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The Importance of Enzymes for Health, Longevity and Chronic Disease Prevention

Analysis by Dr. Joseph Mercola | December 19, 2023

STORY AT-A-GLANCE

- Enzymes are catalysts that accelerate biochemical reactions in your body. Digestive enzymes are important for proper digestion and nutrient absorption, but the benefits of enzymes do not end there
- Researchers have discovered enzymes for all sorts of uses, from boosting athletic endurance by optimizing digestion and nutrient uptake to treating cancer
- To optimize enzyme function, eat plenty of fresh, raw and/or fermented foods. Sprouts are a particularly excellent source. Fasting has also been shown to conserve enzymes

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As the name implies, digestive enzymes are important for optimal digestion and nutrient absorption. But their functions and benefits do not end there. Enzymes are actually necessary for most cellular functions and biological processes.

Enzymes — proteins composed of amino acids — are secreted by your body to catalyze functions that normally would not occur at body temperature, making them vital to good health and longevity.[1,2]

Science has identified more than 3,000 different enzymes, yet we've likely only scratched the surface. There are at least 75,000 enzymes in our bodies.[3] Each organ has its own set of enzymes, and each enzyme has a different function. In essence, they act

like specialized keys cut to fit specific locks. In this analogy, the locks are biochemical reactions.

Enzymes Do More Than Aid Digestion

Over the years, researchers have discovered enzymes for all sorts of uses, from boosting athletic endurance by optimizing digestion and nutrient uptake[4] to treating cancer. According to some researchers, enzyme preservation is an important aspect of longevity, as younger people have far higher levels than older ones.

For example, young adults have about 30 times more amylase in their saliva than 69-year-olds, and 27-year-olds have twice the amount of lipase as 77-year-olds. Chronically ill people also tend to have much lower levels of enzymes.[5]

In one recent animal study,[6] the nicotinamide mononucleotide (NMN) — an enzyme involved in energy metabolism, found in **broccoli**, **cucumbers** and **cabbage** — helped regenerate aging cells, making them behave as younger cells and preventing certain age-related genetic changes.

As a result, the NMN-treated mice gained less weight than untreated ones (likely a result of increased energy conversion) and experienced improved eyesight. Fortunately, optimizing your enzymes is as easy as eating plenty of fresh, raw and/or fermented foods. Sprouts are a particularly excellent source of live enzymes.

Fasting has also been shown to conserve enzymes. If you do not eat, you will not produce digestive enzymes, allowing metabolic enzyme production and activity to proliferate instead.

Types of Enzymes and Their Functions

Enzymes can be broadly divided into the following categories:[7]

- **Digestive enzymes,** involved in digestion; the breaking down of foods into nutrients and elimination of waste products. Digestive enzymes are extra-cellular, meaning

they're found outside your cells.

There are eight primary digestive enzymes, each designed to help break down different types of food:

Protease — Digesting protein	**Maltase —** Converting complex sugars from grains into glucose
Amylase — Digesting carbohydrates	**Lactase —** Digesting milk sugar (lactose) in dairy products
Lipase — Digesting fats (If you have IBS, cystic fibrosis , celiac disease, no gallbladder or gallbladder dysfunction and/or obesity, you may benefit from higher levels of lipase. Also beware that fluorinated water may decrease lipase and protease production)[8]	**Phytase —** Helps with overall digestion, especially in producing the B vitamins
Cellulase — Breaking down fiber	**Sucrase —** Digesting most sugars

- **Metabolic enzymes,** involved in energy production and detoxification. Metabolic enzymes are intra-cellular, meaning inside your cells, where they help the cell carry out a variety of functions related to its reproduction and replenishment.
- **Food-based enzymes,** contained in raw, uncooked/unprocessed foods and/or supplements. Dietary enzyme supplements are derived either from plants or animals.

For example, enzymes can be extracted from certain fungi and bacteria, raw foods, such as the bromelain in pineapple and papain from papaya. Pancreatic enzyme

supplements, such as pepsin and trypsin, are obtained from the stomach, small intestine and pancreas of animals.

