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## Digestive Health

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## Enzymes and Probiotics are Keys to Healthy Digestion

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The gastrointestinal system is a complex network of organs and glands that extract nutrients and water from food we eat so the body can use it. The food we consume is processed by the gastrointestinal system in six phases:

- I. Mental Preparation: prepares the stomach for the meal that will be eaten.
- II. Ingestion: taking food into the body (eating).
- III. Peristalsis: the movement of food through the gastrointestinal (GI) tract.
- IV. Digestion: the breakdown of food by both mechanical and chemical processes.
- V. Absorption: the passage of digested food from the digestive tract into the vascular and lymphatic systems for distribution to the cells.
- VI. Elimination: the elimination of indigestible substances and waste products from the body.

Digestion itself is divided into two categories: mechanical and chemical. Mechanical digestion is physical movement that aids chemical digestion. After initial breakdown by chewing, food is churned by the smooth muscles of the stomach and the small intestine, mixing it with enzymes that start the chemical reactions.

Chemical digestion is a series of complex chemical reactions that break down large carbohydrate, lipid, and protein molecules into molecules small enough to enter the blood vessels. Chemical digestion occurs through the action of several different enzymes, such as amylases, proteases, and lipases.

For optimal digestion to occur, all these processes must work together in a delicate, synchronized balance. If any part of this complex system under-performs or over-performs, physical problems can result.

### Q. How important are enzymes to digestion?

A. Without enzymes, digestion could not take place and the food we eat could not be absorbed and utilized by our bodies. Enzymes are complex proteins produced by living cells and they start chemical reactions in the body.<sup>1</sup>

Enzymes are present in the digestive juices. They act upon food, breaking it down into simpler components the body can use for en-

ergy.<sup>2</sup>

### Q. What happens if digestive enzymes don't work adequately?

A. Inadequate digestion is thought to be a significant cause of food allergies.<sup>3</sup> When not digested completely, food can initiate allergic reactions in the body, causing inflammation and immune sensitivity.<sup>3</sup> This can lead to chronic inflammatory conditions and certain types of arthritis.

### Q. What enzymes are involved in the digestion process?

A. Many enzymes are part of the digestion process. The three main enzymes involved in digestion are amylase, protease, and lipase. Other enzymes, such as sucrase, lactase, and maltase, have a significant sec-



ondary function in digestion.

Amylase breaks down carbohydrates. Saliva contains amylase, which initiates the digestion of dietary starches. Pancreatic secretions also contain amylase. Amylase breaks down starch into several disaccharides (simpler molecules).<sup>4</sup>

Disaccharides, which include lactose, maltose, and sucrose, are further broken down into simple sugars by the enzymes lactase, maltase, and sucrase respectively. These simple sugars can then be absorbed through the small intestine to help energy production.<sup>4</sup>

Proteases break down protein. Protein digestion begins in the stomach with the action of the protease, pepsin. The stomach's acidic environment activates this enzyme. Pepsin is deactivated in the alkaline environment of the intestine.<sup>4</sup> However, certain plant based proteases remain active even in more alkaline environments.

Proteins are further broken down by pancreatic enzymes in the alkaline environment of the intestine. Most proteins are ultimately broken down into amino acids, the building blocks of life.<sup>4</sup>

Lipases break down fat. Fat digestion accelerates in the second part of the small intestine with the action of the pancreatic lipases. These enzymes break down fat into essential fatty acids. The lipase enzymes, along with bile salts, are responsible for the absorption of the fat-soluble vitamins: A, D, E, and K.<sup>4</sup>

**Q. What is the difference between plant enzymes and animal enzymes?**

A. Animal enzymes, particularly porcine-derived enzymes, closely resemble human digestive enzymes. For this reason, many experts believe animal enzymes are effective for specific applications.

In general, animal enzymes are more sensitive to pH extremes. To compensate for this pH sensitivity, many of the animal enzyme formulas sold as dietary supplements contain

bicarbonates to protect the enzymes from stomach acid.

Plant enzymes are derived from fungal or botanical sources. These enzymes are able to survive a broader range of pH differences and provide a wider range of activity throughout the gastrointestinal tract. Also, plant enzymes may be preferred by people who wish to avoid animal-derived products.

**Q. What other dietary supplements or enzymes could support digestive health?**

A. There are many dietary supplements effective at supporting digestive health. Probiotic supplements, in particular, offer a myriad of health benefits.

