Loomis Institute™

Enzyme Nutrition
Part 1 - What is it?

by Howard F. Loomis Jr., D.C.

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Enzyme nutrition is a method of delivering food past an incompetent digestive system, or it can be used for preventing exhaustion of the digestive system by a diet high in enzyme-deficient food. This is in perfect harmony with the vitalistic philosophy of chiropractic, namely that the body is capable of regulating homeostasis if given adequate amounts of air, water, nutrients, and exercise.

Why is it needed?

Dietary supplements became very popular after World War II and were used to replace vitamins and minerals deficient in the American diet. Later when hypoglycemia was brought to our attention, protein supplements were added to the list. Difficulty has arisen with this practice, however, as the food industry has become better at supplying a balanced diet and adding vitamins and minerals to their products. One popular breakfast cereal now advertises that it can supply 100% of the vitamins and minerals needed in your diet. Fast food chains can give evidence that their food products do supply a balanced diet of nutrients recommended by the government and leading nutritional experts. These charts are usually displayed on the walls of their restaurants. If you don't see one, just ask and they will be glad to furnish one to you.

Gradually, the dietary supplement industry has been moving deeper and deeper into human biochemistry attempting to find chemical compounds it can use to combat disease entities, no longer content to replace substances deficient in the diet but instead to use concentrated chemical compounds for the treatment and prevention of disease. Take a look at the brochures offered by a few supplement companies and you will see my point. I am not complaining about this; it appears to be the normal progression of the industry. This is, however, not the science of food but instead a pharmaceutical adjunct to the healing arts.

The science of food is the study of what food is ingested, how it is digested, absorbed, transported, utilized, and eliminated. In the development of the science of food supplements, an elementary and basic step was missed-not forgotten-but completely missed, and we should go back, pick it up, and incorporate it into our plan of supplementing the diet with essential nutrients.

The step I am referring to is the removal of naturally occurring food enzymes from our diet. It is correctly reported in nutritional textbooks that cooking destroys certain vitamins, and the water used in cooking food removes many of its minerals. It is logical that these should be replaced by supplementing the diet when needed. What is never stated in the nutrition textbooks, however, is that the naturally occurring enzymes in raw foods are also destroyed by heat and other processes used in preparing food.

Not only that but even a diet of raw fruits and vegetables must be suspect today because of the use of sprays and chemicals, used in farming and in the produce case of your local market as well. These also diminish the enzyme content of foods. One might think that is adequate justification for enzyme

replacement, but there is more. While the food industry proudly proclaims that it adds vitamins and minerals to bread, milk, cereal and other foods, they do not proclaim that they systematically destroy the naturally occurring enzymes in foods. It doesn't happen by chance or oversight: removing enzymes from your food is a well-developed science within the food industry.

Why are they removed?

Shelf-life. Food enzymes must be destroyed in order to preserve foods for shipment, storage, and extended shelf-life, until the consumer takes it home. Even then it may be stored in the cupboard for some time. If the enzymes are not destroyed, they will digest the food right in the can or box before it can arrive at your local market. This would amount to a tremendous "spoilage" of food and make it impossible to continue our present society as we know it. We would all be forced to live on farms or at least close to the farmers market. The process of cooking food so it may be canned destroys these enzymes just as it does many vitamins, as well as removes many minerals.

What can be done?

Replacement therapy for vitamins and minerals has been practiced for years. Why not enzyme replacement? If you believe that the enzymes that occur in food are at least as important as the vitamins and minerals found there, then you must find a way to replace them in your diet, supplementing your diet with proteases, amylases, and lipases just as you do vitamins and minerals.

The symptoms of vitamin and mineral deficiencies and excesses are well-known and documented. But, what are the symptoms of a protease deficiency? How about amylase and lipase deficiencies, how are they manifested? When I asked that question in the early 1980's, no one could answer me, and there were no books to turn to for the answers. Dr. Edward Howell, who first brought food enzymes to the attention of a less-than-interested scientific community, told me that he did not know the specific symptom patterns involved in food enzyme deficiencies, but that he felt they were manifested as chronic degenerative disease patterns as opposed to the acute onset patterns seen in vitamin and mineral deficiencies.

