



The Type of Food that Will Slow Nearly EVERY Inflammatory Disease...

By Dr. Mercola

You've probably heard of enzymes, and you probably already know they are important for your digestion. But you may not be aware of just how necessary enzymes are to every cell in your body—not just for digestion but for ALL your physiological processes.

Enzymes are composed of amino acids and are secreted by your body to help catalyze functions that would normally not occur at physiological temperatures. They literally make magic happen and are absolutely vital to your life. More than 3,000 different enzymes have been identified, and some experts believe there may be another 50,000 we have yet to discover. Each enzyme has a different function—like 3,000 specialized keys cut to fit 3,000 different locks. In this analogy, the locks are *biochemical reactions*.

Enzymes drive biological processes necessary for your body to build raw materials, circulate nutrients, eliminate unwanted chemicals, and the myriad of other biochemical processes that go on without your even thinking about it. For starters, here are just some of the activities in your body requiring enzymes:

- Energy production
- Absorption of oxygen
- Fighting infections and healing wounds
- Reducing inflammation
- Getting nutrients into your cells
- Carrying away toxic wastes
- Breaking down fats in your blood, regulating cholesterol and triglyceride levels
- Dissolving blood clots
- Proper hormone regulation
- Slowing the aging process

And small amounts of enzymes can affect profound changes! Enzymes are the catalysts that cause many essential biochemical reactions to happen—but they are not "used up" IN the reaction. They merely assist—meaning, they accelerate reactions—sometimes to a mind-boggling several million reactions per second!

Enzymes lower the amount of energy needed for a reaction to occur. Without them, some reactions simply would not function in your body.

But enzymes don't work alone.

Enzymes rely on other elements to accomplish their tasks, such as certain vitamins and minerals. These elements are called "coenzymes."

You are probably already familiar with one of these—coenzyme Q10. CoQ10 is found in the mitochondria (power centers) of your cells where it is involved in making ATP, every cell's principal energy source. Another example is magnesium, which participates in over 300 enzyme reactions.

The Concept of "Enzyme Potential"

Dr. Edward Howell spent his entire professional life studying enzymes and can be credited with catalyzing enzyme research.

Whether or not this is true, Howell believed you were born with a limited enzyme-producing capacity, and that your life expectancy depends on how well you preserve your "enzyme potential." His theory was that if you don't get enough enzymes from the food you eat, great strain is placed on your digestive system to "pick up the slack," i.e., produce enough enzymes to accomplish the task.

A deficiency in digestive enzymes then reduces availability of your metabolic enzymes. Howell believed this metabolic enzyme deficit was at the root of most chronic health problems.

Enzyme Basics

There are three basic categories of enzymes:

1. Digestive
2. Metabolic
3. Food based

Digestive enzymes, as their name implies, help you break down food into smaller parts that can be absorbed, transported and utilized by every cell in your body. Digestive enzymes are *extra-cellular*—meaning, they are found outside your cells.

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.

Your pancreas produces most of these digestive and metabolic enzymes.

Fortunately, you get (or *should* be getting) many enzymes from the foods you consume—particularly, raw foods. These directly help with your digestive process.

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.

Your Meal's Journey through Your Digestive System

Once consumed, your meal begins a complicated, multi-phased journey of breakdown and conversion into nutrients your body can use. This process is, of course, called digestion, and enzymes play a key role.

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

1. **Protease:** Digesting protein
2. **Amylase:** Digesting carbohydrates
3. **Lipase:** Digesting fats
4. **Cellulase:** Breaking down fiber
5. **Maltase:** Converting complex sugars from grains into glucose
6. **Lactase:** Digesting milk sugar (lactose) in dairy products
7. **Phytase:** Helps with overall digestion, especially in producing the B vitamins
8. **Sucrase:** Digesting most sugars

Digestion begins in your mouth, starting with saliva. Did you know that you produce about 1.7 liters of saliva each day? Your mouth is where enzymes (primarily amylase) begin to exert their action. Amylase in your saliva begins to break down carbohydrates.

As food passes into your stomach, proteins are worked on by protease. From there, the bolus of food passes into your small intestine, where lipase begins to break down fats, and amylase finishes off the carbohydrates.

Did you know that **90 percent** of your digestion and absorption takes place in your small intestine?

From here, the micronutrients are absorbed into your bloodstream through millions of tiny villi in the wall of your gut. But what happens when this process goes awry?

Disease—or "*dis-ease*."

Aftermath of the Western Diet: Enzyme Deficiency

Insufficient enzyme production is at the root of much "tummy trouble" in our country. Digestive problems cost Americans \$50 billion each year in both direct costs and absence from work.

