response” in your body. Stimulation of parasympathetic activity by this process may help produce relaxation responses, and help reduce stress effects.

Cognitive Behavioral Therapy

Also known as “talk therapy,” cognitive behavioral therapy encompasses a variety of techniques, which your practitioner may help you identify and change troubling emotions, thoughts, and behaviors. Such stressors can trigger and worsen gastrointestinal pain and other symptoms, and vice versa. Your practitioner can provide a supportive and comfortable environment so that you can freely communicate any concerns or fears that may be causing stress in your body. This one-on-one talk therapy provides a relaxed atmosphere for the development of a comfortable relationship between you and your practitioner.



Conclusion

Chronic gastrointestinal dysfunction can play a profound role in quality of life. Many times, we look at each body system in its own silo, isolated from the rest of the body and its function. We now know that this is not how to enhance wellness. Looking at the body as a whole and identifying the root cause of illness often starts by identifying dysfunction in the gut. Our diet and lifestyle choices, the health of our digestive and elimination processes, our gut microbiome and intestinal barrier health all have an important effect on our overall health.

The human body is remarkably resilient and maintains a metabolic reserve to help protect against disease. Still, the lifestyle choices you make can greatly enhance or decrease optimal function. Ultimately, you hold the keys to your wellness, longevity and vitality.

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Notes:

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Recommendations:

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