I began then to incorporate food enzymes into my practice in the early 1980's and experimented with many different combinations and formulas, and I used my chiropractic education and methodology to begin cataloging various food enzyme deficiency syndromes. I used many examination techniques before settling on what I believe is a definitive procedure.

How is it done?

Its application, far from the unscientific approaches often used for diet supplements, uses the methodology all doctors are trained in, namely:

* Case History, including symptomology.
* Diet analysis and food cravings.
* Laboratory work-up, including blood chemistries, C.B.C.'s with darkfield, and 24-hour urinalysis.
* Traditional physical examination procedures and a unique system of nociceptive reflex examinations by palpation. This procedure employs reflex examinations given after an eight-hour fast, and 45 minutes after a small amount of a specially formulated challenge meal has been ingested. The meal contains government-approved percentages of protein, simple and complex carbohydrate, fat, and fiber. It is a methodology easily incorporated into a chiropractic practice that is rewarding both in clinical results and income.

The intent of these examinations is to identify the stimuli that are exhausting the body's homeostatic mechanisms before degeneration and disease can occur. It is in keeping with the studies on stress conducted by Hans Selye in 1950's. Selye taught that the body acted predictably to stress, any stress, be it physical, chemical or emotional. He stated there was first an alarm reaction sent to the body's compensatory mechanisms for homeostatic maintenance. Then the stage of resistance began until the stimulus (stress) was removed. If it continued, a gradual exhaustion of the compensatory mechanisms began, and eventually led to degeneration, disease, and finally death.

Food enzyme deficiencies are a stress to the body, and in this day and age they are a continual stress to you and your patients. The symptoms of their deficiency are not quickly manifested because your body makes enzymes of its own. Those enzyme systems must be stressed to exhaustion and degeneration, and sometimes even disease, before they are recognized. By then, the patient is being treated for a chronic degenerative disease and the food enzyme deficiency has completely escaped detection.

I formulated my examining procedures with the idea that the single most important factor for determining nutrient and enzyme supplementation is the state of the extracellular fluids and maintenance of homeostasis. After years of practice and lecturing to doctors from all educational backgrounds, it is my opinion that chiropractors are best qualified to identify the early warning signs of the exhaustion of homeostatic mechanisms because of their unique training in physical diagnosis and chiropractic philosophy.

Enzyme Nutrition
Part 2 - Why is it important?

In Part 1 of this series, I discussed the basic concepts behind Enzyme Nutrition, and why it is important to the chiropractic clinician. We discussed that enzymes are found in all living things. In fact, they are the spark of life itself, for life is not possible without them. Yet, they must be removed from the food supply in order to provide extended shelf-life for food products. The real enzyme experts are, and always have been, the biochemists in the canning industry. Volumes have been written since the 1900 about the science of removing enzymes from raw foods. The canning industry could not exist if it couldn't destroy the enzyme content of their products. The University of Wisconsin announced in 1996 that they have found a way to grow tomatoes with a lower enzyme content! They explained this is critical for farmers who need to increase shelf-life of fresh tomatoes. Look for this technology to expand.

In this article, I will review what happens in the body when we eat a diet deficient in food enzymes, and why it is important to every clinician and to all the patients they see.

Each living organism, plant or animal, contains the enzymes in exact ratio to the amount of protein, starch, sugar and lipid they contain. This enzyme content is exact because they are necessary to run virtually all of the biochemical reactions in that organism, plant, or animal. In other words, the enzymes are responsible for bringing the animal to maturity or the plant to ripeness. In fact, all living things have the enzymes needed to digest themselves when the proper conditions are present for that to occur. This includes the human body. Fortunately, the pH and temperature ranges are not right for that to occur while you are living. What is critical to this discussion is what happens when raw (enzyme-containing) food is eaten as opposed to consumption of enzyme-deficient food.

