

DIGESTION

“As a result of your program, my blood pressure fell in 6 months from 135/82 to 110/62, my asthma of 30 years totally disappeared, my sinuses cleared up for the first time in my life, my edema went away, and my digestion improved from poor to perfect. I think everyone MUST follow your program if they want a long, pain-free life.”

KIRIL (60), IDAHO

Choosing the right foods can have a profound impact on your health and longevity. But no matter how good that food is, it will do you little good if it isn't digested properly—and proper digestion is hardly the norm. A study published in 1993 in the journal *Digestive Diseases and Sciences* estimated that 70 percent of American adults suffered from some form of gastrointestinal distress resulting from poor digestion. More recently, the Consumer Healthcare Products Association estimated that total U.S. sales of over-the-counter gastrointestinal medications in 2006 were well over \$2 billion—and that doesn't include the billions spent on prescription medications taken by those who found no relief from over-the-counter products.

Some of those digestive ailments, such as lactose intolerance (the inability to digest milk sugar), result from genetic defects. Many problems, however, simply result from excess stress placed on the digestive system by a poor diet. In some cases, specific supplements or medications may help to correct a malfunctioning system, but in all cases, eating the right foods is essential to restoring and maintaining gastrointestinal health.

HOW IT WORKS

The moment food passes your lips, digestion begins. As your teeth grind food into smaller pieces, the food mixes with saliva from your salivary glands. Saliva contains amylase, an enzyme that breaks starchy carbohydrates into simple sugars (glucose and maltose) for easier absorption later in the digestive process. Saliva also buffers (modifies the acid–alkaline balance) and lubricates the food, making it easier to swallow and preparing it for further digestion. The act of chewing doesn't appear to be very difficult, but inadequate chewing is not at all uncommon. The hurried pace of modern life leaves a lot of people literally eating food on the run, which can cause malabsorption, robbing your body of vital nutrients. Inadequate chewing also puts an extra burden on your digestive tract, causing it to overproduce digestive juices in an attempt to break down the large food particles. This can cause gas, bloating, and, over time, more serious damage to your digestive system. So relax, slow down (and sit down!), savor your food, and chew thoroughly—you'll enjoy your food more and you'll be doing your digestive tract a favor.

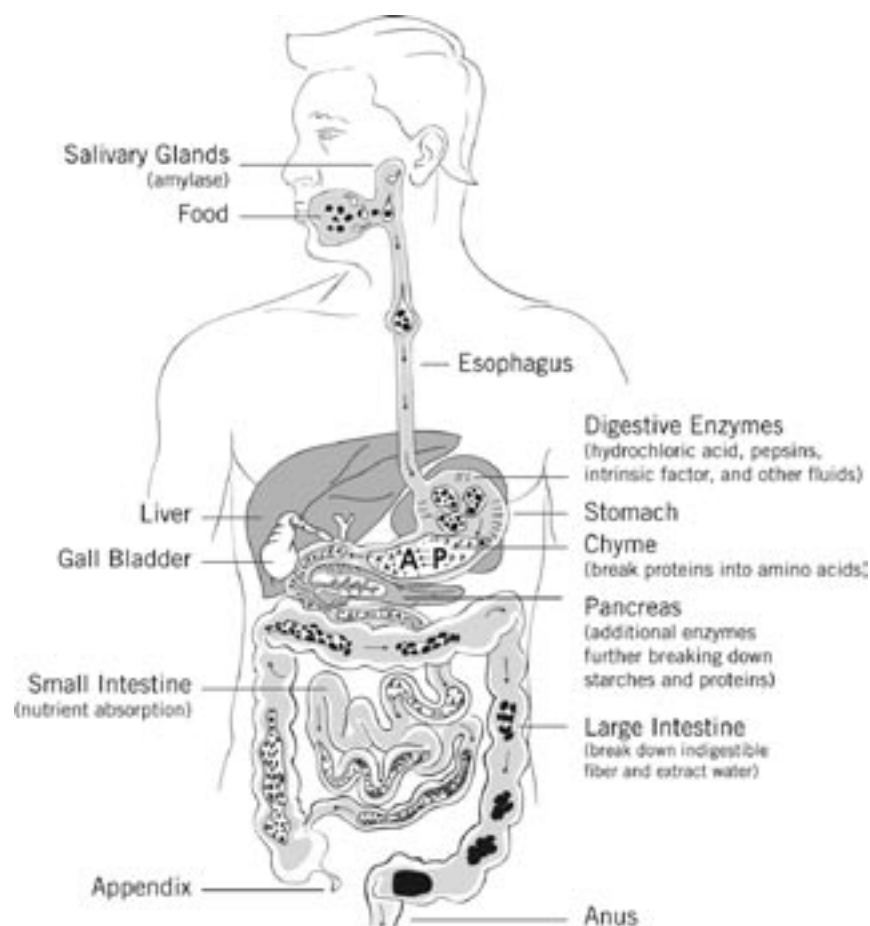
When you swallow, automatic rhythmic contractions of the muscles in your esophagus called *peristalsis* move the food down to your stomach. There, hydrochloric acid and other fluids secreted by the stomach lining dissolve it into a thick liquid called chyme. Stomach juice also contains digestive enzymes (pepsins) that begin to break proteins into amino acids for absorption further along the digestive tract. A protein called *intrinsic factor* is also secreted by the stomach to enable absorption of vitamin B₁₂ in the small intestine.

