

Big Picture

Everything that you eat is broken down by the digestive system. The process of digestion does two things: it gathers nutrients from the food you eat, and it produces waste. Foods need to be broken down mechanically and chemically into very small molecules. These nutrient molecules are absorbed through the wall of the small intestine and transferred around the body to provide a source of energy.

Key Terms

Digestive System: The organ system that breaks down food, absorbs nutrients, and eliminates any remaining waste.

Mechanical Digestion: The physical breakdown of chunks of food into smaller pieces. Takes place mostly in the mouth and stomach.

Chemical Digestion: The chemical breakdown of food into nutrient molecules. Occurs mainly in the small intestine.

Absorption: The process in which substances pass into the bloodstream.

Gastrointestinal (GI) Tract: A long tube that connects the mouth with the anus. It includes the esophagus, stomach, large and small intestines.

Esophagus: Long tube that pushes food from the pharynx to the stomach by peristalsis.

Stomach: Sac-like organ in which food is further digested.

Small Intestine: Most absorption of nutrients takes place here. The small intestine consists of three parts: the duodenum, jejunum, and ileum. It also contains villi, which play a key role in absorbing nutrients.

Large Intestine: Tube that connects the small intestine with the anus. The large intestine consists of three parts: the cecum, colon, and rectum.

Liver: The liver processes and regulates the substances entering the blood stream from the food that is ingested. The liver also produces bile.

Gallbladder: Small sac under the right lobe of the liver. Stores bile and secretes it into small intestine.

Pancreas: Helps with the digestion of carbohydrates, proteins, and fats.

Mastication: The mechanical process of chewing.

Amylase: An enzyme released by the salivary glands to help break complex carbohydrates into smaller chains.

Peristalsis: An involuntary muscle contraction that moves and contracts digestive organs in wave-like motions.

Bile: Aids the digestion of lipids in the small intestine.

Villi: Increase the surface area of the intestinal wall. Increased surface area allows for more area where the nutrients can be absorbed.

Functions

The **digestive system** has three main functions:

- Digestion: breaking down food into components the body can absorb; can be **mechanical** or **chemical**
- **Absorption** of the substances into the bloodstream, where the substances can then move throughout the body
- Elimination of waste

Path of Digestion

The digestive system is made up of two groups of organs: the **gastrointestinal (GI) tract** and the accessory organs.

Most of the organs of the digestive system make up the GI tract. The GI tract consists of the **esophagus**, **stomach**, **small intestine**, and **large intestine**. Food travels through the GI tract.

The other organs in the digestive system – **liver**, **gall bladder**, and **pancreas** – are called accessory organs because food does not pass through them.

Mouth

The digestive system starts from the mouth. When food enters the mouth, **matriculation**, a type of mechanical digestion, occurs. From your mouth, **amylase** and other digestive enzymes begin the chemical digestion of carbohydrates.



If you smell good food and your mouth starts to water, you're actually just getting ready for digestion! Your saliva contains amylase, which will help to start breaking down food.

DIGESTIVE SYSTEM CONT.

Path of Digestion

Esophagus

From the mouth, food then moves down the esophagus via **peristalsis**. The esophagus doesn't digest or break down food; it is merely a pathway to the stomach. This is why it's important to properly chew food in the mouth before it enters the esophagus.

When the esophagus enters the stomach, it goes through a structure called the sphincter. The sphincter opens to allow food through but closes and prevents acidic food from the stomach to enter the esophagus.

While the stomach has a mucous lining to buffer the acid, the esophagus has no such lining, so any acid coming in would result in tissue damage. This is why vomiting can be dangerous.

The Stomach

The stomach functions to break down proteins, and it does this both mechanically and chemically.

The churning of the stomach muscles mechanically breakdown the food. At the same time, the food is mixed in with digestive fluids that contain hydrochloric acid and digestive enzymes such as pepsin.