People who may benefit from eating more raw foods and/or taking a food enzyme supplement include those who:

- Eat cooked, microwaved or processed foods. The more raw foods you eat, the lower the burden on your body to produce the enzymes it needs, not only for digestion, but for practically everything.

  Whatever enzymes are not used up in digestion are then available to help with other important physiological processes.

- Are over the age of 30. Studies show your body's production of enzymes decreases by about 13% every decade. So by age 40, your enzyme production could be 25% lower than it was when you were a child.

  By the time you're 70, you could be producing only one-third of the enzymes you need for good health. Making matters worse, your stomach produces less hydrochloric acid as you age, and hydrochloric acid is crucial in activating your stomach's digestive enzymes.

  When digestion of foods requires such a heavy demand, enzyme supplies run short and your enzyme-producing capacity can become exhausted.

- Struggle with toxicity.

- Are acutely or chronically ill, including those with digestive problems, endocrine gland imbalances, high blood sugar, diabetes, **obesity**, high cholesterol, stress-related problems, arthritis and other inflammatory conditions.

  Supplements containing amylase, lipase and proteases (enzymes that help break down starches, fats and proteins respectively) have been shown to benefit those with food sensitivities.[9] For optimal digestion, you need all three. Other less well-known digestive enzymes include ribonuclease and deoxycyribonuclease-I, which digest nucleic acids and DNA/nuclease respectively.

Enzymes and Coenzymes Play Important Roles in Health

Enzymes are catalysts that cause biochemical reactions to happen. In other words, they assist and accelerate reactions, sometimes to a mind-boggling several million reactions per second. In this way, enzymes significantly lower the amount of energy needed for a reaction to occur. And, without them, some reactions would not even be able to take place at all. Here's a sampling of activities in your body that require enzymes in order to occur:

Energy production	Carrying away toxic wastes
Absorption of oxygen	Dissolving blood clots
Fighting infections and healing wounds	Breaking down carbohydrates, proteins and fats, and regulating cholesterol and triglyceride levels
Reducing inflammation	Hormone regulation
RNA/DNA functioning	Nerve impulse regulation
Getting nutrients into your cells	Slowing the aging process

As important as they are, enzymes do not work alone. They rely on other elements to accomplish their tasks, such as certain vitamins and minerals. These elements are called coenzymes.[10] One of the most well-known coenzymes is coenzyme Q10 (CoQ10), found in the mitochondria (power centers) of your cells where it is involved in making ATP, a principal energy source. Another example is magnesium, which participates in over 300 enzyme reactions.

However, while your body produces its own enzymes, this ability begins to decline as early as your late 20s. The situation is worsened if you eat primarily processed foods, as viable enzymes are only found in fresh foods. This is yet another reason why diet has

such a tremendous impact on disease risk, as enzyme imbalance or deficiency can significantly raise your risk of cancer and autoimmune diseases.

Annesse Brockley's and Kristin Urdiales' book, "Autoimmune," explores the link between digestive enzyme deficiency and autoimmune disease. While still controversial, the link between digestive enzymes and immune dysfunction is quite compelling, and helps us understand why and how diet can be such a powerful intervention.

Cancer-Fighting Benefits of Pancreatic Enzymes

A large portion of your digestion occurs in your duodenum, the early part of your small intestine. Your pancreas secretes digestive juices in response to food in your stomach. These digestive juices contain the eight groups of enzymes responsible for breaking down carbs, protein, fats and other nutrients.

When your pancreas is not working well, a deficiency in pancreatic enzymes can lead to malabsorption of nutrients and overgrowth of bacteria in your small intestine, a condition that presents itself as gas and bloating, fatigue and constipation. It may also play a role in irritable bowel syndrome (IBS).[11] Pancreatic insufficiency may be treated by taking a pancreatic enzyme supplement.