After being processed by the stomach for 1 to 3 hours, chyme is slowly released into the small intestine, where the greatest amount of nutrient absorption takes place. In the small intestine, additional enzymes produced in the pancreas are released, further breaking down starches and proteins and beginning to break down fats in order to make absorption possible.

After passing through the small intestine, chyme enters the large intestine, also called the colon or bowel. At this point, most usable nutrients have already been absorbed by the small intestine. The primary function of the large intestine is to prepare what is left for elimination, a process that is aided by “friendly” bacteria that break down indigestible fiber such as cellulose.

Specialized cells in the colon also extract much of the water from the chyme, turning it into solid feces.

Interestingly, the bacteria in your colon are the most numerous type of cell in your body, and each of us harbors somewhere in the neighborhood of 2 or 3 pounds of these healthy bacteria. Our bodies actually have 10 times more cells of these bacteria than human cells with our own DNA. Beneficial colonic bacteria species, such as *Lactobacillus*, *Bifidobacterium*, and *Escherichia coli*, have several important functions. They help remove toxins from the gut, help produce nutrients, and, by their sheer numbers, crowd out pathological or toxic organisms.



HOW DIGESTION GOES AWRY

As food makes its way through your digestive tract, there are many stops along the way where the process gets into trouble. If you suspect any of the conditions we describe here, our *TRANSCEND* program recommends that you always *Talk with your doctor* to determine the true source of the problem and your best treatment options. Following our *Nutrition* and *Supplementation* recommendations is also vital because it is an unhealthy diet that causes many digestive problems in the first place.

As we described above, when food reaches the stomach, intrinsic factor is secreted to facilitate absorption of vitamin B₁₂. If an insufficient amount of intrinsic factor is released, vitamin B₁₂ deficiency can result. If not addressed, this can lead to a range of symptoms, including anemia, fatigue, tingling or numbness in your fingers and toes, poor sense of balance, depression, and dementia. However, insufficient intrinsic factor can be managed by supplementing with intrinsic factor and vitamin B₁₂. Keep in mind that vitamin B₁₂ does not survive in the digestive tract, so you need to supplement it either through injections or sublingual tablets.

Helicobacter pylori (or *H. pylori*) infection is another potential problem at this stage of the digestive process. These bacteria can disrupt the fragile balance between the highly acidic gastric juices and the mucus that coats the stomach lining to protect it from being digested by those juices. Serious damage, such as peptic ulcers, is often the result of *H. pylori* infections. Note that at least one-third of Americans are colonized with *H. pylori*, many of whom are asymptomatic. Symptoms of peptic ulcers may include a burning pain or dull ache in the stomach, often 2 to 3 hours after eating or in the middle of the night, which typically goes away after eating. Should you exhibit such symptoms, your physician can administer a blood test for antibodies, an indicator of an *H. pylori* infection.

