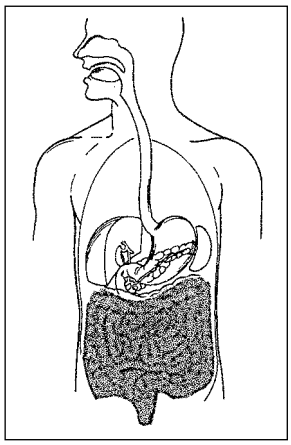
INTRODUCTION TO DIGESTION

THE DIGESTIVE SYSTEM: OUR LIFELINE TO GOOD NUTRITION AND OPTIMAL HEALTH

Everything vital to life (except oxygen) enters the body by the digestive tract, a 25-30-foot (7.5-9-meter) tube with specialized regions — mouth, esophagus, stomach, small intestine, colon, rectum, and anus. Along the way, the salivary glands, gall bladder, liver and pancreas provide essential secretory products for digestion. Fully HALF of the vitally important Six Stages of Nutrition — digestion, absorption, and elimination — take place in the digestive tract. If this system is not in good working order, even the best diet will do us little good.

The digestive system is both a supply line for receiving nutrients and a discharge line for removing wastes. Think of it as the body's very own "food processing plant." Each day roughly two and a half gallons of food, liquids, and digestive secretions flow through it. Efficient "processing" all along the way — from ingestion, digestion, and absorption of foods to excretion of wastes — requires a delicate balance of give and take. This subtle balance can be easily upset.



WHEN BALANCE IS THREATENED, SERIOUS AND PAINFUL PROBLEMS MAY RESULT

A healthy digestive system is capable of performing a wondrous "alchemy": the transformation of inert foodstuffs into building blocks for life and health. Optimum digestive function requires a balance of gastric juices, enzymes, bile salts, beneficial microorganisms, fiber, and other digestive factors. A deficiency of just one digestive factor may undermine the workings of the entire system.

A healthful digestive balance is supported by a well-balanced diet high in fresh fruits and vegetables, legumes, and whole grains, and low in preserved, cured, and salted foods and an excess of red meat. Several factors can impair digestion and nutrient absorption — aging, illness, disease, genetics, poor eating habits, excesses of alcohol, smoking, certain drugs (such as antibiotics), waterborne chemicals, food preservatives, and pesticides. Other factors, such as *Heliobacter pylori,* a type of "bad" bacteria linked to stomach cancer, may tip the scales away from health and towards disease. Factors that overtax the capacities of the digestive tract may contribute to serious problems over time. While discomfort can develop quickly, disorders and diseases of the digestive tract rarely show up suddenly.

We don't usually pay much attention to our digestive system until something goes wrong. Then we tend to look to the drug store for solutions to address painful symptoms — heartburn, flatulence, bloating, diarrhea, constipation, upset stomach — rather than the underlying causes of discomfort. Overuse of such "solutions" — especially antacids and laxatives — may exacerbate problems. Digestive troubles can be more than just the price we pay for overeating, eating on the run, or giving in to the temptation of certain foods: They may signal serious conditions, such as ulcers, diverticulitis (inflamed or abscessed pockets in the intestinal wall), and even cancer.

A properly functioning digestive system is absolutely critical to health. Regardless, digestive health is often neglected. As a result, gastrointestinal problems are rampant. A 1986 survey by the U.S. National Center for Health Statistics reported that gastrointestinal conditions were responsible for 32 out of every 100 days that people of all ages limited their activities.[1] In 1996, stomach cancer, the world's second-most-common cancer, killed 776,000, and colorectal cancer killed 386,000, according to the World Health Organization.

DIGEST *THIS!* — TURNING FOOD INTO USEABLE NUTRIENTS

Diet is what you eat, but *nutrition* is what your cells and tissues actually receive. Your nutritional status is only as good as your body's ability to break down foods into nutrients that cells can assimilate. Digestion, the second of the Six Stages of Nutrition, is the process by which foods are broken down into nutritional "building blocks" small enough to be absorbed through the intestinal wall and into the bloodstream for distribution and utilization for energy and cellular support. Complex foods — lipids, proteins, and carbohydrates — are broken down into simpler substances — fatty acid, amino acid, and simple sugar "building blocks," respectively.

3 WAYS THE DIGESTIVE SYSTEM UNLOCKS THE NUTRITIONAL POWER OF FOODS

The digestive system uses three means to break down foods into useable nutrients:

Physical — The body mechanically breaks down food in the mouth with chewing and in the stomach and intestines with churning.

Chemical — Throughout the digestive tract, different chemicals (hydrochloric acid in the stomach, bicarbonate in the small intestine, bile salts and acids, etc.) and biochemicals (enzymes such as amylase to digest carbohydrate, lipase to digest fat, and protease to digest protein) act on foods to break them down.

