

DIGEZYME: INTELLIGENT NUTRIENT IN SUPPORT OF BODY FUNCTIONS IN HEALTH AND DISEASE

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INTRODUCTION

The three essential nutrients in food, i.e. carbohydrates, proteins and fats can be assimilated by our body only after being broken down to smaller digestible units. This work is done by various enzymes and compounds secreted by the lining of the digestive tract and the digestive glands in our body, such as salivary glands, the liver and pancreas. The digestive process starts with action of salivary amylases which injected with saliva to the mouth start breaking complex sugars, like vegetable starches, into smaller sugar units. The food is then moved to the stomach where it is subjected to enzymatic action of protein digesting enzyme pepsin, secreted by specialized stomach cells called chief cells or zymogenic cells. Subsequently, the stomach content is transported by a peristaltic movements of digestive tract to small intestines. It is there that pancreatic juice is delivered together with bile secreted from the liver via the gallbladder to facilitate further digestion of sugars, proteins and, importantly, digestion of the dietary fats. The corresponding enzymes, i.e. pancreatic amylase, carboxypeptidase and lipases are provided in pancreatic juice. Fats are hydrolyzed by the pancreatic lipase into free fatty acids, and by the action of bile salts they are transformed into micelle, i.e. the form of dietary fats that are absorbed by cells of the gastrointestinal tract.

THE CRITICAL ROLE OF DIGESTIVE ENZYMES IN HEALTH AND DISEASE

Although barely noticeable, work of our digestive tract in producing digestive juices and enzymes can be measured with an impressive numbers. For example, an average daily production of saliva is 1 to 1.2 liters. That amount of saliva is needed day-in-day-out just to initiate the digestive process. Equally impressive are the calculated amounts of the gastrointestinal digestive juices and fluids, produced to sustain the digestive process. This silent work of our digestive tract is not appreciated by us other than by feeling well and fit. However, this indispensable function of the digestive tract ages like rest of the body does, and production of the digestive juices and enzymes declines with age. In addition, there are numerous nutritional and dietary factors, as well as disease conditions that deprive the digestive process of enzymes and the digestive capacity. It is estimated, for example, that exposure of the food to prolonged cooking in 118 degrees F destroys entire content of enzymes that may be otherwise present in raw food.



THE SIGNS OF DIGESTIVE ENZYMES DEFICIENCY

Probably the most often recognized condition due to enzyme deficiency is lack or low activity of the gastrointestinal enzyme lactase, which splits the non-absorbable milk sugar or lactose into the easily absorbable monosugars. In the absence of this enzyme, the milk sugar is transported unchanged to the large intestine where it is fermented by the bacteria. Excessive fermentation will manifest with gas and diarrhea - a typical complaint among people with lactose intolerance. There are also more serious and less recognized, in general population, conditions due to enzyme deficiencies. Pancreas is a digestive organ that manufactures several enzymes which include major three groups of enzymes, i.e. amylases, lipases and proteases. These enzymes are released everyday by healthy pancreas to the small intestine to literally make the food useful to us. In a disease condition of pancreas, due to for example an excessive use of alcohol, the production of pancreatic enzymes is severely diminished. That results in poorly digested food which shows in an undigested form in the stool. This way the undigested fats will show in stool, which technically is known as steatorrhea.

Another condition that can impair enzymes production is gastritis, or inflammation of the lining of stomach. Stomach mucosa is built of specialized cells that manufacture gastric acid, mucus and the protein digesting enzyme pepsin. Deficiency of pepsin will eventually manifests by poor absorption of proteins. In general any inflammatory process in the gastrointestinal tract will interfere with the digestive enzyme production by disabling the specialized in enzyme production cells.

In fact, it may be said that lack of digestive enzymes increases the inflammatory process in the gut, which further shuts down the enzyme production. On the other hand, restored presence of the digestive enzymes can exert the anti-inflammatory and thus healing action.

WHEN THE DIGESTIVE PROCESS IS AILING

The markedly diminished activity of enzymes in the digestive tract may initially be manifested by a gastrointestinal discomfort such as gas, bloating, nausea, intestinal cramps, diarrhea and also constipation. Undigested nutrients can not cross the barrier between gut and blood vessels and thus are not bioavailable to the metabolic processes in specialized tissues and organs of the body. A chronic deficiency of digestive enzymes may result in progressive depletion of nutrients, wasting of lean body mass, and paradoxically increase in body weight due to accumulation of fat. The too often imperceptible



process of nutrient deficiency eventually may lead to a full-blown pathology, including chronic degenerative and inflammatory disease and the neoplastic disease.

