Digestion Enhancement Enzymes™ v 3

Digestive Enzymes

Enzymes are protein molecules that catalyze (i.e., increase the rates of) chemical reactions in our body. In a sense, enzymes are the physical molecules that transmit "life force energy" into the physical world. There are an estimated 50,000 different types of enzymes in the human body that do all the work required to keep our bodies functioning. Truly, life as we know it would not exist without enzymes.

The human body produces a specific class of enzymes called digestive enzymes that assist with the digestion of the macronutrients in our food. Protease enzymes break down protein into amino acids, amylase enzymes break down carbohydrate/starch into sugars, and lipase enzymes break down fat into fatty acids. These three types of enzymes break down the majority of the common food groups, making the nutrients in our food available for absorption into our bloodstream.

Digestive System 101

When we chew our food, our body releases amylase and small amounts of lipase in our saliva to begin the process of digestion for fats and carbohydrates. These salivary enzymes are most active in the slightly alkaline pH of our saliva. When food reaches our stomach, these salivary enzymes are slowly deactivated as stomach acids are secreted. Our stomach secretes the protein digestive enzyme pepsin, active in the acidic environment of the stomach, to begin protein digestion. Food generally leaves our stomach in a liquefied state known as chyme and enters the small intestine. Here, our pancreas secretes bicarbonate fluid which neutralizes the acidic chyme, as well as secretes various proteases, amylases, and lipases that allow us to continue to digest proteins, carbohydrates, and fats in the pH neutral to slightly acidic environment of our intestinal tract. The final stages of digestion are accomplished by digestive enzymes secreted by our brush border epithelial cells and intestinal microbes.

The Need for Digestive Enzymes

Raw (uncooked) foods contain food enzymes that can assist us in digesting our food. When you chew up a raw carrot, for example, the food enzymes are activated and help you digest the carrot, effectively reducing the number of digestive enzymes your body needs to secrete to accomplish proper digestion. When we cook food, however, all the food enzymes in the food are usually destroyed, and we must rely on our body's ability to secrete adequate digestive enzymes to digest the food properly.

There are a number of factors that may interfere with your body's ability to produce adequate levels of digestive enzymes. As we age, our ability to secrete digestive enzymes decreases. This age-related decline in digestive enzyme secretion can be hastened by frequently chewing gum. Every time you use chewing gum, your body is fooled into thinking food is coming and the various digestive organs begin secreting digestive enzymes in response, slowly exhausting their ability to do so for your real meals. In addition, stress dramatically suppresses our body's ability to secrete digestive enzymes, as the "fight or flight" adaptive response shunts our body's energy away from things like the immune and digestive systems and into our muscles to help us escape perceived threats like saber-toothed tigers. In the modern world, this stress takes many forms which are more benign (e.g., exposure to electromagnetic radiation (wi-fi and cellphone), taking on more than we can handle, not sleeping well, an argument with a loved one) but equally as effective in suppressing digestive secretions. Your ability to secrete digestive juices will be severely compromised every time you eat in anything but a peaceful and calm state. Finally, a variety of inflammatory conditions that are common in western cultures can prevent secretion of adequate digestive enzymes, such as retroviruses, high heavy metal and neurotoxic chemical accumulation, Epstein-Barr virus, Lyme disease, mold toxins, parasites, thyroid disorders, candida overgrowth, gastritis, IBS, Crohn's disease, celiac disease, food sensitivities, chronic fatigue, intestinal dysbiosis, and root canals.

Consequences and Symptoms of Digestive Insufficiency

When your body does not secrete enough digestive enzymes to digest your food adequately, the health of your GI tract, along with the rest of your body, is slowly compromised. Poor digestion leads to poor nutrient absorption and consequent nutritional deficiencies that affect your health. In addition, unfriendly microorganisms love to feed on undigested food. These unfriendly microbes slowly take over your GI tract when poor digestion is a frequent occurrence, leading to intestinal dysbiosis and all the problems that flow from this condition – IBS, colitis, Crohn's disease, food allergies/sensitivities, leaky gut, autoimmune conditions, immune insufficiency, and liver toxicity. Some other signs that may indicate that your body is not secreting enough digestive enzymes include gas, bloating, acid reflux, feeling tired after meals, and constipation.

