

eN-Zyme™

Break down your food...Build up your body

THE NUMBERS

- ❑ We chew our food only about 25% as much as really needed to fully engage the digestive process
- ❑ Recent studies have shown that close to 100% of Americans have an enlarged pancreas by the time they turn 40
- ❑ Only one-third of adults have the ability to digest lactose (the sugar in milk and most dairy products)
- ❑ It is estimated that 30-50 million Americans are lactose-intolerant

GETTING THE ESSENTIALS FROM THE FOOD WE EAT

The food we take into our bodies cannot be used by the various body systems "as is." A carrot, for instance, in all its natural carrot glory, straight from the ground, is pretty much useless to the human body in that form. It's too big to fit in the bloodstream. It would be extremely painful, if not impossible, to move through the digestive tract. And yet we all know the many health benefits associated with carrots and the essential vitamins, minerals and other nutrients they contain.

So how do our bodies ingest that carrot and turn it into something we can use, something that helps us on the road to better health? How do we release the nutritional benefits of all the varieties of foods available to us today?

The answer is simple in many ways. It all has to do with the essential, yet often overlooked, little helpers we know as enzymes. On the one hand, enzymes can be thought of as the "deconstructionists" of nutrition. One of their primary functions is the digestion -- or breakdown -- of various food items and even toxins in the body.

On the other hand, enzymes play a very powerful role as "aiders and abettors" in many body systems and functions. They help speed along different body processes, from digestion to the rebuilding of tissues that have been damaged by injury, disease, surgery, etc. And enzymes are very efficient workers. Each one performs a specialized task within the body.

ENZYMES: THE LITTLE ENGINES THAT COULD

Digestion begins the moment we put a piece of food in our mouth, thanks to the work of enzymes that reside there. Chewing starts the process, then enzymes in the saliva join in as the food moves toward the stomach where acid and other enzymes continue the process. Further on, in the intestines, enzymes produced by the pancreas carry on the digestive task to ensure that the nutrients reach a final form that's usable by the body.

The simple fact is, the food particles must be fully broken down to a size and state that allows their entry

into cells before they enter the bloodstream, or else the body views them as "invaders" -- foreign particles intent on doing harm. In this case our immune systems will attack them, setting up what manifests itself to us as various food allergies.

Enzymes are vital to this breakdown process. One of the most fortuitous things about the enzymes we need is that they come packaged with the specific food types they are designed to work on. When we eat a raw fruit or vegetable, we are also eating the enzymes that will help digest them. Unfortunately, enzymes are both powerful and fragile. They can tackle the toughest piece of meat, totally pulverizing it in mere hours, yet even fairly narrow fluctuations in temperature can completely destroy them. In fact, most natural enzymes in food are destroyed by the heat used in processing and cooking the food.

Our bodies manufacture most of the enzymes needed for various metabolic processes, but it is felt that we have a finite lifetime potential for this production. The "enzyme potential" (present in full at the time of our birth) serves as a back-up system which is tapped into when needed to help in digestion.

As a result of the processing, preserving and preparation we tend to subject our foods to, our bodies are constantly being forced to tap into their enzyme reserves to help with digestive activities. This burdening and resultant depletion of the enzyme

stores is partially responsible for the various breakdowns we associated with the "aging process." Longevity and vitality are heavily dependent on the level of our enzyme use. That in itself would be reason enough to consider enzyme supplements to take up some of the slack in the nutrient deficiencies of our modern processed-food diets. But enzyme supplements can also help reduce indigestion and allergy symptoms, even discomforts and injury healing times!

WHAT WE NEED TO SURVIVE -- AND TO THRIVE

It should be clear by now that we need enzymes to survive. In fact, enzymes govern every metabolic function in our bodies, allowing us to see, breathe, think, and feel. Enzymes are what are known as catalysts -- they make metabolic processes happen, and happen quickly. Without enzymes speeding the various body processes along, metabolism would proceed so slowly that we would die before we could assimilate and utilize the nutrients we need to survive. To break down a steak in a laboratory, you would need to boil it for around 24 hours in a hydrochloric acid solution. Adding proteolytic enzymes (the ones designed to break down proteins) will get the job done in under 4 hours.

A good enzyme supplement can give our bodies what is lacking in the modern diet. Let's look at some of the specific constituents of a particularly good supplement, eN-Zyme:

Protease and Acid-stable Protease

Also known as proteolytic enzymes, proteases hydrolyze, or break down the peptide bonds in proteins. Proteases have the same speci-

ficity discussed earlier as a hallmark of enzymes in the body: each different protease works on a specific type of peptide bond. Since proteins are among the most complicated food substances to metabolize, proteases play an integral role in our nutrition. When they break down proteins, they free the amino acids that make up the proteins, amino acids that are the very "building blocks" of life. Acid-stable proteases continue the work of digestion in the stomach, where there are large amounts of digestive acid.

In addition to their ability to enhance digestion of proteins, proteases are also great at free radical scavenging and digesting the protein "shell" that many foreign invaders (like viruses) hide in to dupe the body into thinking they belong where they don't. Once the protein shell is broken down, the immune system can go to work more effectively, destroying the invaders.