All too popular response to symptoms of gastrointestinal problems is to suppress discomfort, rather than address the problems. Typically a person experiencing heartburn is thinking about prompt relief with antacid, which is until.....the next heartburn, which is equally promptly relieved with antacid. These popular interventions are against the physiology of the digestive process and physiology of human body in general, because they are a proverbial “quick fix”. One of the newest acid suppressing agents works by inhibiting the active transport of hydrogen ions by the stomach cells - a necessary step to form a hydrochloric acid. Although it is true that the hydrochloric acid is a culprit in heartburn symptom, it also is a necessary component of the digestive juice which facilitates formation of chyme, or food mixed in stomach with the digestive juices. Changing acid content in the stomach may slowdown or accelerate its emptying to the small intestine, which partly depends on the acid/base level of the stomach content. This in turn may alter acid/base balance in the gastrointestinal tract disrupting digestive enzymes which function depends on specific acid/base range. For example, there are three protein digesting enzymes working in three different acid/base conditions, i.e. neutral proteases, base proteases and acid proteases.

Therefore reason for taking antacids may in fact be a misguided and eventually could result in diminished capacities of the digestive tract. The indiscriminate use of antacids is one of many examples of a burden on the digestive process which prevents digestive enzymes from proper functioning, as well as depletes their resources.

THE CONSEQUENCE OF ENZYME DEFICIENCY

Besides consequences of the digestive enzymes deficiency affecting nutrient delivery, there is less obvious consequence of the deficiency which nevertheless may threaten our health and well being. In health certain enzymes, especially proteolytic (breaking down proteins) enzymes safeguard body from malignant cells by literally unmasking cancerous cells, and delivering them to the immunological system for destruction and disposal. According to this theory, the cancer cell is wrapped in a protein material like fibrin, which fools the immune system as “sheep in wolf’s skin”. However, proteolytic enzyme is capable of stripping fibrin from the cancer cell and thus allows its detection by the immune system. The more cancer cells the body produces, the more enzymes the body needs. Exhaustion or absence of certain enzymes allows cancer cell to grow, which may lead to clinically manifested disease. In a healthy



individual with sufficient levels of enzymes being manufactured by the body there is a balance between cancer cell production and cancer cell destruction. However, as we age or due to disease, stress, faulty nutrition, and faulty life style (lack of exercise, obesity) our body is less able to produce cancer unmasking enzymes. According to Anthony J. Cichoke, a renowned author of book on Enzyme Therapy, certain natural enzymes like bromelain (extracted from pineapple) can retard the growth and metastasis of several malignant cell lines in vitro and in vivo. In his 1999 publication Dr. Cichoke lists cancers that have been helped by systemic enzyme therapy.

RATIONALE FOR THE SUPPLEMENTAL ENZYMES

The long-term digestive well being and the overall health should be taken into consideration while attempting to alleviate gastrointestinal symptoms – most likely the first symptoms of enzyme deficiency. Restoring proper levels and activity of digestive enzymes should be one of the priorities which will result not only in alleviation of the gastrointestinal symptoms, but possibly can prevent a disease. Restored gastrointestinal enzymes will reverse chronic nutritional deficiency by improving nutrient absorption and their ultimate tissue bioavailability.

Ideally, the secretion of the digestive enzymes should be sustained by proper nutrition and the proper life-style. For example, physical exercise of aerobic type and a technique to avoid mental and emotional stress. In reality in addition to healthy life style and nutrition, we may need to resort to “extra” help to offset the accumulated negative impact of dietary errors and “quick fix” approach in our lives. The “extra” help is also needed due to a natural process of aging and weakening of the digestive tract functions.

Enzyme supplementation to balance the digestive process should be recommended particularly for those who experience a chronic gastrointestinal discomfort (e.g. gas, constipation, diarrhea, cramps) and as a preventive in the middle age and elderly individuals.



DigeZyme®

Commercially, digestive enzymes are isolated from various sources such as the pancreas of higher animals (swine and cattle), higher vegetables (barley), and microorganisms including bacteria and fungi. The multi-enzyme complex DigeZyme® consists of GMO-free broad acting enzymes obtained from the fermentation process with *Aspergillus oryze*, including amylase, protease and lipase; this group of enzymes breaks carbohydrates, proteins and fats and all three groups of enzymes are resistant to the action of gastric juices, while retaining their digestive activity. DigeZyme® is referenced in *The Complete Book of Enzyme Therapy* by Anthony J. Chichoke (Ref. 1). DigeZyme was also clinically evaluated for enhanced absorption of minerals and vitamins.

Enzymes are catalysts which participate in virtually every bodily process and, as previously discussed, their shortage can cause an illness. The profound effect of enzymes on the body can be illustrated by the German study of karate fighters using enzymes before fighting. The group that took enzymes showed recovery from fight related injuries in seven days while the placebo group recovered in 16 days. This study shows a direct link between ability of the body to regenerate and a sufficient presence of the digestive enzymes in the body.

Although most of us do not need to recover from a karate fight on a daily basis, we nevertheless need to protect our body from a daily assault of physical and mental stress. Supplemental enzymes can possibly be considered to improve our health in numerous conditions; however they are not a substitute to a healthy life-style and nutrition.

REFERENCE

1. Anthony J. Chichoke. *The Complete Book of Enzyme Therapy*. Avery Publishing Group. Garden City Park. New York. 1999; pp. 492.



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