Digestion Enhancement Enzymes

Digestion Enhancement Enzymes is a plant-based digestive enzyme blend containing 15 different enzymes to provide full-spectrum digestive support:

Protease[1-3] A proteolytic enzyme which breaks down proteins into basic amino acids. It is derived by the fermentation of *Aspergillus oryzae* and *Bacillus subtilus*.

Amylase[4-7] An enzyme which breaks down starch and other carbohydrates. Amylase is naturally excreted from the pancreas and saliva. Amylase is a primary salivary enzyme that breaks down long chains of sugars attached to each other to release maltose sugar molecules. It is due to the presence of salivary amylase that foods high in starch (breads and grains, starchy vegetables, beans and other legumes) will taste sweet when chewed. Thus the adage to chew your liquids and to drink your food, i.e., anything but water (like vegetable juices, smoothies, teas) should be moved around in the mouth so that the saliva has a chance to mix with it, and chew your food until it is a liquid before it is swallowed. Pancreatic amylase secreted by the pancreas is responsible for aiding the G.I. tract in breaking down food molecules into usable energy that can be used and stored by the body. It is derived by the fermentation of *Aspergillus oryzae*.

Acid Specific Protease[8,9] A proteolytic enzyme, which can still function in the highly acidic environment of the stomach, that is capable of digesting a broad range of proteins into amino acids; protease is responsible for digesting the bulk of ingested proteins and is one of the three enzymes found in our body's natural pancreatic juices. Digestion Enhancement Enzymes contain a blend of proteases to broaden the pH range of the product. It is derived by the fermentation of *Aspergillus niger*.

Glucoamylase[10] Like amylase, glucoamylase converts starch into energy but is most active in a highly acidic environment. Glucoamylase promotes the complete digestion of both polysaccharides and oligosaccharides, which comprise starches. ("Poly" refers to many carbohydrates and "oligo" means less carbohydrates.) This is accomplished by breaking the bonds between the carbohydrate chains that form the aforementioned saccharides as well as dissolving the glycosidic bond at the end of the chain in order to release glucose. The ability to degrade starches both between and at the end of carbohydrate chains makes glucoamylase particularly beneficial. This results in the total digestion of carbs that are then released in a form of energy your body can actually use – glucose. The inclusion of this component allows for many carbohydrates to be broken down prior to exiting the stomach. It is derived by the fermentation of *Aspergillus oryzae*.

Cellulase[11-13] An enzyme that digests cellulose (fiber), a complex carbohydrate, which is the basic primary structural component of plant cell walls. Most animals (including humans) do not produce cellulase naturally so cellulase allows better digestion and absorption of the nutrients inside the cells of vegetables and fruits. It is derived by the fermentation of *Trichoderma longibrachiatum*.

Peptidase (Dipeptidyl peptidase (DPP-IV)[14,15] Peptidase, a proteolytic enzyme, is primarily responsible for the breakdown of gluten, the main protein found in wheat, rye and barley. There are actually many types of peptidases but dipeptidyl peptidase (DPP-IV) is especially proficient at breaking down gluten and casein in the small intestines. DPP-IV is produced by the pancreas; however, supplementation of this enzyme can help to ensure the decomposition of certain proteins into its constituent amino acids if the body's natural levels are inadequate to break them down completely.

Proper digestion of proteins like gluten and casein is crucial in today's standard American diet as it can cause so much inflammation, but many are finding that what is best for them is to avoid consumption of those proteins entirely. It is derived by the fermentation of *Aspergillus oryzae*.

Lactase (non-dairy)[17-20] Responsible for the hydrolysis (breaking down) of the milk sugar lactose into glucose and galactose. Inactivity of the lactase enzyme affects 75% of the world's population, resulting in lactose intolerance.[16] It is derived by the fermentation of *Aspergillus oryzae*.

Lipase[21-24] This enzyme triggers the breakdown of fat into fatty acids. Lipase is the third enzyme that is found in our body's natural pancreatic juices along with protease and amylase. It is derived by the fermentation of Candida rugosa.

Alpha-galactosidase[25] This is the primary enzyme used in popular gas-relief products; alpha-galactosidase is an enzyme responsible for breaking down complex carbohydrates into simple sugars and breaking down nondigestible sugars. This allows for certain foods such as beans and other legumes, cruciferous vegetables, and grains to be more easily digested as those foods can be resistant to amylase and thus have a tendency to promote gas. It is derived by the fermentation of *Aspergillus niger*.