Intestinal Flora — Beneficial intestinal bacteria ("good" bacteria) free some nutrients from food. They also produce small amounts of vitamin K and B-vitamins. In addition, they discourage the growth of disease-causing ("bad") bacteria and pathogenic fungi, and improve the balance of microorganisms that normally inhabit the intestines.

If digestion is inefficient, your body cannot extract the full nutritional value from the foods you eat. If even part of the digestive system is not functioning properly, digestion, absorption, and elimination may become compromised.

The Body's Equivalent To Grand Central Station

Picture the gastrointestinal tract as a "railroad track" of sorts. Whereas a railroad track guides trains, which carry people, the gastrointestinal tract guides foods, which carry nutrients. At certain "stations" throughout the gastrointestinal tract-the mouth, stomach, intestines — the "train" will take on new "passengers" — chemicals, enzymes, and beneficial microorganisms. Other "passengers" — nutrients and wastes — either get on or off the train and continue their journeys into or out of the body.

Nutrients leave the "train" through absorption "gates" in the intestines and enter the bloodstream for subsequent distribution throughout the body. Different types of absorption gates exist for different types of nutrients. An amino acid (digested protein), for example, cannot be absorbed through a calcium absorption gate. Also, sometimes a nutrient must have the correct "travel companion," or carrier molecule, before it can pass through an absorption gate. This is the case with vitamin B12, whose carrier requires an acidic stomach environment to bind before it can be properly absorbed in the intestines. What's more, carrier molecules are sometimes necessary to escort toxins out of the digestive tract.

All Aboard! — A Quick Trip through the Digestive Tract

Here's what happens to food as it travels through the digestive system:

The Mouth

Digestion starts in the mouth, where chewing breaks large pieces of food into smaller ones and mixes them with saliva, which contains enzymes that begin to break down carbohydrates.

The Stomach

In the stomach, food is broken down into smaller and smaller particles by mechanical, chemical, and enzymatic means. The stomach secretes hydrochloric acid and protein-digesting enzymes (acid-stable proteases). The hydrochloric acid "opens up" protein molecules so that protein — digesting enzymes can work on them. It also transforms inactive pepsinogen into active, protein-digesting pepsin. Working together, acids and enzymes convert food into a semi-fluid paste of partially digested nutrients called chyme.

The Small Intestine

Next the chyme moves into the small intestine, where digestion is completed and absorption begins. Here the environment of the digestive tract undergoes a dramatic change: Whereas the stomach is strongly acidic, the small intestine secretes bicarbonate and has a neutral to slightly alkaline pH. As different enzymes are triggered by different pH levels, different enzymes are active at different sites throughout the digestive tract. The pancreas and intestinal walls secrete enzymes to digest carbohydrates, proteins, and fats. Moreover, 90-95% of all nutrient absorption occurs in the small intestine.

The Colon

Food then moves to the colon (large intestine), where water is removed and wastes (both food wastes and metabolic wastes from cells) are concentrated, stored, and excreted. Because most of the food has already been digested and absorbed in the small intestine, the only nutrients left are small amounts of carbohydrates, non-digestible protein residues, and fiber. The dense population of "good" bacteria resident in the colon subsists on these food residues and helps keep the digestive tract healthy by inhibiting the growth of "bad" bacteria.

The Importance of Elimination: Ridding the Body of Wastes and Toxins

Elimination deals with the removal of everything that was not absorbed from the digestive tract, as well as wastes produced by the body. Cells produce waste products during metabolism. *All* of the waste products of metabolism are toxic to the body and must be eliminated. Improper elimination poses a serious health risk. As waste accumulates in the intestines, toxins begin to build up and can be reabsorbed into the bloodstream.

Trouble Along the Way: Common Problems with Digestion

Problem #1. Too Little Hydrochloric Acid

Hypochlorhydria — too little hydrochloric acid in the stomach — is a common digestive disorder. Around age 30, the stomach begins to secrete less hydrochloric acid. This decline continues over the years. Overeating, excessive alcohol, or the habitual use of antacids may also dilute the concentration of stomach acid, reducing the total amount of hydrochloric acid available for digestion. Without sufficient hydrochloric acid, most foods cannot be broken down enough to release certain nutrients for absorption. Or nutrients whose carriers require an acid environment in the stomach may not be absorbed efficiently later on in the intestines. The result may be wasted nutrients, intestinal discomfort, or medical problems. Therefore, even if the diet is nutrient-rich, incomplete digestion can contribute to a nutrient deficiency.