It is a sad fact that 90 percent of the food Americans buy is processed food. Diets heavy in cooked, processed, and sugary foods, combined with overuse of pharmaceutical drugs such as antibiotics, deplete your body's ability to make enzymes.

Enzymes may be relatively large, but their protein structures are fragile. The amino acids in the molecular chain link together to form certain patterns and shapes, which give enzymes their unique characteristics and functions. When something disrupts the chain's structure, the enzyme becomes "denatured"—it changes shape and loses its ability to perform. Heating your food above 116 degrees F renders most enzymes inactive.

This is one of the reasons it's so important to eat your foods raw. Raw foods are enzyme-rich, and consuming them decreases your body's burden to produce its own enzymes. The more food that you can eat raw, the better. Ideally, you should get 75 percent of your digestive enzymes from your food.

In addition to heat, enzymes are also very sensitive to shifts in pH, which is why different enzymes work in different parts of your digestive tract, based on the pH each enzyme needs in order to function.

Enzyme deficiency results in poor digestion and poor nutrient absorption. This creates a variety of gastrointestinal symptoms, including:

- Constipation
- Bloating
- Cramping
- Flatulence and belching
- Heartburn and acid reflux

Chronic malabsorption can lead to a variety of illnesses. Think about it—if your body doesn't have the basic nutritional building blocks it needs, your health and ability to recover from illness will be compromised.

Besides breaking down food, enzymes (particularly the proteases) can help with gut healing, controlling pathogens, and immune support.

Your immune system begins in your gut—and if you have enzyme and digestive issues, chances are your immune system isn't functioning as well as it should be.

Complicating matters, your capacity for enzyme production also declines with age.

How Aging Affects Your Enzyme Production

Research has shown that your natural enzyme production starts to decline by the time you're about 20.

Studies show that, every ten years, your body's production of enzymes decreases by 13 percent. So by age 40, your enzyme production could be 25 percent lower than it was when you were a child. And by the time you're 70, you could be producing only ONE-THIRD of the enzymes you need.

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. Why does this matter? The high demand for digestive enzymes *depletes your body's production of metabolic enzymes*, which every cell in your body needs in order to function.

The Many Roles of Metabolic Enzymes

Now that you know how important digestive enzymes are for getting nourishment, let's take a look at another type of enzymatic activity—your metabolic enzymes. Metabolic enzymes are intimately involved with running your circulatory, lymphatic, cardiac, neurologic, endocrine, renal, hepatic, and reproductive systems, and maintaining your skin, bones, joints, muscles and other tissues.

Every one of your 10 trillion cells depends on these enzymes and their ability to catalyze energy production. As I said before, each of these enzymes is highly specialized as a function of its particular molecular structure.

Consider these two examples:

- RNA polymerase is an enzyme your body uses to transcribe DNA into RNA, which is used to make proteins.
- Lysosomal enzyme, produced in the lysosome of each cell (also called the "suicide bag"), breaks down macromolecules and other

foreign particles the cell has ingested (such as bacteria) so they can be disposed of. The lysosome is a microscopic garbage disposal!

One of the most important functions of metabolic enzymes happens in your blood. If you think about it, it makes sense. We know that bacteria, fungi, and parasites are comprised of protein, as is the shell encompassing viruses. Enzymes in your blood—primarily proteases (proteolytic enzymes)—serve to break down protein-based foreign bodies, effectively cleansing your blood.

As blood cleansers, these enzymes combat chronic inflammation, which left unchecked can lead to everything from autoimmune diseases, to cardiovascular disease and even cancer. Enzymes reduce inflammation in your body by:

1. Breaking down foreign proteins in the blood that cause inflammation and facilitating their removal via your blood stream and lymphatic system
2. Removing "fibrin," a clotting material that can prolong inflammation
3. Reducing edema in the inflamed regions

It follows, then, that any disease caused by inflammation—which is practically every chronic disease we face today—can be benefited by increased levels of functional enzymes in your blood.

I will discuss oral enzyme supplementation shortly. Although taking an enzyme supplement may be helpful, NO manufactured product can duplicate the positive effects of a nutrient-rich diet.

Boosting Your Enzyme Levels Naturally

There are four ways to naturally increase your enzyme levels:

1. Increase your intake of raw, living foods
2. Eat fewer calories
3. Chew your food thoroughly
4. Avoid chewing gum

The very best way to get enzymes into your body is by consuming at least 75 percent 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, kiwi, and grapes
- Avocado
- Raw honey (the enzymes actually come from the bee's saliva)
- Bee pollen
- Extra virgin olive oil and coconut oil
- Raw meat and dairy

The best way to bump up your metabolic enzymes is to provide your body with the raw materials and energy it needs to make them. 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 percent 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. Chewing also stimulates a reflex that sends a message to your pancreas and other digestive organs, "Gear up—we've got incoming!"

