Enzymes - Not Just Food Anymore

By Thomas A. Kruzel, ND

A 46-year-old female patient is having a tremendous amount of difficulty walking into the examining room where I am to evaluate the leg pain which she has experienced for the last 10 days. The calf of her right leg is painfully swollen, hard and very warm to the touch. Both Lisher's and Homan's signs are positive which makes the diagnosis of thrombophlebitis (a blood clot in the leg), likely. After explaining the importance of remaining off her feet and elevating the leg, she is placed on 220 mg of protease enzymes, 4 capsules between meals 4-times/ day. I am concerned that the phlebitis will become much worse as I have seen previous cases require months of anticoagulant therapy to eliminate the blood clot and frequent hospitalizations. She later reports that within the first 24 hours the pain level decreased by half and that within 48 hours the swelling had decreased by half with pain no longer being experienced. She went on to a rapid recovery over the next 10 days, avoiding anticoagulant therapy and hospitalization.

A 40-year-old male patient complains of a fever and sinus pain associated with an abscessed tooth. The pain has been treated with narcotics which have acted to dull the pain only. He is placed on 220 mg of Amylase which acts over the next 48 hours to relieve the pressure in the congested sinus. The pain decreases. Additionally, the decrease in pressure and swelling allows for more drainage of the infected material from the sinus, lowering his temperature. He was able to go on to a successful recovery.

These cases illustrate that enzymes are effective in the treatment of a wide variety of conditions. Because of these cases and others, physicians are having to take another look at enzyme therapy as being more than just treatment for digestive problems. Physicians trained in the use of therapeutic nutrition are discovering success in the treatment of chronic degenerative diseases such as cancer and arthritis. All living things need enzymes in order to maintain life. Without them we simply could not function. Even a depletion or lack of enzymes will affect the body's ability to function. The genetic disorder phenylketoneuria or PKU is an example of a problem caused by an enzyme deficiency. Children born without the enzyme phenylalanine hydroxalase cannot convert

phenylalanine to tyrosine . This causes a buildup of phenylalanine, an amino acid, which results in mental retardation. Simple diet changes implemented early in life will prevent the condition. While it is a rarely seen disorder, it underscores the importance that enzymes play in our lives. An example of a depletion of enzymes is the occurrence of a heavy feeling following a meal accompanied by a persistent after taste of the food last eaten.

What is food enzyme therapy and how can it be of benefit to you?

Food enzyme therapy is not something new, but has been known about since the time of Hippocrates. It has long been recognized that illness is related to improper diet and faulty nutrition (decreased vitamin & mineral intake) and that fasting, juicing and raw foods diets help restore the body to health. Early religious literature speaks of healthful ways of living and the concept of food enzymes and the longevity associated with their use is found here.

Traditional and ethnic diets were the rule prior to the introduction of modern processed foods. One of the longest living populations on earth, the Hunzas, subsist primarily on a raw foods diet, a diet rich in enzymes. Currently, work being done in Europe with raw food dieting in the treatment of chronic illnesses shows that patients with longstanding degenerative diseases are able to make remarkable recoveries. More recently the National Institute of Health released a study showing that eating smaller meals leads to a longer life. This suggests that our intrinsic enzyme production is better able to take care of smaller dietary loads than a larger intake of food.

What are enzymes?

Enzymes are complex protein molecules that are found in every cell throughout the body. Under the right conditions enzymes become activated (energized) and are capable of specific tasks such as energy production or exchange of oxygen and carbon dioxide when we breathe. The enzyme possesses special properties which are able to transfer energy to other molecules, thus making it easier for them to be produced and utilized by the body. This is similar to having a stack of dominos where one domino falls into another

causing it to fall into another and so on until the whole stack has fallen. The energy of the first was transferred to the next and the next, making it easier for the next one to fall and move its neighbor.

Without enzymes, all bodily functions would require a longer period of time in order to occur. For example, the enzyme carbonic anhydrase, which catalyzes the conversion of carbon dioxide to carbonic acid and back again, will convert over 600,000 molecules of carbon dioxide in one second. Without this reaction, our red blood cells could not carry enough oxygen and we would not be able to perform simple tasks such as walk or run. The human body contains somewhere over 1300 different enzymes whose job it is to breakdown nutrients, rebuild cells and cause the body to function smoothly and disease free.

