



Formula



Rationale

Jigsaw Health

Digestive

Formula # 7676 Revision 1.7

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 led 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

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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.

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 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 and milk proteins are addressed by the proprietary enzyme blend BioCore® Dairy.

This formulation was designed specifically to support digestion in people who eat the typical modern diet, with an emphasis on protein digestion. It contains a proprietary blend of proteolytic and carbohydrolytic 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 protein and carbohydrate. Supplemental enzymes also help assure that the maximum amount of available nutrition is obtained from the food eaten.

These ingredients and their specific functions are outlined below.

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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/Acid Protease 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/Acid Protease has an effective pH range of 2.75 to 6.25. For this reason, Protease 4.5/Acid Protease works synergistically with endogenous enzymes to provide protein digestion in the stomach and superior duodenal region of the small intestine.

Protease 6.0/Alkaline Protease 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. The USP protease activity occurs at an alkaline pH and works synergistically with endogenous protease to digest protein in the small intestine. For this reason, protease 6.0/Alkaline Protease works synergistically with endogenous enzymes to provide protein digestion through all portions of the digestive tract.

Peptidase (Exo-peptidase/ Dipeptidyl peptidase IV) 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. The DPP IV activity may also assist in the breakdown of gluten. 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.

Pepsin is an animal enzyme that exhibits aspartic endopeptidase activity and efficiently hydrolyzes most proteins. Supplemental pepsin works synergistically with endogenous human pepsin to provide protein digestion in the stomach. Scientific evidence suggests that proteolytic enzymes, such as pepsin, can be useful supplements for digestive support, immune support, anti-inflammatory support, cardiovascular support, and general nutritional support.

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.

Carbohydolytic Enzyme

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.

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Branded Blend

BioCore® Dairy 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 may also be effective for the amelioration of the symptoms of dairy intolerance.

Additional Ingredient

Betaine HCL is a metabolite of choline that is used in one of the pathways that convert homocysteine to L-methionine. Betaine HCL was added to this formulation as a source of supplemental hydrochloric acid. This may aid in digestion in some individuals. Betaine HCL can be helpful by lowering the stomach's pH, thus providing a favorable operating environment for low pH enzymes like pepsin.



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