Digestive enzymes

Digestion & GI health

Whenever we place food in our mouths, our digestive systems begin the miraculous process of transforming that food into usable nutrients, rallying together a cavalcade of diverse biochemical players whose job it is to carry out the task. And digestive enzymes play a significant role in this process, as the all-important "cleavers" that turn big food molecules into smaller ones and allow us to absorb vital nutrients.

Just as each of the nutrients in our food and drink has an important job to do in regulating our daily activities — providing ample energy, creating new body tissues or cleansing our system — each member on the digestive tract chemical team has a specific purpose.

If one is unable to do its job effectively, it can throw off the whole system, causing disturbing symptoms, such as bloating, gas, nausea or diarrhea. If symptoms persist, it could lead to more chronic conditions like acid reflux, ulcers, irritable bowel syndrome, diverticulosis or Crohn's disease.

In other digestive health articles we describe the leading role of hydrochloric acid in our stomachs, as well as the protective role of beneficial microflora in our guts. Let's look now at how and where different types of digestive enzymes, sometimes referred to as the "sparks of life," ply their busy trade. From there you can better determine whether digestive enzyme supplements can benefit your digestive health.

What are the functions of digestive enzymes?

Each digestive enzyme works best in a specific environment, and each segment of the digestive tract offers that unique environment so enzymes can work in concert to carry out healthy digestion. The following provides a brief outline for what, in reality, is a very complex process.

Mouth. As soon as we eat, *salivary amylase* in the mouth begins the digestive process by breaking down bigger starch molecules (*polysaccharides*) into smaller ones, known as *maltose* and *dextrin*.

Stomach. As food moves to the stomach, gastric juices — comprised of *hydrochloric*

acid and *pepsinogen*, secreted by *parietal* and *chief glands* in the stomach's lining — take over next. The job description for hydrochloric acid in the stomach is to dissolve food, kill unwanted microorganisms, and convert pepsinogen into the stomach enzyme *pepsin*. Pepsin, a proteolytic (protein-breaking) enzyme, helps unwind and chop up molecules of protein into smaller subcomponents. Most proteins are big, complicated molecules made up of units called *amino acids* — sometimes called the "building blocks of life." Because pepsin depends on the acidic environment of the stomach, this is where it does most of its work.

Small intestine. From the stomach, the lump of partially broken down food gets shunted into the upper section of the small intestine, known as the *duodenum*. At this stage, only a few of the proteins and carbohydrates have been broken down, and none of the fats. This is where *pancreatic enzymes* do their magic. The pancreatic enzymes *trypsin* and *chymotrypsin* digest additional members of the protein family, and function best in the more alkaline (or basic) environment of the intestine. Other pancreatic enzymes include *pancreatic amylase*, which continues breaking down starches into maltose; and *lipase*, which begins to digest fats into glycerol and fatty acids.

Peristalsis, or the wave-like action of the smooth muscles of digestion, keeps this whole process going, and from here the food proceeds down the portion of the small intestine known as the *jejunum*, where most of the absorption takes place. Enzymes embedded in the lining of the small intestine's absorptive fingers — or *villi* — complete the digestion of peptides and maltose into the amino acids and simple sugars we can absorb.

Large intestine. What remains of our food then moves into the large intestine, also referred to the *colon*, where important functions take place, such as the absorption of water and sodium, as well as the ongoing manufacture and absorption of micronutrients with the help of intestinal flora. What is left of the food is formed into stool and ultimately exits the body via the rectum.

By now all the digestive enzymes have had their moment in the digestive limelight. Because each part of the process is equally important — from chewing to micronutrient uptake — it makes sense that we take time to eat instead of rushing through meals on the run. When and if something goes awry, your body will let you know with bloating, gas, cramping or possibly even vomiting and diarrhea. If you suffer from these symptoms on a regular basis, there are some digestive enzyme supplements we've found

helpful as a bridge until you find the deeper issue.

Are digestive enzymes safe to take? Which are the best digestive enzymes?

Because certain enzymes should not be used by people with a history of certain digestive disorders, such as peptic ulcers, we recommend you work with your practitioner to find the best solution for your unique situation. But there are a few safe exceptions, such as papain and lactase, as mentioned below. And remember, healthy digestion begins with healthy eating habits.

Betaine HCl is a combination digestive aid comprised of betaine, a vitamin-like substance, and hydrochloric acid. The digestive enzyme pepsin is sometimes included in betaine HCl products. This digestive enzyme can be useful in treating patients with digestive issues such as acid reflux (GERD) — particularly those found to have *hypochlorhydria*, where there is too little acid produced by the stomach. Betaine HCl is occasionally prescribed for patients with other forms of indigestion such as heartburn and gas, as well as rosacea, asthma, yeast, allergies and sensitivities.

Since healthy digestion depends on the stomach's ability to dissolve large chunks of food, a highly acidic environment is required. The high acid content of betaine HCl can cause irritation of the stomach, and should only be taken in the middle of a meal. Because it can significantly change pH in the stomach, we recommend betaine HCl be used only under the guidance of an experienced healthcare practitioner.

Multi-enzyme products contain a spectrum of enzymatic ingredients, some of which support the action in the stomach and others that boost the enzymatic action taking place further down the digestive tract. Here is an alphabetical listing of just some of the many enzymes that these products can contain:

- *alpha-galactosidase*
- *amylase*
- *bromelain*
- *cellulase*
- *glucoamylase*
- *hemicellulase*
- *invertase [sucrase]*
- *lactase*

- *lipase*
- *maltase*
- *papain*
- *peptidase*
- *protease*
- *phytase*

For best results, ask a holistic healthcare provider for assistance when choosing a comprehensive digestive enzyme product. One we frequently recommend to our patients at the clinic is SpectraZyme by Metagenics, but you can also get good results from other products found in health food stores.

Individual enzymes. You can also purchase products containing individual enzymes. Remember, each of these enzymes can target certain bonds in proteins, sugars, and other macromolecules to break them into their constituents. For example, lactose, a milk sugar, is poorly tolerated by many people the world over.

For lactose-intolerant individuals who for whatever reason want to be able to eat or drink dairy products, supplementing their diets with *lactase* tablets or foods that include lactase is a safe and easy way to allow their systems to cleave this milk sugar into its usable components. This can help prevent the bloating and discomfort afterward that they would otherwise experience.

Pregnant women, too, may find themselves feeling nauseous after a meal or first thing in the morning. Taking a mild digestive enzyme such as *papain*, a proteolytic enzyme extracted from papaya, can sometimes help quell the nausea for these women, and is sometimes also used to settle motion sickness. Isn't it wonderful that something as safe and simple as papaya enzyme can solve these common problems? Ask your naturopathic healthcare provider for guidance in choosing individual digestion enzymes best suited to your needs.

Enjoy "slow food" — and let your digestive enzymes sweat the small stuff

Having a basic understanding of the elements of the digestive process can help us appreciate how day-to-day choices impact our overall health. If you have digestive problems, this information can help you talk to your healthcare provider about using digestive enzyme supplements to help as you work to find the root cause.

In real life, digestion is a much more elaborate process than we can cover in the scope of this article. What's important to remember as we rush through our busy days is to slow down. You can give you digestive team its best shot by chewing food carefully and fully enjoying it. When you honor the role of your digestive enzymes, you are honoring yourself with the gift of full nourishment.

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