Enzymes act within different ranges of temperature and ph, depending upon their type and function. This means that certain enzymes will be working while others await the proper conditions such as a ph or temperature change to occur. When this happens, they become activated or "turned on," and are able to transfer energy at a very fast rate. The same properties that will activate enzymes will also destroy them. In particular, they are affected by temperature. If you want to destroy an enzyme all you have to do is subject it to high temperatures such as that of a cook stove or microwave oven.

Enzymes and Digestion.

Most of what we know about enzymes relates to their function in the digestive system. The digestive system transforms food into energy for the body's use by breaking down complex proteins, fats and carbohydrates into smaller, simpler and more useable forms. Without this transformation, digestion and assimilation of nutrients becomes more difficult. The human digestive system is truly a remarkable part of our bodies, especially when you consider how it has been over taxed and abused by excesses of processed foods and stimulants such as caffeine, soft drinks and alcohol which require a large energy input in order to be assimilated and used by the body.

Digestion begins with first sighting, then smelling and tasting the food. These events cause a reflex action in the stomach and intestines which stimulates the secretion

of digestive enzymes. A thorough chewing of your food allows for saturation by the salivary enzyme, amylase which breaks down the starch in the potato or bread you are eating to glucose. The food becomes sweeter as you chew because of the enzymes action. In addition, the act of chewing also breaks the food into smaller and smaller particles making for easier swallowing and greater exposure to the digestive enzymes. Saliva is secreted by the submandibular glands and maintains a ph of 7.0. This allows the amylase to act in its optimal ph and temperature range while protecting the teeth from calcium loss. Amylase in saliva also acts to maintain the microbial balance in the mouth, having a detrimental effect to some bacteria.

Contrary to some thinkers, digestion by amylase and other enzymes does not stop once in the stomach. While the ph range drops to 4 to 5, digestion continues in the upper portion of the stomach known as the fundus. This is also known as the food enzyme stomach or predigestive portion of the stomach. This predigestive area is present in man and other animals and allows for the foods own enzymes to break it down into simpler forms. An example would be the cow with its 3 stomachs which allow for predigestion of grasses before assimilation.

The stomach contents are then passed through the pyloric valve into the small intestine where it is mixed with pancreatic juices. These juices are rich in enzymes such as lipase (fats), chymotrypsin (protein), amylase (starch) and trypsin (protein), to name a few, which further digest the food and prepare it for assimilation. The alkaline nature of the pancreatic secretions help to neutralize the stomach acid that aids in digestion and protects the small intestine.

Enzymes and Predigestion.

At each point along the path of digestion, the body must expend a certain amount of energy to transform and assimilate the food. It is logical then that the more food eaten, the more energy is required to digest it, which is why one feels tired after eating a large meal. The body must focus its energy on the process of digestion. It follows then, the body for its digestion and assimilation, there would less energy require that if what was eaten had been predigested. In fact, this is what occurs when the person eats a raw food

diet or predigested food is administered, similar to patients in the hospital with serious illnesses.

Predigestion in the stomach can occur only if there are enzymes present in the food that is eaten. Since enzymes are inactivated at high temperatures, cooked or processed foods do not have any enzyme activity available for predigestion. Food enzymes are activated in the mouth during the process of chewing and continue their work in the enzyme or predigestive portion of the stomach. This occurs if raw foods are eaten or if enzymes are supplemented, but will not occur if they have been inactivated. Therefore, the body's production of digestive enzymes must increase to make up the deficit.

It is obvious then that the more energy expended to digest cooked and processed foods the less is available for other areas of the body. The reverse is also true in that the less energy expended, the more is available for other body systems such as the immune system. In fact, studies have shown this to be correct. Populations of laboratory mice fed diets of raw enzyme rich foods compared to those fed cooked and processed foods showed that the raw food population lived 1 1/2 times longer. Similar results have been obtained in numerous studies conducted with different animal populations.

The same is observed when different ethnic populations are studied which consume diets high in raw foods. Generally, they are found to have better health and an increased longevity than their counterparts who have become modernized and consume cooked foods and a standard western style diet.

Enzymes and Immunity.

Enzymes also affect immune function, both directly and indirectly. White blood cells contain digestive enzymes such as alkaline phosphatase, lipase, protease, amylase and peptidase to name a few (these are many of the same enzymes found in the pancreatic juice). These white blood cell enzymes act to destroy bacterial and viral proteins but will also act on improperly digested food. It has been shown that the white blood cell concentration in the stomach and intestines increases with digestion as white blood cell enzymes are needed to help with the breakdown and assimilation of foods. It follows then

that if the white blood cells are engaged in digestion, then they are not able to function in other areas of the body such as the urinary tract or respiratory system. This decreased availability of white blood cells lowers the body's immune response and leaves other areas of the body more susceptible to infection.

