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## Digestive System

Learn more about how we get energy from food.

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**DIGESTIVE SYSTEM** Once food is swallowed, it passes through the esophagus into the stomach, the pink organ shown here above the yellow pancreas. A large, muscular chamber, the stomach produces digestive juices like pepsin, lipase, and hydrochloric acid, which digest and dissolve stomach contents.

ILLUSTRATION BY PURESTOCK

The digestive system is the series of tubelike organs that convert our meals into body fuel. There are about 30 feet (9 meters) of these convoluted pipeworks, starting with the mouth and ending with the anus. Along the way, food is broken down, sorted, and reprocessed before being circulated around the body to nourish and replace cells and supply energy to our muscles.

## CHANGING FOOD TO FUEL

Food on the plate must be converted into a mashed-up, gooey liquid for the digestive system to be able to split it up into its constituent parts: proteins, carbohydrates, fats, vitamins, and minerals. Our teeth start the process by chewing and grinding up each mouthful, while the tongue works it into a ball-shaped bolus for swallowing.

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Moistening saliva fed into the mouth from nearby glands starts the process of chemical digestion using specialized proteins called enzymes.

Secreted at various points along the digestive tract, enzymes break down large molecules of food into smaller molecules that the body is able to absorb.

Once we swallow, digestion becomes involuntary. Food passes down the throat to the esophagus, the first of a succession of hollow organs that transport their contents through muscular contractions known as peristalsis.

The esophagus empties into the stomach, a large, muscular chamber that mixes food up with digestive juices including the enzyme pepsin, which targets proteins, and lipase, which works on fats. Hydrochloric acid likewise helps to dissolve the stomach contents while killing potentially harmful bacteria. The resulting semifluid paste—chyme—is sealed in the stomach by two ringlike sphincter muscles for several hours and then released in short bursts into the duodenum.

The first of three sections of the small intestine, the duodenum, produces large quantities of mucus to protect the intestinal lining from acid in the chyme.

Measuring about 20 feet (6 meters) in length, the small intestine is where the major digestion and absorption of nutrients take place. These nutrients are taken into the bloodstream, via millions of tiny, fingerlike projections called villi, and transported to the liver.

What's left in the digestive tract passes into the large intestine, where it's eaten by billions of harmless bacteria and mixed with dead cells to form solid feces. Water is reabsorbed into the body while the feces are moved into the rectum to await expulsion.

## OTHER KEY PLAYERS

Other organs that play a key role in digestion include the liver, gallbladder, and pancreas. The pancreas is a gland organ located behind

the stomach that manufactures a cocktail of enzymes that are pumped into the duodenum. A duct also connects the duodenum to the gallbladder. This pear-shaped sac squeezes out green-brown bile, a waste product collected from the liver that contains acids for dissolving fatty matter.

The liver itself is the body's main chemical factory, performing hundreds of different functions. It processes nutrients absorbed into the blood by the small intestine, creating energy-giving glycogen from sugary carbohydrates and converting dietary proteins into new proteins needed for our blood. These are then stored or released as needed, as are essential vitamins and minerals. The liver also breaks down unwanted chemicals, such as any alcohol consumed, which is detoxified and passed from the body as waste.

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