Digestion Begins in the Mouth

Mastication liberates food enzymes, and they are activated when they come in contact with saliva at body temperature and in an acceptable pH range. Human saliva also contains enzymes of its own. Amylase is secreted by the parotid glands, lipase is secreted by the sublingual glands, and protease is secreted from the submandibular glands. The following factors are of vital importance for the activity of enzymes:

- Obviously, the proper substrate (food) must be present since enzymes are quite specific in their action.
- Body heat-enzymes work in specific heat ranges.
- Water (saliva) must be present for hydrolysis (digestion) to occur.
- Enzymes work in specific pH ranges:
  Plant enzymes - 3.0 to 9.0
  Animal enzymes - 7.2 to 9.0

While the digestive process may begin in the mouth, food is seldom present in the mouth long enough for significant digestion to occur. Fortunately, as food is swallowed, none of the conditions necessary for food enzymes activity changes, even in the stomach. Many nutrition and physiology texts do not consider this so-called "predigestion" in man to be significant. But, since the resting pH of the stomach is between 5.0 and 6.0, the food enzymes continue digesting until inactivated in the stomach. Fortunately, it takes between 30 to 60 minutes to secrete enough HCl to reduce the pH of the stomach to 3.0. However, studies indicate that most geriatric patients are unable to do this at all! For this segment of the population, food enzyme supplementation would appear to be mandatory. Only plant-source food enzymes are active in the pH range of the stomach. Animal-source enzymes (pancreatin) cannot work in the stomach since they must have an alkaline environment of at least 7.0 to activate them. This brings us to a critical point in the use of enzymes in clinical practice.

Pancreatin Cannot "Predigest" Food

After food has been acted upon by the stomach secretions and passes through the pyloric valve, the chyme stimulates the production of two hormones by the duodenal mucosa, Secretin and Cholecystikinin. These two hormones signal the pancreas and gallbladder regarding the content of the chyme and how concentrated their respective secretions must be to finish the digestive process. If food has been "predigested", their secretions can be much less concentrated. In other words, the pancreas doesn't have to produce as concentrated a secretion of enzymes. The presence of a pancreatin supplement will have done nothing to "predigest" the food and relieve stress on the pancreas.

How Much Predigestion Can Be Accomplished?

Various studies have reported that significant digestion from the salivary enzymes alone occurs in the stomach during the 60-minute time interval before HCl reduces the pH of the stomach below 3.0. Guyton reports that 35 to 45% of starches can be digested before HCl is secreted (*Textbook of Physiology*, 7th ed., Saunders). Beazell reported in the *American Journal of Physiology* (1945) that 60% of starch, 30% of protein, and 10% of fat of foods could be digested before HCl and pepsin began to work.

Thus, it can be seen that food enzymes can play a significant role in predigesting food, offering a solution to many acute and chronic digestive disorders and a means of delivering nutrients past an incompetent digestive system.

What Happens When Normal Digestion Does Not Occur?

Normal digestion is taken for granted unless the patient complains, but even then the symptoms are vague and non-specific and it is hard to delineate what the problem is. Nevertheless, let's look at what happens when food is not adequately digested, absorbed, transported, utilized, and eliminated properly. It is necessary to divide our studies into two groups, the first of which we will discuss in this article:

- Food particles not digested well enough topass across the gut wall pass down the alimentary canal where theywill putrefy, forming Indican and producing Bowel Toxicity.

- Food particles digested well enough to passthrough the gut wall and into the blood but not reduced to particlessmall enough to be utilized by the body for energy production. Wewill discuss this in Part III of this series. Specifically, we will examine the process of Digestive Leucocytosis and the formation of Circulating Immune Complexes and the resulting Fibromyalgia.

A General Indicator of the Inability to Digest Food

Patients with "unfriendly" bacterial growth in the small intestine excrete large amounts of metabolites of amino acids, such as tryptophan or tyrosine, in the urine. The bacteria feed on inadequately digested protein, especially when refined carbohydrates are consumed at the same meal, and when oils coat the food (poor biliary function) and do not allow penetration of digestive enzymes. The higher the level of indicanuria, the greater the degree of constipation and/or diarrhea and lower bowel gas. When protein is decomposed by bacteria, indole and skatol are formed. These compounds are toxic to the body. Most is excreted in the feces, but the remainder is absorbed into the blood and detoxified by the liver, returned to the blood, and eliminated by the kidneys. This is a considerable stress to the entire system, especially the bowel and liver. Therefore, the amount of excreted indican can be used as an indication of the presence of stasis and inflammation and, in general, the degree of bowel toxicity. This process produces an inflammatory reaction on the bowel wall that has come to be referred to as the "Leaky Gut Syndrome". This condition can affect almost any tissue as evidenced by the following list compiled from medical data bases in 1978.