A more common stomach problem, which is often missed, is *hypochlorhydria*, a condition in which inadequate amounts of hydrochloric acid are produced. This can leave food insufficiently dissolved, resulting in the malabsorption of nutrients. Hypochlorhydria is a relatively common disorder, particularly among older people, with studies indicating that 20 to 30 percent of those over age 60 may be affected. Symptoms of hypochlorhydria are often mistaken for

just the opposite—excess acid indigestion or acid reflux disease—and often result in people taking over-the-counter and prescription antacids, which only exacerbate the condition. The hair mineral analysis test described in the following section on Early Detection can suggest whether you have hypochlorhydria.

In the small intestine, a common genetic defect can result in insufficient production of the digestive enzyme lactase, which is needed to break down milk sugar or lactose. This results in a condition known as *lactose intolerance*, which can cause nausea, cramps, gas, and diarrhea when dairy products are consumed. Lactase production falls off after childhood in many people; more than 50 million Americans are affected, including about 50 percent of Hispanics, 80 percent of African-Americans, and 90 percent of Asians. Avoiding milk products altogether is one way to prevent symptoms. Many people also benefit by supplementing with lactase (available over the counter as Lactaid or other brands) when they consume milk products.

The small intestine is also where *leaky gut syndrome* can develop. Caused primarily by poor diet, it can also result from long-term use of NSAIDs (non-steroidal anti-inflammatory drugs), such as aspirin or ibuprofen. Leaky gut is a progressive condition whose incidence increases with age, leaving most people over 50 affected to some degree. Over time, constant irritation of the lining of the small intestine results in chronic inflammation. The inflammation opens microscopic gaps between the cells, which allow minute food particles, gastric juices, microbes, and toxins to seep into the bloodstream. This can cause malabsorption of vital nutrients, strain the liver's ability to detoxify the blood, and, most important, lead to autoimmune reactions to normally healthy foods. When fragments of partially digested foodstuffs enter the bloodstream before they're fully digested, the immune system mistakes them for foreign invaders and forms antibodies against them. These antibodies, in turn, can cross-react with normal tissues, resulting in increased risk of asthma, arthritis, and other autoimmune diseases.

Treatment of leaky gut syndrome primarily involves ending the poor dietary practices that are at the root of the problem, thereby reducing inflammation so the intestinal lining can repair itself. Follow our *TRANSCEND Nutrition* recommendations for a low-glycemic-load, high-fiber diet (see Chapter 11) and

avoid alcohol, caffeine, NSAIDs, and other foods and medicines that can irritate the intestine. In addition, testing for food allergies can determine whether specific foods, such as wheat, dairy, or citrus, are irritating your digestive system.

Often linked to leaky gut syndrome is an overgrowth of unhealthy bacteria or yeast in the intestinal tract. This can be addressed by using herbal medications and prescription drugs, as well as by *Supplementation* with probiotics (supplements that help replace unhealthy intestinal bacteria with healthy strains, such as acidophilus). In such cases, we also recommend taking 2 to 5 grams of FOS (fructooligosaccharides) a day; this fiber supplement provides nutritional support to the healthy intestinal bacteria. Enzyme supplements may also help break down foods for easier digestion. Supplemental garlic, bioflavonoids, and aloe vera may also be useful in promoting healing.

One of the most common disorders of the lower gastrointestinal tract is *irritable bowel syndrome* (IBS). There are no specific diagnostic tests for IBS. It is considered a “diagnosis of exclusion” after tests fail to confirm evidence of food allergy or intestinal damage and when other specific diseases have been ruled out (for example, Crohn's disease, ulcerative colitis, colon cancer, gastroesophageal reflux disease, or other inflammatory conditions). Cramps, pain, bloating, diarrhea, constipation, feelings of incomplete bowel movements, and excessive passing of gas can all be signs of IBS, and it is often associated with simultaneous upper gastrointestinal symptoms, such as heartburn, nausea, and excessive belching.