The acid kills bacteria and creates the acidic environment that is needed by the enzymes to work.

The Small Intestine

Most chemical digestion and almost all absorption occur in the small intestine. In the first part of the small intestine, called the duodenum, most of the chemical digestion occurs as many enzymes are active. Also released into the duodenum is **bile**, which is made in the liver. Bile neutralizes the acidic food coming from the stomach so that the enzymes in the duodenum can work. Bile also breaks up large chunks of lipids so that enzymes can easily break them down.

The second part of the small intestine, the jejunum, is covered in microscopic projections called **villi**. The villi increase the surface area for absorption. The jejunum is responsible for most of the absorption of nutrients. A few leftover nutrients are then absorbed in the last part of the small intestine, the ileum.



Figure: A magnified view of villi.

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The Large Intestine

The large intestine connects the small intestine to the anus. Like the small intestine, the large intestine is divided into three parts. Waste from the small intestine passes through the first part, the cecum, and into the colon, the second part. Since the waste is in its liquid state, water is absorbed through the colon. The remaining solid waste is called feces. The feces accumulate in the third part, the rectum. There the feces compact and are eventually released from the rectum by a sphincter.

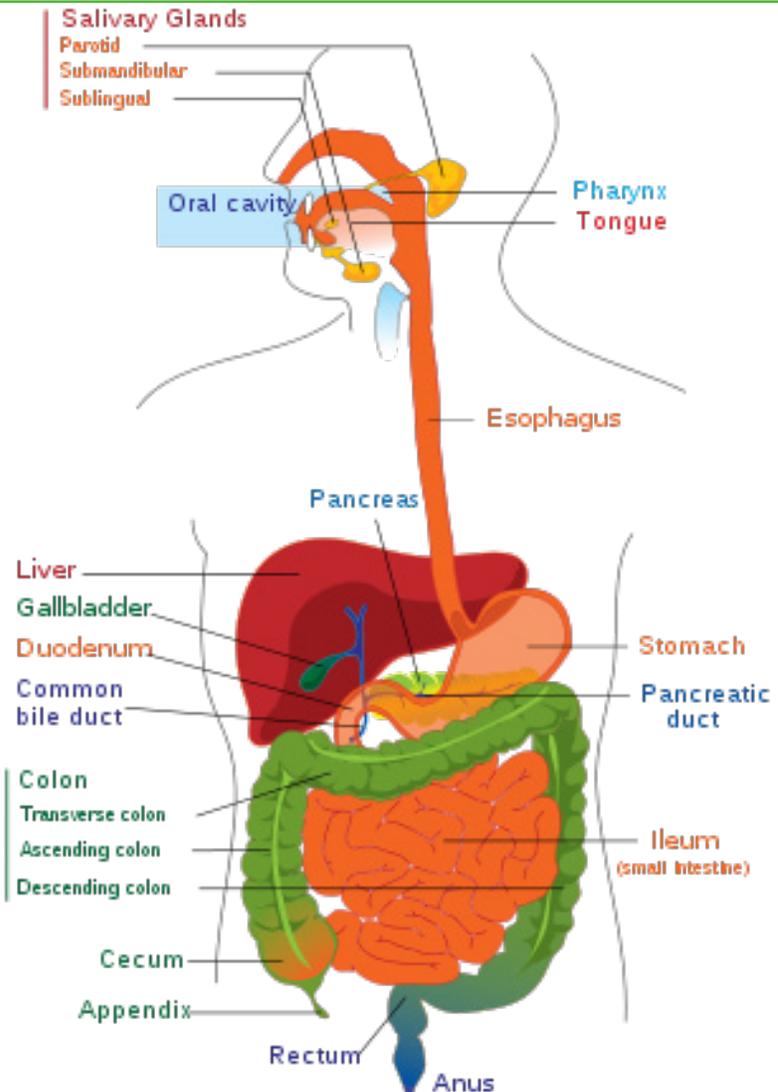


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