**Q. What are probiotics?**

A. Probiotics are beneficial nontoxic live bacteria that are necessary



for life and do not cause disease (non-pathogenic).<sup>5</sup> The probiotic bacteria most commonly studied include members of the Lactobacillus and Bifidobacterium group. Because of the Lactobacillus and Bifidobacterium's ability to break down

lactose, these probiotic bacteria are also known as lactic acid bacteria. Both of these probiotic bacteria are well-studied and are available in foods and dietary supplements.<sup>5</sup>

**Q. Why are probiotic bacteria important for digestive health?**

A. Colonies of bacteria in the intestine are called "microflora". While a normal microflora is associated with good health, changes in intestinal health are associated with weakened immune function. An imbalance in the natural microflora is frequently associated with various disease states such as yeast infections and colon cancer.<sup>6</sup>

Oral ingestion of probiotic bacteria helps support and modify the composition and metabolic activities of the large intestine microflora.<sup>9</sup> Microflora

**HEALTH FACT:**

**Plant enzymes are able to survive a broader range of pH differences and provide a wider range of activity throughout the gastrointestinal tract.**

of the large intestine assist digestion through fermentation (lowering the pH of the intestine, making it more acidic and inhospitable to invading species); protect against disease causing bacteria; and stimulate the development of certain immune system components.<sup>6</sup> Lactic acid bacteria have a central role in the gut flora enabling them to influence the composition of the flora for health benefits.<sup>10</sup>

Probiotic bacteria also have been demonstrated to have anti-cancer properties. In a study, colon cancer patients given L. acidophilus fermented milk showed significantly increased numbers of intestinal Lactobacilli and decreased risk factors associated with colon cancer.<sup>8</sup>

Lactose is an important sugar that is converted to lactic acid by lactic acid bacteria.<sup>11</sup> Lactose intolerance results from an inability to digest lactose, due to the failure of small intestine mucosal cells to produce lactase, an enzyme needed to digest lactose.<sup>12</sup> This often results because of genetics, gastrointestinal disease, or because of the decline in the amount of intestinal lactase levels associated with aging.<sup>13</sup> Lactase deficient people accumulate non-absorbed lactose in the gastrointestinal tract, which draws water and electrolytes into the gut and accelerates transit time, leading to bloating, cramping, diarrhea, and malabsorption of nutrients.<sup>14</sup>

Lactic acid bacteria have been shown to support the breakdown of lactose, specifically by enhancing the activity of lactase (beta galactosidase), which improves lactose digestion and tolerance.<sup>15,16</sup>



**Q. How often should probiotics be taken to ensure optimal support of the digestion system?**

A. Although probiotic bacteria may survive passage through the stomach, they do not permanently colonize in the body and need to be replenished. Therefore, they need to be ingested regularly for their health-promoting effects to persist.

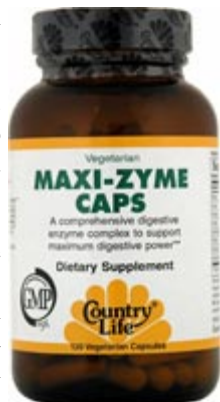
**Conclusion**

Everything our body has ever been or ever will be is dependent upon nutrition. Every building block, every bone cell, even the sheen of our hair, is the result of the food we eat. But what good does it do to select high quality food if its nutrients are not fully absorbed?

Enzymes that assure greater levels of digestion and absorption of your food, and probiotic bacteria that keep problems in check, can make a huge difference in your health. Try a broad spectrum, plant-based, quality enzyme product with each meal for one week. You will feel an immediate difference. Couple the enzyme product with a quality probiotic product that contains at least four different types of bacteria from the Lactobacillus and Bifidobacteria with 3 to 4 billion live bacteria per dose.

How do you know the bacteria are still alive? Look at the bottle. If there is no date stamped, put it down. If it says the company guarantees there was a certain number alive at the time of manufacture, put it down. This means the company is not willing to claim the bacteria are alive when it reaches you. If the product must be constantly refrigerated, put it down.

Find a probiotic that says the bacteria are guaranteed to be alive in the numbers stated on the label until the date printed on the bottle. A product that says it doesn't need refrigeration, or only needs to be refrigerated upon opening, means that company has gone to extra time and expense to make sure you reap the benefits you deserve. Again, try these two kinds of supplements for even a week. As good as the short-term



results are, the long term results are even better.

**HEALTH FACT:**

**Probiotic bacteria need to be ingested regularly for their health-promoting effects to persist.**

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