And don't chew gum.

Chewing gum fools your body into believing it is digesting something, so it pumps out digestive enzymes unnecessarily. Why waste those precious resources?

Digestive Enzyme Supplementation

If you suffer from occasional bloating, minor abdominal discomfort, and 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.

Digestive enzymes should be taken WITH a meal. There are hundreds on the market, so how do you choose a good one? You should 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

Besides digestive enzyme supplementation, there is another way to use oral enzymes—for *systemic use*. This requires taking enzymes between meals so they can be absorbed through your gut and into your bloodstream, where your cells can use them metabolically.

Systemic Enzymes—Playing Catch-Up with European Medicine

Getting enzymes from your digestive tract into your bloodstream isn't as easy as it would seem. As I've already discussed, enzymes are very susceptible to denaturing and must be helped to survive the highly acidic environment in your stomach. They are often given an "enteric coating" to help them survive the journey through your digestive tract.

And then, there is the matter of absorption.

For nearly 100 years, medical dogma insisted that enzymes taken orally were too large to pass through the digestive tract wall.

However, there is now a good deal of research that they can indeed pass through your intestine intact and into your bloodstream and lymphatic system, where they can deliver their services to the rest of your body... one of the mysteries of medical science.

Now that we know this is possible, 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 just now taking off in the United States.

It is crucial 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.

Let's take a look at how systemic enzymes can benefit your health by examining their applications for two major health problems we face today: heart disease and cancer.

How Systemic Enzymes Battle Heart Disease

It is now fairly well recognized that heart attacks and strokes are related to inflammation, which is why C-reactive protein (an inflammatory marker) can be predictive of cardiac events.

However, according to an excellent article about systemic enzymes by Michael Sellar, French researchers have proposed that bacteria might be a causative factor in coronary artery disease. Very high levels of bacteria were found in their patients' arterial plaques, possibly explaining elevations in C-reactive protein.

C-reactive protein functions to stop the spread of bacteria in your body.

Since enzymes inhibit platelet aggregation, help your immune system combat pathogens, and break down fibrin (which makes up clots), they may offer significant benefits for vascular diseases like thrombosis, phlebitis, and varicose veins.

Sellar quotes enzyme researcher Rudolph Kunze:

"Although enzymes reduce inflammation and we used to think that was all they did, we now believe that the central target of systemic enzymes is the immune system. It is my belief that heart disease is an immune disease very much, although obviously not totally, related to bacterial pathogens and other invaders."

Systemic Enzymes in the Treatment of Cancer

The use of enzymes to treat cancer has its roots all the way back to 1911 with John Beard's *The Enzyme Treatment of Cancer and Its Scientific Basis*. Beard believed cancer was a result of diminished pancreatic enzymes, impairing your immune response.

A study in 1999 suggests he may have been right on target.

Ten patients with inoperable pancreatic cancer were treated with large doses of oral pancreatic enzymes (along with detoxification and an organic diet), and their survival rates were 3 to 4 times higher than patients receiving conventional treatment. Proteolytic enzymes can be helpful in treating cancer because they help restore balance to your immune system.

Dr. Nick Gonzalez in New York City, NY has also done a lot of work on enzymes in cancer treatment and has written a book on the subject.

Some of the ways proteolytic enzymes can be helpful in the fight against cancer are:

- Boosting cytokines, particularly interferon and tumor necrosis factor, which are very important warriors in destroying cancer cells.
- Decreasing inflammation.
- Dissolving fibrin: Cancer cells hide under a cloak of fibrin to escape detection. Once the cancer cells are "uncloaked," they can be spotted and attacked by your immune system. It is also thought that fibrin makes cancer cells "stick together," which increases the chance for metastases.
- German studies have shown that systemic enzymes increase the potency of macrophages and killer cells 12-fold.

For more about the difference between digestive enzymes and systemic enzymes, click here for a video interview with enzyme expert Nena Dockery.

Hopefully you can now appreciate just how important enzymes are to your overall health, right down to the cellular level. Once you understand this, you may begin to see just how important it is to eat a diet rich in fresh, organic, raw foods. You may even want to try juicing some of your vegetables as a way of getting more nutrients—and enzymes—into your body.

It has been said, "You are what you eat." But really, "You are what you digest" is closer to the truth.