



Formula



Rationale

Jigsaw Health
Essential Blend Digestive
Formula # 7676 Revision 1.2/1.1

Enzymes – A Historical Perspective

While the recognized use of enzymes as dietary supplements and therapeutic agents has only developed within the last century, humans have been benefiting from their presence in food since the dawn of mankind. Consumption of raw foods and traditional food processing practices, including aging of food and fermenting food, take advantage of dietary sources of enzymes. However, many modern food-processing practices actually deplete our food's supply of enzymes. Uniquely modern ailments that have developed since the onset of modern food processing techniques have lead to research into the benefits of dietary enzymes.

All raw food contains the enzymes needed to eventually "digest" itself through decay. The native enzymes found in raw foods actually act synergistically with human endogenous enzymes to help digest our foods, reducing the enzymatic burden of digestion on the body. Early human diets were rich in raw food sources allowing early man to benefit from this synergism. As civilization advanced, cooking and processing of foods became more prevalent. Though humans did not understand the basic mechanisms of enzymatic predigestion in raw foods, they started taking advantage of this fact early on, by allowing foods to age. During the aging process of foods, native enzymes begin the digestive process, making foods more tender, flavorful, and nutritious. A natural adjunct to the aging process was fermentation of foods. The act of fermentation subjects the food to the enzymatic actions of microbes, essentially predigesting the food. For centuries, foods have been fermented with bacteria and fungi to produce nutritious and tasty foods, such as tofu, cheeses, tempe, yogurt, and alcoholic beverages

In the late Nineteenth Century, large scale canning and heat processing techniques rapidly replaced traditional food preparation/preservation techniques in the Western world. The temperatures used in large scale food processing are specifically designed to destroy enzymatic activity and delay the predigestion (decay) of foods. As a result, processed foods completely lack native enzyme activity, which some feel places the burden of digestion completely on the human body. Some researchers have theorized that the added digestive burden may lead to a variety of diseases and disorders, though this theory has yet to be proven conclusively.

In recent decades, the biological effects of modern food processing have been compounded by a modern lifestyle. Our modern fast paced high stress lifestyles tend to lead to improper digestion. Stress and anxiety trigger hormone releases that interfere with smooth muscle contraction and enzyme secretion, leading to indigestion. This is further compounded by the tendency to eat on the run and to overeat. Because hurried eating results in partially chewed foods being dumped into the digestive tract, the tendency to eat on the run results in food not being properly mixed with salivary enzymes and to be in such large pieces that digestive enzymes can not adequately act on the food. Overeating causes more nutrients to be consumed than what the average human digestive system can handle. These issues can combine to overwhelm the body's ability to completely digest consumed meals, which can lead to digestive discomfort, constipation, and suboptimal nutrient uptake.

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Age Related Digestive Insufficiency

A person's ability to properly digest and absorb their food decreases with age. This reduction in digestive capacity is likely related to the fact that pancreatic digestive enzyme production decreases linearly after the second decade of age, at a rate of nearly 10% per decade. As a result, the ability to digest/absorb fats and proteins can become greatly impaired. This impairment can lead to a host of gastrointestinal symptoms and health consequences, including anorexia, abdominal discomfort, flatulence, constipation, reflux disorders, ulcers and diarrhea. Some studies tested the effectiveness of oral enzyme supplementation on the above stated symptoms. In these studies, the gastrointestinal symptoms of study participants improved significantly. While these conditions are in themselves a concern for seniors, malnutrition caused by such enzyme deficiencies can significantly reduce the quality and quantity of life in the aging population. Protein utilization of the elderly is of particular concern, because such deficiency can lead to reductions in immunity and muscle atrophy. Enzyme supplementation significantly improves protein utilization among the elderly.

Food Intolerance

Some enzyme deficiencies can result from normal genetic variation. This normal genetic variation in the production of digestive enzymes can result in food intolerances. While most food intolerance is a mere nuisance, food intolerances have been implicated in numerous digestive disorders, including Irritable Bowel Syndrome and Celiac Disease. In recent years, lactose intolerance has been a buzzword for many people. Lactose intolerance refers to a broad class of symptoms that result from the ingestion of lactose containing foods by people who fail to produce adequate amounts of the enzyme lactase. The undigested lactose can be fermented by gut flora producing belching, cramping, diarrhea and flatulence. Studies show that supplementation of *Aspergillus* lactase can significantly reduce symptoms of lactase deficiency. However, not all people who believe they are lactose intolerant respond to this therapy. This is because these people may actually be suffering from milk hypersensitivity, likely triggered by milk proteins. Both milk sugar (lactose) and milk proteins are addressed in this formula by the proprietary blend Dairyzymes™.

This formulation was designed specifically to support digestion in people who eat the typical modern diet, which is high in protein, fat, and carbohydrates. It contains a proprietary blend of proteolytic, lipolytic, and carbohydrotic enzymes specifically designed to aid the digestion of these nutrient dense meals. Supplementation with these enzymes is critical in order to handle the increased digestive demands placed on the body when eating a diet that is high in fat, protein, and carbohydrate. Supplemental enzymes also help assure that the maximum amount of available nutrition is obtained from the food eaten. In addition, ginger has been added for its soothing effect on the gastrointestinal tract.

These ingredients and their specific functions are outlined below.