A specific cause for IBS, which is thought to affect 10 to 20 percent of the population, has not been fully established, but several factors have been found to contribute. A bout of food poisoning, a bacterial infection, such as with *Salmonella* or *Shigella*, or a stomach virus that leaves the lower gastrointestinal tract irritated and inflamed can sometimes lead to longer-term IBS symptoms. More frequently, the cause of that irritation and inflammation is long-term consumption of an inflammatory diet high in unhealthy fats, refined sugars, and starch. IBS also appears to be stress-related, with symptoms exacerbated by increased levels of anxiety, somewhat like normal “butterflies” run amok.

Following our *TRANSCEND Nutrition* recommendations can help to reduce IBS symptoms (see Chapter 11). You may also find relief through

Supplementation with enteric-coated peppermint oil and Seacure (a supplement that contains amino acids derived from fish). Managing your stress through *Relaxation* (see Chapter 9) may also reduce the incidence and severity of symptoms.

EARLY DETECTION

Many tests can be done to assess your digestive system function. Most can be performed at home with kits supplied by a healthcare provider because they don't require blood sampling. If you are troubled by digestive symptoms, the tests below can provide a wealth of information about how well your body is performing its functions of digestion, absorption, and utilization of the food you eat. Most of these tests are "functional" tests—they evaluate how well your digestive system is functioning—but they fall into the realm of "alternative" or "complementary" medicine as almost no conventional physicians utilize them. Conventional testing emphasizes direct observation of the intestinal tract, such as through an endoscope (upper gastrointestinal tract) or colonoscope (lower gastrointestinal tract), or by way of imaging studies such as ultrasounds, computed tomography, or barium x-rays.

Test kits for the tests below can be obtained through complementary healthcare practitioners. These tests are not taught in medical school, so interpretation is best done with the assistance of a nutritionally oriented healthcare practitioner such as a naturopath, chiropractor, or alternative and complementary medicine physician.

A **breath test for methane** can determine whether you are lactose intolerant. If so, you can avoid dairy products or take lactase supplements, which will break down lactose and will reduce symptoms when taken whenever dairy products are consumed. This test is available from a complementary doctor, and all you have to do to perform this test is exhale into a balloon. The gas in the balloon is then examined in the laboratory for the presence of methane, a gas that is not normally found in the colon but is formed by the bacteria in your bowel by fermentation of undigested lactose.

The **intestinal permeability test** can help you determine whether you

have leaky gut syndrome. In this test, patients are given small amounts of two sugars, lactulose and mannitol, to drink, and a urine sample is collected some hours later. Normally, very little lactulose is absorbed by a healthy small intestine, so very little should appear in the urine. Mannitol, on the other hand, is very readily absorbed. A relatively high level of lactulose compared to mannitol indicates that the lactulose entered the bloodstream because the patient has leaky gut syndrome.

Hair mineral analysis provides two types of information. It can tell you about the levels of various toxic metals in your body and also indicate levels of essential minerals needed for optimal health. Hair mineral analysis can provide you with semi-quantitative data about essential minerals, such as calcium, magnesium, strontium, chromium, vanadium, manganese, selenium, zinc, and others. To perform this test, a few snips of hair, totaling about 1 gram, are collected from the back of the head and sent to the laboratory for analysis.

If a person has low levels of many essential minerals, the cause is often hypochlorhydria, or low stomach acid. To absorb beneficial minerals such as calcium, magnesium, chromium, and zinc from the food you eat, it is necessary to have adequate amounts of stomach acid. The hydrochloric acid in your stomach helps to ionize minerals to facilitate their absorption. Many people, particularly as they age, develop hypochlorhydria. Paradoxically, a common symptom of decreased stomach acid is heartburn—just the opposite of what you'd expect—and individuals typically treat their heartburn symptoms with antacids, which decreases stomach acid even further. This can lead to mineral malabsorption and is reflected in low levels of minerals in the hair analysis and can lead to symptoms such as chronic fatigue or frequent infections. If you perform a hair mineral test and find that many of your minerals are low, supplementation with betaine hydrochloride (an inexpensive form of hydrochloric acid) can help reverse the underlying hypochlorhydria and facilitate mineral absorption. (Caution: Betaine hydrochloride should never be taken if you have a history of peptic ulcer disease or are taking aspirin or NSAIDs [nonsteroidal anti-inflammatory drugs].)