Peptidase

Peptidases are a group of proteolytic enzymes that work on dividing proteins, polypeptides, and peptides into specific amino acids. One group (including pepsin and trypsin) breaks down large peptide molecules into smaller ones. The other group of peptidases breaks the final peptide bonds to release amino acids.

Bromelain

Like the other proteolytic enzymes, bromelain's primary function is to digest proteins. Bromelain comes from pineapple. It has been hailed as a terrific aid in helping speed healing of minor injuries, reducing inflammation (which has benefits in relieving the chronic joint discomforts associated with arthritis), and cutting down on post-operative swelling. Bromelain has often been used alone as a general digestive aid.

Papain

Another powerful proteolytic enzyme, papain is derived from papaya. It has been used for many years as a meat tenderizer, and it is also a popular digestive aid.

Amylase

Amylase breaks down starch, glycogen, and dextrin -- all carbohydrates. While the recent fad of "low-carb" diets has tended to cast aspersions on this critical nutritional component, carbohydrates remain an essential part of proper nutrition, primarily because they supply the body with a ready source of energy. Polysaccharides are the most complex carbohydrates (the prefix "poly-" means many, referring to the sugars in the molecules). Amylase breaks down polysaccharides into disaccharides (two sugars), and finally into monosaccharides, which are "pure" sugars like glucose that can be used immediately by the body as fuel.

Amylase also helps digest dead white blood cells (or pus), which can help clear or even prevent abscesses.

Sucrase

Like amylase, sucrase aids in the breakdown of sugars. In particular, it breaks sucrose down into glucose and fructose.

Lactase

If lactase seems to ring a bell because it sounds like "lactose," you've got the right idea. Lactase is the enzyme responsible for breaking down lactose in the small intestine. Lactose is the "sugar" in milk and milk products. When a person is "lactose-intolerant," they lack an adequate supply of the enzyme lactase and therefore are unable to fully digest milk sugars. These sugars

end up being fermented by intestinal organisms, leading to gas, cramps and, often, diarrhea. There are some indications that lactose intolerance can also lead to a reduction in the absorption of calcium, a mineral crucial for many aspects of health, notably strong bones.

Cellulase

As their name implies, cellulases are enzymes that work primarily on the breakdown of cellulose. This basically means they help digest soluble fiber in the diet. They are not among the enzymes produced by the human pancreas, and so supplements and natural foods are our only sources of these enzymes. Cellulase breaks soluble fiber down into digestible glucose units. It can be helpful in relieving the symptoms associated with food allergies and also in breaking down certain neurotoxins that have been tied to facial pain and even the paralysis associated with Bell's palsy.

Maltase

Maltase is an enzyme that works primarily on breaking down maltose (a disaccharide that comes from polysaccharide starches) into the simple monosaccharide glucose, which is readily used by the body for energy. Maltase can be consumed in foods and supplements, and it's also produced in the intestinal walls, where it assists with maltose metabolism.

Alpha Galactosidase

With its primary target being carbohydrates, alpha galactosidase helps reduce some of the gastrointestinal effects (notably gas) that can be associated with eating a high fiber diet. It occurs naturally in foods like beans, cucumbers, and black-eyed peas.

Lipase

Lipase helps digest fats. Even people trying to follow a low-fat diet need to consume some fat as part of their daily nutrient intake. But undigested or incompletely digested fats in the blood can lead to serious health problems. Lipase can help lower elevated blood cholesterol and triglyceride levels. It can also help remove fatty deposits from the circulatory system, like a mini shop-vac in the blood.

Bringing it All Together

Supplementing with enzymes to ensure proper digestive processes is an important part of a program for maintaining good health. The enzyme supplement should be taken with meals for this purpose. Additional health benefits can be realized by taking a good enzyme supplement between meals, when the supplemental enzymes will be absorbed and utilized to help support other metabolic activities. eN-Zyme is an outstanding supplement for both of these purposes.

CAUTIONS

These statements have not been evaluated by the FDA. This product is not intended to diagnose, treat, cure, or prevent any disease, but rather is a dietary supplement intended solely for nutritional support.

SOURCES

Duskova M, Wald M. Orally administered proteases in aesthetic surgery. *Aesthetic Plast Surg* 1999 Jan-Feb;23(1):41-4.

Hoernecke R, Doenicke A. Perioperative enzyme therapy. A significant supplement to postoperative pain therapy? *Anaesthetist* 1993 Dec;42(12):856-61.

Fruton JS. A history of pepsin and related enzymes. *Q Rev Biol* 2002 Jun;77(2):127-47. Review.

Rosensweig NS. Diet and intestinal enzyme adaptation: implications for gastrointestinal disorders. *Am J Clin Nutr* 1975 Jun; 28(6):648-55. Review.

Gudmand-Hoyer E. The clinical significance of disaccharide maldigestion. *Am J Clin Nutr* 1994;59(3):735s-41s.

Maurer HR. Bromelain: biochemistry, pharmacology and medical use. *Cell Mol Life Sci* 2001 Aug;58(9):1234-45. Review.

Singh A, Hayashi K. Microbial cellulases:protein architecture, molecular properties, and biosynthesis. *Adv Appl Microbiol* 1995;40:1-44. Review.