Symptoms of Indicanuria (Intestinal Toxemia)

SKIN-HAIR-NAILS

-Dermatoses
-Eczema
-Psoriasis
-Malassimilation, weight loss

EYES-EARS-NOSE-SINUSES

-Diseases of middle and internal ear
-Eye strain
-Diseases of nasal accessory sinuses

ENDOCRINE SYSTEM

-Breast pathology
-Eclampsia
-Thyroid goiter

GENITOURINARY

-Foul odor to urine

MUSCULOSKELETAL SYSTEM

-Arthritis
-Low back pain and sciatica
-Fibromyalgia and myofacitis

CARDIOVASCULAR

-Tachycardia
-Arrhythmias
-Migraines

NERVOUS SYSTEM

-Depression and melancholia
-Epilepsy Excessive worry
-Incoordination
-Irritability
-Lack of confidence
-Loss of concentration and memory
-Mental sluggishness and dullness
-Schizophrenia Senility

GASTROINTESTINAL

-Gas and bloating
-Constipation
-Crohn's disease
-Diarrhea
-Food allergies
-Foul stool odor
-Gastritis
-Heartburn
-Inflammatory bowel disease
-lleocecal valve
-Hiatal hernia

MOUTH/THROAT

-Body odor-halitosis

RESPIRATORY SYSTEM

-Asthma

When the functioning of any aspect of the gut mucosal barrier is sufficiently compromised, the integrity of the bowel itself becomes compromised. This results in increased permeability to foreign or gut-derived antigens, allowing them to "leak" through the gut into the lymphatics and into the systemic circulation. Acting as foreign invaders, they can elicit a target organ-specific, kinin-producing, pain-provoking, inflammatory immune response enhanced by immune complex deposition. This can lead to recurrent Fibromyalgia as well as symptoms of infection, often without an infectious agent because immune responses to foreign invaders are identical, be they infectious or not.

Therefore, reducing the permeability of the gut to foreign antigens is a primary preventive and therapeutic tool in the care of such conditions. It is clinically prudent to consider leaky gut syndrome as an integral part of any chronic condition.

Primary Factors involved with the Leaky Gut Syndrome

- Therapy with prostaglandin inhibitors such as NSAIDS or aspirin suppress repair and increase gut permeabilitywith moderate use.
- Long-term steroid use (prednisone and cortisone) can cause stomach and duodenal ulcers and immunesuppression (among many other side effects), contributing significantly to gut hyperpermeability and its complications.
- Antacids decrease the acidity of the stomach, reduce the activity of pepsin, and significantly limit the stomach's ability to adequately digest proteins. This compromise in protein digestion may increase the number of undigested,intact, large protein molecules entering the bowel and, potentially, systemic circulation. By decreasing stomach acidity, antacids can also impair the absorption of minerals such as calcium.
- Antibiotics disrupt the normal balance of bacterial microflora in the gut, as well as the mouth, skin, and vagina. This often leads to serious overgrowth of pathogenic microflora in these areas,

particularly *C. difficile*, yeasts, and fungi, resulting in infection and inflammation. Proliferation and overgrowth of *Candida* and other yeasts in the gastrointestinal tract can result in a complex of symptoms from gas, bloating, and gastrointestinal distress to unexplained chronic fatigue, depression, and various local gut and systemic inflammatory disorders.

DIGESTIVE LEUCOCYTOSIS

When large polypeptide or even disaccharide molecules cross the gut wall into the portal circulation, they are past the digestive capabilities of the body and can no longer be broken down for nourishment. They must then be treated as a foreign invader and attacked accordingly. The number of circulating white blood cells increases to meet the crisis. Donders reported in 1843 that the number of white blood cells in the peripheral blood actually varied and was not constant. Rudolph Virchow, "the father of cellular pathology", made studies of the number of circulating white blood cells in 1897 and considered their fluctuation to be normal because all his subjects demonstrated an elevated count after ingesting food! This phenomenon has been confirmed many times since and has come to be referred to as digestive leucocytosis. Leucocytosis is considered a pathological condition expected to be found in cases of infection, intoxication, and poisoning. Imagine what it might mean to challenge your immune system every time you eat. Imagine a patient with any immune problem-even a "cold"-and the body having to redirect its immune activities to combat inadequately digested food!