Interestingly, pancreatic enzymes may also be very useful in the treatment of cancer. When used for this purpose, pancreatic enzymes are taken between meals rather than with them. When taken at a time when they're not needed for digestion, the enzymes have been shown to go to work systemically, affecting your body organs via your blood.

One of the mechanisms by which enzymes fight cancer is by stripping away the fibrin coating that cancer cells protect themselves with. Fibrin is a fibrous protein that cancer cells wrap themselves with in order to protect themselves against attack by your immune system. Due to its fibrous nature, this coating is 15 times thicker than the outer layer of a normal, healthy cell.

By stripping off this layer, enzymes help your immune system detect the antigens contained within the cancer cell, thereby allowing your immune system to kill the cell

and dispose of it naturally. Moreover, certain enzymes trigger macrophage to release tumor necrosis factor (TNF), which plays an important role in downregulating an overactive immune system, thereby helping those with autoimmune conditions.

Enzymes Used in Leukemia Treatment

L-asparaginase, an enzyme isolated from the bacteria Escherichia coli and Erwinia chrysanthemi, has a long history of use in the treatment of acute lymphoblastic leukemia, the most common form of childhood leukemia in the U.S.

It's also widely used in veterinary medicine to treat certain types of cancers in cats and dogs, specifically cancers involving the immune system.[12] L-asparaginase works by "starving" the cancer cell of asparaginase, an enzyme needed in the production of proteins.

Healthy cells need only a small amount of asparaginase, and can produce what it needs internally. Cancer cells not only need hefty amounts; they also cannot produce this enzyme internally and must obtain it from outside sources.

L-asparaginase works by eliminating asparaginase and, by depriving the cancer cell of it, the cell dies since it cannot produce what it needs to thrive. Researchers have now found an L-asparaginase-like enzyme found in baker's yeast may be a less toxic alternative to the bacteria-derived enzyme. As reported by Medical News Today:[13]

> *"First study author Iris Munhoz Costa … explains that unlike bacteria, yeast is eukaryotic. This means that it contains a membrane-covered nucleus consisting of genetic material, as is the case with human cells. As such, it is hypothesized that yeast-derived enzymes are less likely than bacterial enzymes to trigger severe immune responses."*

The Kelley Treatment — Cancer Treatment Using Enzymes

In 2011, I interviewed Dr. Nick Gonzalez, a prominent cancer doctor who specialized in alternative treatment methods. Gonzalez died in 2015 from what appears to have been a heart attack. Prior to his untimely death, he'd had remarkable success treating cancer patients with a three-pronged nutritional approach based on the groundbreaking work of Dr. William Kelley, a dentist who cofounded nutritional typing.

Many of these patients were diagnosed with highly lethal forms of cancer that conventional medicine cannot effectively address, including pancreatic cancer, brain cancer and leukemia. Gonzalez's program consisted of three basic components:

- Individualized diet based on nutritional (metabolic) typing
- Individualized supplement program, which includes vitamins, minerals, trace elements and pancreatic enzymes
- Detoxification, which included coffee enemas and colon cleanses

In regard to the enzymes, he stressed the importance of taking the correct ratio of active and inactive enzymes. Interestingly, the inactive precursors are particularly active against cancer. They also have a far longer shelf life, and are more stable than the active ones.

According to Gonzalez, pancreatic enzymes not only are useful as treatment for active cancer but are also one of the best preventive measures. Before his death, Gonzalez published two highly rated books, "The Trophoblast and the Origins of Cancer," and "One Man Alone: An Investigation of Nutrition, Cancer, and William Donald Kelley."

