



Physiology of the Digestive System from Ingestion to Elimination

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DESCRIPTION

The digestive system is a complex and vital part of the human body, responsible for breaking down food, absorbing nutrients, and eliminating waste. This physiological process involves several organs and complex mechanisms working together. From the moment food enters our mouths to its elimination as waste, a series of coordinated events occur. The process of digestion begins in the mouth, where food is mechanically broken down by chewing and mixed with saliva containing digestive enzymes like amylase. This mixture forms a bolus, which is then swallowed and travels down the esophagus to reach the stomach. In the stomach, muscular contractions and the secretion of gastric juices, including hydrochloric acid and pepsin, continue the breakdown of food into a semi-liquid mass called chyme.

As the chyme moves into the small intestine, it encounters the duodenum, where bile from the liver and enzymes from the pancreas are added. Bile emulsifies fats, while pancreatic enzymes, including amylase, protease, and lipase, further break down carbohydrates, proteins, and fats, respectively. The small intestine is lined with finger-like projections called villi, which increase the surface area available for absorption. Nutrients such as glucose, amino acids, and fatty acids are absorbed through the intestinal walls and transported to the bloodstream for distribution to the body's cells.

While digestion and absorption are vital processes, elimination ensures the removal of waste from the body. The large intestine absorbs water, electrolytes, and vitamins produced by beneficial bacteria residing in the colon. This absorption process helps in the formation of feces and the maintenance of water balance in

the body, allowing for the formation of solid stools. The large intestine also houses for billions of beneficial bacteria known as gut microbiota, which aid in the fermentation of indigestible carbohydrates and the production of certain vitamins.

The intricate processes of digestion and elimination are regulated by various mechanisms. The nervous system plays a crucial role, with the parasympathetic division stimulating digestion, while the sympathetic division inhibits it. Hormones also contribute to digestive system regulation. For instance, the hormone gastrin stimulates the secretion of gastric juices, while secretin and Cholecystokinin (CCK) regulate pancreatic enzyme release and bile secretion.

Additionally, the digestive system receives signals from the brain, such as the sight and smell of food, which trigger salivation and gastric juice secretion through the cephalic phase. The presence of food in the stomach stimulates the gastric phase, and the entry of chyme into the small intestine triggers the intestinal phase. These phases involve feedback loops and hormonal signaling to coordinate the release of digestive juices and facilitate optimal digestion.

The physiology of the digestive system contains various organs, enzymes, and physiological processes. From the moment we ingest food to its elimination as waste, the intricate mechanisms of digestion and absorption ensure the breakdown of nutrients and the extraction of essential substances for the body's sustenance. Understanding the physiology of the digestive system provides insights into the complexities of our bodies and emphasizes the importance of maintaining a healthy diet and lifestyle for overall well-being.

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