This "intestinal leukocytosis" as it is termed is not seen in animals fed raw foods diets. Raw foods are high in enzymes which act to predigest the food in the stomach, sparing the body's white blood cell reserve. Because of this, a decreased appetite and/or nausea often will accompany a disease process. This is because digesting cooked or processed foods requires energy and white blood cells which are needed elsewhere to fight the disease. The body's own innate wisdom knows to turn off the hunger center in the brain so the immune system can be at maximal function where needed.

Therapeutic Enzyme Use.

As the first cases illustrate, enzymes are useful in treating various illnesses. This occurs because enzymes are absorbed by the body as intact molecules and are thus disseminated throughout the blood to the area where they are most needed. These support the body’s own healing response. An example of this is the enzyme bromalein which is found in pineapple. Bromalein is used to decrease inflammation which accompanies a musculoskeletal injury. It has been shown to be more effective than many of the commonly prescribed non-steroidal anti-inflammatory drugs while not having the toxic side effects.

In cystic fibrosis, a disease in which the pancrease has a decreased ability to secrete enzymes, supplementation with pancreatic enzymes is part of most treatment plans.

In a number of cancer patients that I have treated, the addition of high levels of protease enzymes has slowed metastases and contributed to tumor shrinkage. Additionally, it has helped decrease the pain which sometimes accompanies the cancer.

There is also some evidence that high lipase and amylase levels in the blood lead to a decrease in atherosclerotic plaques, thus making enzyme therapy useful for coronary artery disease and atherosclerosis.

As a general rule I prescribe enzyme supplementation for my elderly patients as I have seen an overall improvement in their energy levels, nutrient assimilation and general resistance to disease. Also noted is a subjectively improved sense of well being.

Enzyme Deficiency

It is felt that the body does not have an unlimited capacity for enzyme production, but rather that it has an enzyme reserve which becomes depleted with time. The depletion leads to a decrease in cellular function and subsequent lower energy production which contributes to the process we term aging. Certainly as we age, the ability for enzyme production as well as the ability to assimilate nutrients becomes less. This is one of the reasons why recovery from disease generally takes longer the older we become.

Deficiencies in enzymes are often first experienced as digestive disturbances. Periodic gas and bloating, or meals, which seem to remain in your stomach for hours or days, may be a sign of low enzyme production. Chronic constipation or diarrhea may also indicate a deficiency. Generally, stools high in undigested materials or those which appear greasy or pasty indicate poor enzyme production and utilization.

These symptoms often are associated with some type of gastrointestinal disease and a workup by your physician is needed to determine the cause. From this, the type of enzyme supplementation needed can be determined.

Enzyme Supplementation.

The use of enzymes as a supplement with meals has been popular for some time. This is because of our dependence on processed foods and fast food restaurants. Because of this, the food we rely on daily for our nutrition is incomplete as preparing it in this manner destroys the enzymes and nutrients. An added burden is placed on our pancrease and immune system to replace the lost enzymes, robbing us of energy production, enzyme reserve and immune function. Enzyme supplementation with meals makes good sense as a preventive measure.

What type of enzyme supplementation is correct for every day use is a question I am often asked. I generally view the different enzymes as being in the "predigestive" and

pancreatic enzyme categories. The "predigestive" enzymes are derived from plant sources and function in a broader ph range. They act similar to the naturally occurring enzymes no longer present in the processed or cooked food. As they work primarily in the predigestive or fundic portion of the stomach, I have termed them "predigestive" enzymes. These are good to use when you are experiencing an upset stomach with eating or your dinner seems to take a long time to digest.

Pancreatic enzymes, which are derived from animal sources, work in a narrowed ph range. Because of this, they work better in the small intestine than in the stomach where the ph has a wider range. Pancreatic enzymes are useful for gas and bloating which occurs following a meal or if there is a problem with fat, protein or carbohydrate digestion leading to constipation or loose stools.

Specific enzymes such as lactase or rhamanase may be used if there is intolerance to dairy (lactase deficiency) or beans. Combinations of the both enzyme types may be used and it is generally a matter of trial and error to see which one or which combination works best for you. It is important however, that if digestive or other problems persist, that they be evaluated by your physician.