Paul Kautchakoff, M.D., expanded Virchow's findings in 1930 by proving that digestive leucocytosis was caused by eating enzyme-deficient food. Kautchakoff found that he could divide his findings into four distinct groups according to the degree of elevation of white cells in the blood:

1. Raw or frozen food still contain their enzymes and produced no increase in the W.B.C. count.
2. Commonly cooked food caused a mild leucocytosis.
3. Pressure cooked or canned food produced a moderate W.B.C. elevation.
4. Man-made foods (which do not contain food enzymes), such as carbonated beverages, alcohol, white sugar, flour, vinegar, etc., were the most offensive, causing a severe leucocytosis. Kautchakoff went so far as to prove that meat would have to be eaten raw (cooking kills its enzymes) to avoid leucocytosis. He also found that cured, salted, canned, cooked meats brought on a violent reaction, equivalent to the leucocytosis seen in poisoning.

The leukocytes are rich in enzymes and apparently, are called upon to finish digestion not completed in the gut. They also carry on similar functions during infection when they digest foreign, protein-based particles. Obviously, they would not be called upon if the body were capable of supplying 100% of the enzymes needed to digest the food ingested.

This pathological condition occurs after ingesting cooked food, because the enzymes found in food (capable of digesting in the stomach) are destroyed at 118 degrees Fahrenheit and no longer available. The body needs those enzymes to perform predigestion of ingested food, and when they are not present, the body must mobilize its immune system to combat the effects of deficiency.

The body has two ways of using enzymes to remove foreign matter from the extracellular fluids: pinocytosis and phagocytosis.

PINOCYTOSIS

The cell membrane has the ability to imbibe small amounts of substances from the extracellular fluid by the process called pinocytosis. This occurs particularly when large quantities of proteins or excessive amounts of salts are present in the surrounding fluid. Protein, for instance, becomes adsorbed to the membrane, which causes the membrane to invaginate and to pinch off inside the cell to form a pinocytic vesicle. Then, the pinocytic vesicle combines with one or more lysosomes which discharge hydrolytic enzymes into the vesicle; these in turn digest the protein and other substances in the vesicle. The end products of digestion then become distributed throughout the cell.

Lysosomes are sacs in the cell membranes that contain hydrolytic enzymes active at an acid pH which serve to digest exogenous material. The real importance of pinocytosis to the body is that this is the only known means by which very large molecules, such as those of protein, can be transported to the interior of cells. Please take careful note of this paragraph because it is of vital importance to clinicians. Notice that the enzymes must be active at an acid pH-only plant-sourced enzymes are active in an acid environment. Pancreatic enzymes or 'pancreatin' is active only in an alkaline environment.

PHAGOCYTOSIS

Phagocytosis occurs by essentially the same mechanism as pinocytosis, but phagocytosis means ingestion of large particulate matter, such as bacteria or cell fragments, that is free in the extracellular fluid. When one of these particles comes in contact with the membrane under appropriate circumstances, the membrane engulfs the particle and moves it to the inside of the cell where it is digested by lysosomes. Thus, the difference between phagocytosis and pinocytosis is primarily a matter of size. The importance of phagocytosis is that it is used by special cells, such as the white blood cells, to rid the body of bacteria and unwanted debris in the tissues.

CIRCULATING IMMUNE COMPLEXES

Having discussed how the body defends itself against foreign invaders (inadequately digested food or otherwise), let us look at circulating immune complexes. They are systemic foreign antigens and are the leading cause of Fibromyalgia. They can retard healing, promote and prolong pain from inflammatory processes, and reduce the competency of the immune system. Only adequate digestive processes and an intact intestinal mucosal barrier protects the body from entry by foreign antigens and their adverse systemic effects.