Proteolytic Enzymes

Protease 3.0 is characterized by its ability to hydrolyze proteins under acid conditions. The broad specificity of acid-stable protease enables the enzyme to, easily and efficiently, hydrolyze most soluble proteins. Because protease 3.0 has an effective pH range of 2.75 to 4.7, it is uniquely suited to work synergistically with endogenous pepsin to provide protein digestion in the stomach.

Protease 4.5 is a mixture of acid, neutral and alkaline proteases that demonstrate both exo-peptidase and endo-peptidase activity with high substrate specificity. Protease 4.5 has an effective pH range of 2.75 to 6.25. For this reason, protease 4.5 works synergistically with endogenous enzymes to provide protein digestion in the stomach and pyloric regions of the small intestine.

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Protease 6.0 is a mixture of acid, neutral and alkaline proteases that demonstrates both exo-peptidase and endo-peptidase activity with high substrate specificity. Protease 6.0 has an effective pH range from 2.75 to 7.0. For this reason, protease 6.0 works synergistically with endogenous enzymes to provide protein digestion through all portions of the digestive tract. Protease 6.0 is unique in its high substrate specificity, demonstrating reduced occurrence of carbohydrase side activity.

Peptidase is an enzyme system that contains a very high level of exo-peptidase activity. The high exo-peptidase level allows the user to obtain a high degree of protein hydrolysis without formation of bitter products. Peptidase has an effective pH range from 3.25 to 7.5, and works synergistically with endogenous enzymes to provide protein digestion throughout the entire digestive tract.

The proteolytic enzymes in this formula are used to help digest protein to produce amino acids, which are important building blocks in the human body. The amino acids are used to build muscles, metabolic enzymes, neurotransmitters, and many other essential biochemicals. Proteolytic enzyme supplementation can be essential to maintaining lean muscle tissue while on any type of diet, and allows you to get the maximum nutrition from the protein consumed in a typical diet.

Lipolytic Enzyme

Lipase YN catalyzes the hydrolysis of triglycerides of simple fatty acid esters, yielding mono- and diglycerides, glycerol and free fatty acids. It has broad substrate specificity on the fats and oils of vegetable and animal origins. Lipase YN works synergistically with endogenous enzymes to help digest fatty foods.

Supplementing with Lipase YN can help the body to properly digest the excessive fat being eaten in today's typical high fat, high carbohydrate diet. Considerable digestive distress and even malabsorption of nutrients such as vitamins A and E can result from improper fat digestion.

Carbohydolytic Enzymes

Amylase will randomly hydrolyze the interior alpha-1,4-glucosidic bonds of starch to release simple sugars for digestion. This enzyme works synergistically with endogenous human amylase to digest starchy foods.

Glucoamylase will hydrolyze terminal 1,4-linked alpha-D-glucose residues successively from non-reducing ends of amylose chains to release free glucose. This enzyme also possesses the ability to hydrolyze alpha-1,6-glucosidic linkages in isomaltose and dextrans. This enzyme works synergistically with endogenous human amylase and supplemental amylase to potentiate the complete digestion of carbohydrate rich foods.

α-galactosidase is characterized by its ability to hydrolyze the alpha-1-6 linkages in melibiose, raffinose, and stachyose. These are indigestible sugars containing alpha-galactosyl groups, and commonly occur in vegetables, especially in members of the legume and cruciferous families.

Cellulase hydrolyzes the beta-D-1,4-glucosidic bonds of cellulose (an indigestible structural carbohydrate of plant cell walls), its oligomers and derivatives. This enzyme is a complex composed of three distinct enzymes to convert cellulose to glucose. Since humans lack the endogenous enzymes required to digest cellulose, the supplementation of cellulase provides humans with an additional source of nutrition and reduces the bulking effect of fibrous foods.

This combination of carbohydrases is designed as a comprehensive approach to carbohydrate digestion, which allows for a more complete digestion of the carbohydrates consumed. This enables a person to properly digest and receive the maximum amount of nutrients available from their carbohydrate intake.

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Branded Blends

CereCalase™ is a unique mixture of enzymes that hydrolyzes non-starch polysaccharides (NSPs). Hemicellulase, beta-glucanase, and phytase are included in this novel enzyme system to digest hemicelluloses, beta-glucans, and phytic acid. Hemicelluloses, beta-glucans, and phytic acid can act as anti-nutritive factors due to their tendency to bind minerals and other nutrients, and thus prevent intestinal absorption of these nutrients. These NSPs are common in many vegetable foods including grains, beans and herbs. Since humans do not produce the enzymes found in CereCalase™ addition of these enzymes to a diet high in fruits and vegetables provides a greater source of nutrition.

Dairyzymes™ is a unique blend that will hydrolyze lactose as well as milk proteins, including caseins and β -Lactoglobulins. This blend works synergistically with endogenous lactase and protease to digest the sugars and proteins found in dairy products. This product is also effective for the amelioration of the symptoms of dairy intolerance.

Botanical Ingredient

Ginger is a perennial herb that is native to parts of China and India. It is now cultivated in tropical locales, worldwide. Ginger has been commonly used by traditional herbalists to treat gastrointestinal upset and nausea. In addition to its gastrointestinal soothing properties, ginger was added to this formula to promote digestion by increasing the flow of saliva, gastric juices, and bile. These properties enable ginger to work synergistically with the digestive enzymes to promote proper digestion and reduced gastrointestinal upset.

National Enzyme Company

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