Many people believe that indigestion results from excess stomach acid, an assumption that is understandable given the "burning" sensation often associated with stomach distress. Acid *insufficiency,* however, is a much more common cause of indigestion. Food that is only partially digested is hindered in its movement through the digestive tract.

Problem #2. Not Enough Fiber

A high-fiber diet helps keep intestinal function smooth and regular and supports optimal health. Dietary fiber does more than just contribute to the feeling of "fullness." It increases the bulk of the intestinal contents, speeding their transit through the intestines and increasing the frequency of elimination. It also supports the metabolic activities of "good" bacteria and binds bile acids and cholesterol. Populations consuming high-fiber diets have a low incidence of intestinal disorders such as diverticulitis, polyps, colitis, hemorrhoids, and cancer. However, despite fiber's many proven benefits, most people don't get anywhere near the 20-35 gm of dietary fiber recommended by the National Cancer Institute. The average person only consumes 12 gm of fiber per day.

Problem #3: Too Little Lactase

Lactose is a sugar found in milk and other dairy products. The digestive enzyme that breaks it into components small enough to absorb and utilize is called *lactase.* Insufficient lactase may result in lactose malabsorption, or intolerance, characterized by abdominal pain, bloating, flatulence, and diarrhea. The severity of the symptoms varies depending on the amount of lactose ingested and the degree of the enzyme deficiency. Lactase added to foods may reduce discomfort associated with lactose malabsorption.

Problem #4: Overburdened Enzyme Supplies

At times we overindulge in the wrong kinds of foods. Or we eat too fast. Too much food may overburden the capacity of a limited supply of digestive enzymes to break down complex foods into their simpler components.

Exclusively from GNLD: Digestive Supplements You Can Stomach

Safe and gentle, GNLD's digestive supplements are formulated to support the natural activities of the digestive system. Based in nature and backed by Science, they address the underlying causes of digestive troubles, not just the symptoms. Along with appropriate food choices, they contribute to the stability of the gastrointestinal environment and promote optimal digestive function.

GNLD has formulated a series of leading-edge products to address the most common "problem areas" within the digestive tract. Employing the most recent scientific findings and selecting only the finest natural ingredients, the GNLD Scientific Advisory Board has created a product line of digestive aids to provide complete and balanced support for the entire system. To support the natural balance of the digestive tract, our products provide vital acids, enzymes, "good" bacteria, fiber, and other healthful factors. Plant-sourced and naturally derived ingredients work with the body to enhance digestion so that you are able to unlock the complete nutritional power of the foods you eat.

- **GNLD products support the Six Stages of Nutrition.** There's more to complete nutrition than just eating a well-balanced diet. Your body must digest foods to release the nutrients they contain. It must absorb these nutrients through the intestines and into the circulation, which delivers them to every cell in your body. Cells must then assimilate nutrients and eliminate wastes. And lastly, the body must rid itself of waste products from metabolism and undigested food. The efficient completion of all of these tasks, which make up the Six Stages of Nutrition, guides GNLD's approach to creating supplements capable of supporting optimal health.
- **Complete formulas.** Reflecting the latest breakthroughs in nutritional science, GNLD formulas are complete. Beta-Gest™, for instance, supports efficient digestion in the stomach with betaine hydrochloride, a source of hydrochloric acid found in beets, and enzymes that digest protein and lactose. Our intestine-targeted Enzyme Digestive Aid features enzymes that digest proteins, carbohydrates, and fats. Our broad-spectrum Acidophilus Plus includes five types of "good" bacteria known to benefit human health.
- **Targeted delivery of active ingredients.** Using leading-edge nutritional technology such as enteric coatings and pH-triggered enzymes, each product is carefully formulated to guarantee that digestive factors arrive intact where they're needed most. Acidophilus Plus, for instance, features GNLD's exclusive "Gel-Gard" Enteric Protection System to assure the maximum numbers of live "good" bacteria survive the stomach acid and reach their site of action in the intestines. Different enzymes are activated by varying pH levels in different areas of the digestive tract. GNLD's enzymes are specifically chosen for their high levels of activity at the appropriate points in the digestive process.
- **Whole-food sources are a "GNLD Difference."** GNLD's products are formulated using whole-food sources. Our fiber supplements, for instance, offer a broad-spectrum mixture of both soluble and insoluble fiber from a variety of whole-food sources which supply complete fiber just as nature intended. Both Beta-Gest and Enzyme feature plant-sourced enzymes. And Acidophilus Plus contains beneficial microorganisms isolated from cultured dairy foods.

For supplements that help you get the best nutritional value from the foods you eat, GNLD is *simply the best!*

References

[1] The Surgeon General's Report on Nutrition and Health, 1988. U.S. Department of Health and Human Services, Public Health Service Publication No. 88-50210, Washington, D.C.