Pectinase[26,27] Breaks down pectin. Pectin is a type of fiber that is a structural part of the cell wall in fruits and vegetables. Pectinase is an enzyme, along with cellulase and hemicellulase, that assists with the digestion of celluloses found in plant-based foods, which can increase their nutritional value. It is also known to improve prebiotic activity from the foods we eat which provides nutrients to probiotic microorganisms within our gut. It is derived by the fermentation of *Aspergillus niger*.

Bromelain[28-32] A proteolytic enzyme (protease) that targets the long chain polypeptides of proteins, breaking them down into shorter chain peptides, which are then able to be broken down further by other enzymes. It is derived from non-GMO pineapple (*Ananas comosus*).

Papain[33-35] A protease (proteolytic enzyme) which hydrolyzes protein peptides into basic amino acids. It is derived from non-GMO papaya (*Carica papaya*).

Hemicellulase[36,37] Breaks down hemicellulose, a type of polysaccharide that is more complex than simple sugar and present along with cellulose in all plant cell walls. Hemicellulase has a profound ability to target yeast breaking down its cell walls and slimy antimicrobial-resistant layer called biofilm. It is derived by the fermentation of *Aspergillus niger*.

Invertase[38-41] Invertase is a carbohydrate-digesting enzyme that breaks sucrose (found in fruits, vegetables, and some grains) into its two primary component parts, fructose and glucose. When used either alone or in conjunction with other enzymes, invertase enhances the overall digestion of many carbohydrates, but specifically sucrose. Invertase has an ability to hydrolyze the bond between fructose and glucose in fruits. This makes it a vital part of the digestion of complex sugars into glucose, which is a primary source of fuel for the human body. As we age, we have less access to this natural enzyme, resulting in a reduced ability to break down sugar… it therefore is helpful for the older population to maintain proper digestion and assist in reducing symptoms of the natural aging process. It is derived by the fermentation of *Saccharomyces cerevisiae*.

Xylanase[42-44] An enzyme which breaks down a specific type of plant fiber called xylan. When broken down, this turns into xylose, a simple sugar that the body can use for energy. The consumption of healthy, fiber-rich whole foods is only as beneficial as the extent to which they are digested. Here are two reasons why:

- Undigested fiber can accumulate in the digestive tract, causing indigestion, bloating, gas, and abdominal pain.
- Improperly digested fiber impacts the amount of bioavailable nutrients that your body can use for energy.

As you can see, the health benefits of dietary fiber are lost unless key enzymes like xylanase are added to the diet. In fact, people who experience frequent digestive problems after eating vegetables, legumes, and grains may have low levels of xylanase. Additionally, the beneficial bacteria in the body can only produce so much xylanase, making supplementation of this enzyme a key component in optimal digestion and well-being.

Xylanase helps your body to thoroughly digest the fiber you consume both by breaking it down into bioavailable nutrients and by stimulating other enzymes to finish the job before it builds up and causes health problems. When xylanase is in short supply, complex carbohydrates are only partially broken down, which leads to carb-buildup that may cause excess gas, bloating, and other digestive complaints. Furthermore, improper digestion hinders the release of essential nutrients into the bloodstream. In short, xylanase stimulates the activity of other enzymes that work together to release all of the nutrients from food into simple sugars that the body can use. It is derived by the fermentation of *Trichoderma longibrachiatum*.

Digestion Enhancement Enzymes vs. Animal-Based Pancreatic Enzymes

Pancreatic enzymes (e.g., pancreatin, trypsin, chymotrypsin) are typically extracted from pig, lamb, or ox pancreas, and they are only functional in a pH which is slightly acidic to strongly alkaline (e.g., 6.5 to 9.0). These enzymes are permanently deactivated by the low pH values found in a healthy human stomach, so must be enterically coated (treated with a material that will not dissolve in stomach acid) to survive the journey to our small intestine, where the enteric coating will dissolve in a more alkaline pH, and the enzymes will finally be able to function. Therefore, pancreatic enzymes will only be able to work in our small intestine and then only if our pancreas is functioning properly – able to release enough bicarbonate solution to neutralize the acidic chyme entering the small intestine from the stomach, thus producing the necessary neutral pH. Contrast this with the plant-based enzymes in Digestion Enhancement Enzymes, which are functional in a much broader pH range (e.g., 2.0 to 9.0) and can be active from the time the food is swallowed all the way through the GI tract. Consequently, Digestion Enhancement Enzymes are significantly more effective than pancreatic enzymes for supporting digestion and are the superior choice for your money.

