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REPORT

Promoting Optimal Nutrition with Digestive Enzymes

By Dale Kiefer



In youth, digestive enzymes break down ingested food into vital proteins, fats, and carbohydrates to provide optimal nutrition for the body. But with aging and illness, the body's digestive functions deteriorate, leading to gas, bloating, partially digested food, nutritional deficiencies, and even inflammatory conditions.

Fortunately, advanced enzyme formulations make it possible to enhance digestive health, prevent gastric distress and malnutrition (particularly in the elderly), while protecting against systemic inflammation.

YOU ARE WHAT YOU DIGEST

While healthy foods provide the foundation for optimal health and vitality, even the healthiest foods are of little use if they are not properly digested. As we age, normal digestion slows down, inhibiting our ability to process vital nutrients for use throughout the body.¹

If the body cannot extract all the nutrients in our food, our overall health will begin to falter, and can result in a wide range of unwelcome diseases. These problems are often caused by decreasing levels of the digestive enzymes that facilitate the crucial breakdown of food in our digestive tract.²⁻⁴

The unfortunate result is malnutrition and deficits in crucial nutrients, which may add to a vicious cycle of faltering immunity and escalating disease, particularly in the elderly.⁵⁻⁸ However, a broad-spectrum of digestive enzymes that includes proteases, amylases, lipases, pancreatin, cellulase, and lipase has been shown not only to increase the digestion of a wide range of foods, but remarkably to decrease post-surgery recovery time^{9,10} and, in certain cases, serve as a helpful adjuvant in cancer therapy.¹¹

NATURAL DIGESTION SUPPORT

Age-related digestive problems needn't become significant health issues, given that supplemental digestive enzymes—many derived from plants—can help replace the pancreatic enzymes produced in youth. These modern digestion-assistance preparations offer natural enzymes that when taken with meals, can enhance the digestive process.



In order to enhance digestion, a number of various enzyme components are crucial to boosting the natural digestive process. One of the most important ingredients is pancreatin—a mixture of several enzymes ordinarily released by the pancreas in response to the presence of food in the intestines. Pancreatin contains enzymes such as proteases to facilitate the break down of proteins into amino acids; amylase to cleave complex carbohydrate molecules into manageable sugars; and lipase to facilitate the break down of lipids (better known as fats) into useable components. Other desirable supplemental components include lactase to assist the body's ability to break down lactose (milk sugar) from dairy products; papain from papaya, to assist with protein digestion; and cellulase, to

prevent the development of a rare condition known as gastric phytobezoar, in which undigested cellulose, or plant fiber, forms a mass with other plant constituents, which may cause blockage within the gastrointestinal system.^{12,13}

WHAT IS DIGESTION?

Once swallowed, food begins an amazing journey through the alimentary canal; a journey that, when all goes according to plan, ends by providing us with health-promoting nutrients, and by fueling us with life-sustaining energy. But just as sleek automobiles cannot run on crude oil, the human body needs to "refine" its fuel in order to run smoothly. It requires digestion.

Digestion is the process by which the body breaks down food, extracting energy and nutrients and discarding unusable components. This break down process involves a coordinated set of events, combining mechanical breakdown through mastication with the deconstructive activities of caustic chemicals and specialized enzymes. Unfortunately, research suggests that digestive enzyme production decreases with advancing age.^{14,15}

UNDERSTANDING DIGESTION

Digestion begins not in the stomach, but with the senses. The mere sight and aroma of tantalizing food sends signals to the brain that trigger a cascade of events. Salivation increases, pumping the enzymes amylase and lipase into the mouth. Amylase, which is actually a family of related proteins, helps start the process of breaking down carbohydrates, while lipase initiates the disassembly of fats into their simpler components.

Chewing serves to mechanically break down food, ensuring efficient chemical and enzymatic disassembly of food. As chewing continues, moistened, enzyme-laced bites of food are swallowed, aided by muscular contraction, passing down the esophagus into the stomach.

In the stomach, food is churned and combined with gastric acid, which consists primarily of hydrochloric acid. Pepsin released by the chief cells in the stomach degrades food proteins into peptides, while more digestive enzymes are added to the mix. These enzymes selectively break down proteins, carbohydrates and fats, before transporting the stomach's contents to the small intestine, where the bulk of digestion and absorption takes place. Importantly, the stomach also contributes a compound called intrinsic factor, which enables the absorption of vitamin B12 further downstream.

In the small intestine, additional digestive enzymes, including pancreatin, trypsin, and chymotrypsin are enlisted to further breakdown food. Produced by the intestinal lining or released into the intestine by the pancreas, these enzymes play an important role in extracting nutrients from food.

