

## Digestive system

**Digestive system** is the group of organs that break down food into smaller particles, or molecules, for use in the human body. This breakdown makes it possible for the smaller digested particles to pass through the intestinal wall into the bloodstream. The particles are then distributed to nourish all parts of the body.

The digestive system consists primarily of a tube that extends from the mouth, through the stomach and intestines, and into the rectum and anus. This tube is called the *gastrointestinal tract* or *alimentary canal*. As food moves through this canal, it is ground and mixed with various digestive juices. Most of these juices contain *digestive enzymes*, chemicals that speed up reactions involved in the breakdown of food. The stomach and the small intestines, which are parts of the alimentary canal, each produce a digestive juice. Other digestive juices empty into the alimentary canal from the salivary glands, gallbladder, and pancreas. These organs are also part of the digestive system.

The fats, proteins, and *carbohydrates* (starches and sugars) in foods are made up of very complex molecules and must be *digested* (broken down). When digestion is completed, starches and complex sugars are broken down into simple sugars, fats are digested to fatty acids and glycerol, and proteins are digested to amino acids and peptides. Simple sugars, fatty acids and glycerol, and amino acids and peptides are the digested foods that can be absorbed into the bloodstream. Such foods as vitamins, minerals, and water do not need digestion.

**From mouth to stomach.** Digestion begins in the mouth. Chewing is important to good digestion for two reasons. When chewed food is ground into fine particles, the digestive juices can react more easily. As the food is chewed, it is moistened and mixed with saliva, which contains the enzyme *amylase*. Amylase changes some of the starches in the food to sugar.

After the food is swallowed, it passes through the esophagus into the stomach. In the stomach, it is thoroughly mixed with a digestive juice by a vigorous churning motion. This motion is caused by contractions of strong muscles in the stomach walls.

The digestive juice in the stomach is called *gastric juice*. It contains, in most people, hydrochloric acid and the enzyme *pepsin*. This juice begins the digestion of protein foods such as meat, eggs, and milk. Starches, sugars, and fats are not digested by the gastric juice. After a meal, some food remains in the stomach for two to five hours. But liquids and small particles begin to empty almost immediately. Food that has been churned and partly digested is called *chyme*. Chyme passes from the stomach into the small intestine as a thick liquid.

**In the small intestine,** the digestive process is completed on the partly digested food by pancreatic juice, intestinal juice, and bile. The pancreatic juice is produced by the pancreas and pours into the small intestine through a tube, or duct. The pancreatic juice contains the enzymes *trypsin*, *amylase*, and *lipase*. Trypsin breaks down the partly digested proteins,



amylase changes starch into simple sugars, and lipase splits fats into fatty acids and glycerol. Bile is produced in the liver, is stored in the gallbladder, and flows into the small intestine through the bile duct. Bile contains chemicals that help break down and absorb fats.

When the food is completely digested, it is absorbed by tiny blood and lymph vessels in the walls of the small intestine. It is then carried into the circulation for nourishment of the body. Food particles are small enough to pass through the walls of the intestine and blood vessels only when they are completely digested.

Almost no digestion occurs in the large intestine. The large intestine stores waste food products and absorbs water and small amounts of vitamins and minerals. The waste materials that accumulate in the large intestine are roughage that cannot be digested in the body. Bacterial action, also necessary for producing many vitamins, produces the final waste product, the *feces*, which are eliminated from the body.

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