Effectiveness and Affordability

Many other plant-based enzymes contain exotic enzymes that digest obscure nutrients, which may or may not even be present in your food. These enzymes serve to dramatically increase the price of the supplement, without a significant increase in the overall digestive support provided. Also, other plant-based enzymes are often concentrated into extremely high potency. Note that once your meal is digested properly, extra enzymes only serve to increase the price of the supplement, without significantly improving the digestion of your food. Digestion Enhancement Enzymes provides more than enough enzymes to digest your food adequately, without the high levels of extra enzymes that would excessively drive up the price of the product. HealthForce always strives to provide the best balance between effectiveness and affordability.

By combining a variety of digestive enzymes, such as cellulases, xylanases, amylases, pectinases, proteases, lipases, invertases, hemicellulases, and lactases ultimately results in the creation of a super efficacious enzyme supplement that supports the body's own enzyme

expression systems for enhancing nutrient utilization. These enzymes were carefully selected to address the needs of those consuming a diet that is high in natural plant fibers, fruit sugars, healthy fats, and clean proteins. A higher than average dose may be necessary when consuming foods that typically cause distress. The enzymes within Digestion Enhancement Enzymes are safe and well tolerated. Digestion Enhancement Enzymes has been carefully crafted to support healthy and comfortable digestion and is the only digestive aid you will ever need!*

Suggested Use: 2–4 capsules per cooked food meal or snack, depending on content and volume of meal. Ideally, take with the first bites of meal/snack.

Suggested Adjuncts: A whole-food organic, diet with emphasis on high-water-content fresh, raw/live foods and cultured vegetables; naturally structured water, Vitamineral Green™ and Vitamineral Earth™, Liver Rescue™, Shilajit Supreme™, Integrity Extracts™ Schisandra, MycoForce™, SCRAM™, Intestinal Drawing Formula™, exercise (try rebounding) and dancing, fresh air (get lots of plants), Earthing, plenty of safe sun exposure, adequate sleep/rest in a low-EMF environment, quieting the mind and getting heart-centered, relaxation and spirit nurturing practices, going to your happy place, and everything else healthful.

Supplement Facts

Serving Size: 4 VeganCaps™ (1.3g)

Amount Per Serving	%Daily Value
Digestive Enzyme Blend 1,300 mg	†
• Proteases∞ (50,500 HUT) • Amylase∞ (8,000 DU) • Acid Stable Protease∞ (220 SAPU) • Glucoamylase∞ (40 AGU) • Cellulase∞ (2,000 CU) • Peptidase∞ (100 DPPIV) • Lactase∞ (800 ALU) • Lipase∞ (2,000 FIP) • Alpha-galactosidase∞ (180 GalU) • Pectinase∞ (40 endo-PGU) • Bromelain∞ (132,000 PU) • Papain∞ (168,000 PU) • Hemicellulase∞ (2,000 HCU) • Invertase∞ (400 SU) • Xylanase∞ (500 XU)	

† Daily Value not established.

Other Ingredients: MCT Oil, Tapioca Starch, VeganCaps (hypromellose)
∞ TruGanic™

"Mother Nature has put miraculous healing plants on this Earth for us to benefit from. I am honored and deeply driven to uncover the greatest potential benefits from these elements, and to assemble these gifts from nature into products that help people to heal and to realize their full potential."

Dr. Jameth Sheridan – Naturopath and Hard-Core Herbal Medicine Researcher

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Additional Resources

Research: Pineapple Enzyme Kills Cancer Without Killing You
https://www.greenmedinfo.com/blog/research-pineapple-enzyme-kills-cancer-without-killing-you

The Role of Enzyme Supplementation in Digestive Disorders
http://www.altmedrev.com/archive/publications/13/4/307.pdf

Proteolytic Enzyme
https://www.britannica.com/science/proteolytic-enzyme

Protein Digestion and Absorption Process
https://study.com/academy/lesson/protein-digestion-and-absorption-process.html

Your Digestive System & How it Works
https://www.niddk.nih.gov/health-information/digestive-diseases/digestive-system-how-it-works

Digestion and Absorption of Carbohydrates, Proteins and Fats
https://microbenotes.com/digestion-and-absorption-of-carbohydrates-proteins-and-fats/

Proteins Are Degraded to Amino Acids
https://www.ncbi.nlm.nih.gov/books/NBK22600/