The liver contributes by producing bile, which is stored in the gallbladder and released in response to the presence of fats. Bile helps emulsify fats, rendering them more susceptible to enzymatic breakdown. This action is important for the absorption of fat-soluble vitamins, such as vitamins A, D, E, and K.

This complex series of events breaks food down to its constituent amino acids, sugars, and fatty acids, which are readily absorbed through the lining of the small intestine and transported into the bloodstream. Nutrients are then shunted to the liver, where filtration occurs, toxins are inactivated and removed, and final processing happens.

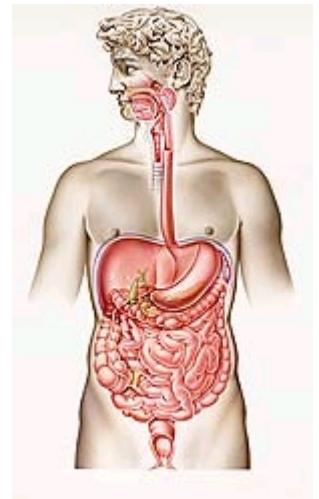
Obviously, enzymes play an integral role in this complex process. Unfortunately, many adults have inadequate amounts of these workhorse digestive facilitators. One reason for this enzyme deficit can be traced back to the diet. Although natural enzymes are found in raw fruits and vegetables, many Americans consume too few of these healthful foods. And even when people make an effort to include adequate amounts of these foods in the diet, a majority of these enzymes may be inactivated through cooking and processing, rendering them useless. Additionally, the amount of enzymes produced by the stomach, pancreas, and small intestine is generally believed to decline as we age.^{14,15}

Consequently, older people may experience problems with poor digestion, decreased nutrient absorption, and diminished intestinal motility, all of which may contribute to a variety of complaints, including problems with elimination, increased gas and bloating, anemia, and even malnutrition.

MALNUTRITION AND AGING

Many factors challenge the nutritional status of older adults. Chronic alcohol abuse, atrophic gastritis, chronic pancreatitis, pancreatic insufficiency, lactose intolerance, diverticulosis, and celiac disease are all associated with the potential malabsorption of nutrients and/or malnutrition.²¹⁻²⁶

As noted previously, aged individuals are especially at risk of developing vitamin, mineral, and trace element deficits; all of which may seriously impact immunity and overall health.^{8,27} A recent study conducted in France, for instance, found a high prevalence of vitamin, mineral, and omega-3 fatty acid deficiencies among men and women aged 70 and above.²⁸ And vitamin B12 deficiency, which may lead to a serious condition known as pernicious anemia, among other pathological conditions, is all too common among the elderly.^{29,30}



Given the potentially devastating consequences of inadequate nutrition, it is imperative to optimize digestive health in older adults.

IMPROVING DIGESTION

Many individuals and health practitioners rely on digestive enzyme supplements to ensure the healthy break down and assimilation of food.

A double-blind, crossover study confirms the efficacy of digestive enzyme supplements in optimizing digestion. Healthy volunteers consumed a high-calorie, high-fat meal, either with pancreatic enzyme capsules or with placebo. Gastrointestinal symptoms were recorded for the next 17 hours. Pancreatic enzyme supplements significantly reduced bloating, gas, and the feeling of fullness. These findings demonstrate that even healthy individuals can experience greater digestive comfort through the aid of digestive enzyme supplements, and suggest a role for digestive enzymes in those challenged with irritable bowel syndrome.³¹

POTENTIAL SYSTEMIC BENEFITS

In addition to enhancing digestive health, digestive enzymes may play further beneficial roles in the body, such as in reducing autoimmunity and inflammation and speeding healing after surgery.

In autoimmune diseases, immune complexes, which are large aggregations of antigens (molecules that trigger immune responses) and antibodies (immune proteins that neutralize foreign invaders), lock together in a tangled embrace. Their deposition in tissue results in tissue damage. They are believed to play a role in immune system diseases, such as rheumatoid arthritis, lupus erythematosus, and glomerulonephritis, a form of kidney disease. Some scientists believe that supplemental enzymes may have immunomodulatory activity and could play a role in reducing the incidence of these immune complexes.³²⁻³⁵

WHAT YOU NEED TO KNOW

Digestive Enzymes

- As adults grow older, they become more susceptible to impaired digestive function, increasing their vulnerability to malnutrition and disease.
- Replacing digestive enzymes that are lost to the aging process may help restore optimal nutritional status and alleviate numerous health complaints.
- Enzymes such as pancreatin, protease, amylase, lactase, cellulase, lipase, and papaya-derived papain help break down foods into their constituent proteins, carbohydrates, and fats.
- Digestive enzymes not only help promote optimal digestion, they may also help avert inflammation, speed post-surgical recovery time, and serve as a useful adjuvant cancer therapy.