When digestive remnants putrefy in the gut, the resultant toxicity distresses the mucosal barrier, and a major portal of entry into the body for foreign antigens exists. Bowel Toxicity was discussed Part 2.

An adequate mucosal barrier is maintained by:

- Adequate HCl production, biliary secretion, pancreatic and jejunal digestive enzymes to fully digest food. Incompetent digestion leads to a high urinary indican level.
- Healthy intestinal microflora. An incompetent microflora is suggested by a white color change when testing the urinary sediment.
- Healthy mucus to trap food digestive remnants and further digest them.
- Adequate mucosal, secretary IgA (sIgA) antibodies to neutralize immunoreactive remnants that may reach the intestinal mucosal surface.
- An intact diffusion barrier in the intestine to resist invasion by reactive, large molecules while allowing active uptake of essential nutritive and energetic factors.
- Gut-associated lymphoid tissues of Peyer (Peyer's patches) to trap foreign invaders that manage to elude the primary trapping systems.

The mucosal barrier's integrity can be impaired by any of the following:

- Stress: mechanical, chemical, or emotional
- Chronic dietary deficiencies, especially food enzymes
- Accumulated toxins.

MAINTENANCE OF HOMEOSTASIS

It should be obvious that a good diet in conjunction with adequate digestion and elimination are critical aspects in maintaining health and preventing disease. The presence of plant-sourced enzymes in the diet (either in food or supplemental) and their ability to initiate digestion in the stomach is crucial to the maintenance of homeostasis. An overview of the entire concept looks like this:

1. Salivary and food enzymes initiate the digestiveprocess in the stomach.
2. Adequate HCl is donated from the extracellularfluid to the stomach.
3. Adequate HCO3- is donated to the duodenumfor the activation of pancreatic enzymes.
4. Adequate pancreatic enzymes are produced.
5. Microvillous digestive enzymes are activein the jejunum for disaccharides.
6. Adequate soluble and insoluble fiber is ingested.
7. There is a healthy balanced population ofhost-friendly microflora.
8. The reticuloendothelial system (Kupffer hepaticcells and sinusoidal splenic cells) removes damaged cells and immunecomplexes.
9. Antibodies are produced.
10. T-cells defend against foreign invaders.
11. Phagocytic cells clean up inflammatory debris.

FIBROMYALGIA

Like low back pain, Fibromyalgia was initially believed to be a psychiatric disease. It is now widely accepted that Fibromyalgia is an independent physical illness, but a definite cause has not been established. Since Fibromyalgia occurs with other clinical disorders, these other diseases are often presumed to be the precipitating events. In particular, chronic fatigue syndrome and FM have similar clinical features. However, antibody titers of FM patients to Epstein-Barr or other viruses are not different from control values. Thus, while there is clinical overlap, Fibromyalgia and chronic fatigue appear to be distinct clinical entities.

Patients often report a precipitating stressor, such as a traumatic physical event or trauma from an automobile accident, emotional stress, and/or a severe infectious illness. However, it should be noted that not all patients report a precipitating event. Thus, the search for causes and mechanisms continues.

Despite the symptoms, physical laboratory and radiological studies are often normal because advanced immunology tests are often not performed. Unlike rheumatoid arthritis, this connective tissue disorder is not associated with deformity or inflammation of the joints. Thus, the diagnosis has been clinical rather than objective.

Specific alterations in sympathetic and hypothalamic pituitary adrenal activation have been demonstrated. Thus, the hypothesis of a central defect has been gaining ground.

Fibromyalgia (FM) is characterized by:

Musculoskeletal pain and aching
Morning stiffness and tenderness
Disturbed sleeping patterns
Headaches
Fatigue
Depression
Paresthesia
Bowel and bladder disturbances
Palpable soft tissue swelling
Raynaud's phenomenon
Rhinitis
Bruxism
Bursitis
Sciatica
Refractory allergies
T.M.J. dysfunction

The clinical picture of Fibromyalgia suggests a connection with an incompetent digestive, elimination, and immune system. The possibility of a bowel toxicity component in its etiology in very strong. The systemic pattern of symptoms is reminiscent of the symptoms mentioned in Part II of this series. At least it deserves your careful consideration.