We'll be the first to admit that collecting and preparing specimens for the **comprehensive stool analysis** (CSA) isn't particularly pleasant, and it isn't

helped by the fact that the laboratory wants you to collect your stool specimen in a soft cardboard container that looks like it was intended to hold a small order of French fries. But, it's amazing how much information you can get by analyzing your stool. A typical CSA report provides information about all aspects of the digestive tract from the mouth to the colon. The report discusses four specific aspects of digestive tract function: digestion, absorption, metabolic markers, and colonic bacteria.

The *digestion* part of the CSA test looks at what happens from the time the food enters your mouth until the start of your small intestine. Maldigestion may be the result of improper chewing, inadequate amounts of amylase in your saliva, or hypochlorhydria. It includes a measurement of chymotrypsin as well as the number of undigested meat and vegetable fibers in the stool. Chymotrypsin is an enzyme excreted by the pancreas that helps to digest protein. An abnormally low amount of chymotrypsin in the stool suggests inadequate pancreatic function and the possible need for pancreatic digestive supplementation. A high level of this enzyme is associated with rapid transit time of food throughout the digestive tract, perhaps as a result of food allergies. Undigested vegetable and meat fibers in the stool suggest improper breakdown of food due to inadequate chewing or lack of stomach acid.

The *absorption* part of the CSA test measures how well your digested food is absorbed through the walls of the small intestine. Total fecal fat, cholesterol, long-chain fatty acids, and triglycerides are among the tests done. These tests provide information about the adequacy of the liver and gallbladder at making bile acids to help emulsify fat, the pancreas at producing lipase for fat breakdown, and the integrity of the walls of the small intestine for absorption. Liver, gallbladder, pancreatic, and small intestine dysfunction can all be diagnosed through this analysis.

Metabolic markers included in the CSA include several tests of large-bowel or colon health. The tests include beta-glucuronidase, n-butyrate, beneficial short-chain fatty acid distribution, and more. Beta-glucuronidase is an enzyme produced by some of the bacteria living in the colon, and elevated levels are associated with increased risk of colon cancer. N-butyrate is the main nutrient needed by the cells of the colon and help keep these cells

healthy. Beneficial short-chain fatty acids are produced by the fermentation of nonabsorbed dietary fibers. They help to keep pathogens out of the bowel and also help produce as much as 30 percent of the energy used by the body.

Patient data from Terry's clinic suggest that the overwhelming majority of people do not have adequate amounts of normal *colonic bacteria*. As a result, they often develop intestinal dysbiosis, the overgrowth in the colon of abnormal organisms such as alpha hemolytic streptococcus, *Klebsiella*, or yeast. Treatment of dysbiosis includes restoration of normal bacteria through the use of a *probiotic supplement*, as well as an herbal product designed to kill the abnormal organisms. Performing a CSA can provide vital and lifesaving information—as Hippocrates observed centuries ago, “Death begins in the colon.”

Reader: In the future, I hope you guys have come up with a better way of analyzing digestive function than collecting poop.

Terry2023: Even in your day, there were new technologies that allowed doctors to view the gastrointestinal tract with amazing clarity. As early as 2001, some doctors in Israel had developed a “pill camera,” a camera the size of a large vitamin C capsule that patients would swallow. The camera would travel through the gastrointestinal tract and took photos as it traveled throughout the gut for up to 8 hours. This allowed doctors to get a clear view of the esophagus, stomach, and small bowel.

Reader: It sounds like it's been around for almost 10 years already. How come I haven't heard of it?

Ray: As we've said before, most physicians are very slow to adopt new technologies. Endoscopy, passing a flexible tube either through the mouth into the stomach or from the bottom up through the colon, has been how doctors looked at the gastrointestinal tract since the 1980s.

Terry2023: The swallowed camera was much more convenient, less uncomfortable, and less dangerous for the patient. Even so, it still took until the middle of the 20-teens to become the standard of care.

Ray2034: With the advent of the nanobiotic cameras not much bigger than blood cells, there was another paradigm shift again in the 2020s. These microscopic cameras move around on their own and explore the colon, taking pictures and performing chemical and biological tests. The latest version will perform immediate repairs when it detects a problem.