Supplemental oral enzymes have also proven popular in Europe as substitutes for non-steroidal anti-inflammatory drugs, or NSAIDs. They are used to treat conditions ranging from osteoarthritis to rheumatoid arthritis and other inflammation-related conditions. The results of various studies (placebo-controlled and comparisons with non-steroidal anti-inflammatory drugs) in patients with rheumatic diseases suggest that oral therapy with proteolytic enzymes produces certain analgesic and anti-inflammatory effects. Generally, these commercial enzyme preparations have been found to be equally as effective as standard anti-inflammatory drugs, but with better tolerability.³⁶⁻³⁹

In Eastern Europe, oral enzyme therapy (also known as systemic enzyme therapy, in recognition of the activity of these enzymes outside the digestive system and within the general circulation) has been shown to be effective in improving post-surgical recovery time, reducing the need for pain relievers, and diminishing the incidence of troubling edema, or fluid retention, after surgery.^{9,40} Czech surgeons reported, "Efficient edema reduction and thus accelerated healing...and analgesic effect... with the use of oral enzymes."⁹

BOOSTING CANCER THERAPY

Systemic enzyme therapy has even been used as an adjuvant in the treatment of cancer. Swiss researchers published a review of oral enzymes for this purpose, and concluded, "These studies showed that enzyme therapy can reduce the adverse effects caused by radiotherapy and chemotherapy. There is also evidence that, in some types of tumours, survival may be prolonged." The authors noted that exact mechanisms of action remain theoretical, but they speculated, "The beneficial effect of systemic enzyme therapy seems to be based on its anti-inflammatory potential."¹⁰

American researchers have also noted the promise of systemic enzyme therapy in the treatment of cancer. Noting that a preparation of pancreatic enzymes was first proposed as a treatment to fight tumor growth nearly 100 years ago, scientists in Pennsylvania conducted experiments in which pancreatic enzymes, particularly amylase, revealed remarkable selective effects that inhibited the growth of tumor cells with metastatic potential.¹¹

SAFETY CAUTIONS

If you use the prescription medications acarbose (Precose®) or miglitol (Glyset®), consult your physician before using pancreatin.⁴¹ If you use the medication warfarin (Coumadin®), consult your doctor before using papain (a proteolytic enzyme derived from papaya).⁴²

CONCLUSION

Aging presents multiple challenges, but being forced to bid farewell to the simple pleasures of good food need not be one of them. When taken orally before a meal, supplemental digestive enzymes can boost the body's natural ability to break down food into its life-giving and healthful constituents. When consumed between meals, digestive enzymes may help mitigate inflammatory and disease processes throughout the body, thus helping to ensure continued good health.

If you have any questions on the scientific content of this article, please call a Life Extension Health Advisor at 1-800-226-2370.

AGING AND DIGESTIVE ENZYMES

The question of whether or not enzyme production decreases as a function of age has been a subject of controversy among scientists. A recent report on the issue noted that various researchers have reported conflicting findings.¹⁶ For example, in the 1980s, scientists working with laboratory rats noted that amylase from the pancreas decreased by 41% in aging animals, but lipase concentration increased by 29%.¹⁷ Working with male and female human volunteers of various ages, Argentinean scientists found an increase in amylase and lipase secretion in men over 45 years of age, but they reported a decrease in women of the same age.¹⁸

A similar experiment conducted by French researchers found that among older individuals (average age: 72), concentrations of the digestive enzymes lipase and chymotrypsin, "were significantly reduced by...15% and 23% respectively," compared with younger individuals.¹⁹ Another group of French investigators reached a similar conclusion. "The three enzymes that were studied [lipase, phospholipase and chymotrypsin] linearly

decreased in concentration as well as in output with age from the third decade...One can conclude that pancreatic secretion changes in humans with age. Aging alters pancreatic secretion, through a decrease in flow rate, bicarbonate and enzyme secretion... 15

In Japan, scientists gave subjects of various ages an injection of secretin, a hormone generated and released by the intestines, which acts to stimulate pancreatic enzyme output in response to the presence of food. Serial samples of intestinal secretions were collected and the concentrations of intestinal enzymes were measured. "Enzyme output showed a gradual decrease with aging," they concluded, adding, "[Subjects 65 years and older] showed significantly lower values in secretory volume, bicarbonate output, and enzyme output than [younger subjects]."²⁰

Thus, a careful review of the literature reveals a picture of gradually declining digestive enzyme output, which appears to accelerate after age 65, especially among women.

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