The Many Benefits of Seaprose-S

Seaprose-S (also known as protease-s) is one proteolytic, meaning systemic, enzyme with powerful health benefits.[14] It's particularly effective for breaking up of mucus[15] and reducing inflammation.[16] Some studies also suggest it may have antibiotic properties. Its anti-inflammatory and mucus-dissolving activities have been shown to benefit conditions such as:

Arthritis	Edema
Pleurisy (inflammation of your lung lining)	Peritonitis (inflammation of your abdominal lining)
Thrombophlebitis (pain and inflammation in your veins following a blood clot)	Pulmonary tuberculosis
Bronchitis	Pulmonary emphysema
COPD	Bronchiolitis
Bronchial asthma	Wound complications following vaginal birth or C-section[17]
Venous inflammatory disease[18]	

This enzyme is one you would take in-between meals, not with your meals, as it's not aimed at improving digestion but rather doing its work systemically. By passing unused into your digestive tract, seaprose-S can enter your bloodstream, thereby reaching all the tissues in your body.

How to Boost Your Enzyme Levels Naturally

There are four ways to naturally increase your enzyme levels:

- Increase your intake of raw, living foods
- Fast
- Chew your food thoroughly
- Avoid chewing gum

The very best way to get enzymes into your body is by consuming at least 75% of your foods raw. For many of you, you'll have to work toward this goal gradually. While all raw foods contain enzymes, the most powerful enzyme-rich foods are those that are sprouted (seeds and legumes). Sprouting increases the enzyme content in these foods tremendously. Besides sprouts, other enzyme-rich foods include:

Papaya, pineapple, mango, kiwifruit and grapes	Raw honey (the enzymes actually come from the bee's saliva)
Extra virgin olive oil	Raw meat and dairy
Avocado	Bee pollen
Coconut oil	Fish sauce[19,20,21] and other fermented fish products[22]

By eating these types of foods, you supply your body with the amino acids and the enzyme co-factors needed to boost your own natural enzyme production. Another way to lower your body's demand for enzymes is to reduce your caloric intake. Did you know the average person spends 80% of his available energy simply digesting food?

By reducing overall consumption, as well as introducing more living foods, you reduce your need for digestive enzymes, which allows your body to put more of its energy into producing metabolic enzymes, which brings us to chewing: Quite apart from the esthetic pleasure of an unhurried meal, there are important physiological reasons to chew your food well.

Chewing stimulates saliva production, and the more time you spend chewing, the longer your saliva enzymes have to work in your mouth, lessening the workload of your stomach and small intestine. This is also the reason for the recommendation to avoid chewing gum. Chewing gum fools your body into believing it is digesting something, so it pumps out digestive enzymes unnecessarily.

Digestive Enzyme Supplementation

If you suffer from occasional bloating, minor abdominal discomfort and/or occasional constipation and suspect your enzyme production is low, you might want to consider a digestive enzyme supplement in addition to eating more of your foods raw.

Keep in mind that digestive enzymes should be taken WITH a meal, whereas systemic enzymes, taken for other health reasons, are taken between meals (see following section). There are hundreds of digestive enzymes on the market. Ideally, look for an enzyme formula with the following characteristics:

- It should contain a mixture of different types of enzymes, to help digest all of the different components of your diet (including lipase, protease and amylase)
- The ingredients should be high-quality, all-natural and free of allergens and additives
- The supplement should be labeled as to the enzymatic strength of each ingredient, not just its weight
- It should be made by a reputable company with rigorous quality control and testing for potency

Use of Systemic Enzymes May Improve Your Health

Besides digestive enzyme supplementation, oral enzymes can be used systemically. This requires taking enzymes on an empty stomach between meals so they can be absorbed through your gut into your bloodstream, where your cells can use them metabolically to clear away debris and accumulated metabolic buildups.

However, getting enzymes from your digestive tract into your bloodstream isn't as easy as it would seem. Enzymes are very susceptible to denaturing and must be helped to survive the highly acidic environment in your stomach. For this reason, they're often given an "enteric coating" to help them survive the journey through your digestive tract.

Systemic oral enzymes have been used to treat problems ranging from sports injuries to arthritis to heart disease and cancer, particularly in European countries. But most of the research has been published in non-English language journals.

This systemic use of enzymes is still in its infancy in the U.S. Keep in mind that in order for enzymes to be used systemically, they must be ingested on an empty stomach. Otherwise, your body will use them for digesting your food, instead of being absorbed into the blood and doing their work there.

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