Digestive and Endocrine Systems

SECTION 1 The Digestive System

Biology/Life Sciences 9.a Students know how the complementary activity of major body systems provides cells with oxygen and nutrients and removes toxic waste products such as carbon dioxide. **Also covers: Biology/Life Sciences** 9.f, 9.g, 9.i

Before You Read

Have you ever had food "go down the wrong pipe"? On the lines below, describe how your body responded. Explain what purpose you think your body's response serves. Then read the section to learn about reflexes in the digestive process.

The digestive system breaks down food so nutrients can be absorbed by the body.

What You'll Learn

- the structures of the digestive system and their functions
- the process of chemical digestion

Read to Learn

Mark the Text

Identify Digestive Structures Highlight each structure involved in digestion as you read about it. Underline the functions of each structure.

Functions of the Digestive System

The digestive system performs three main functions. It takes in food. Then it breaks down food so nutrients can be absorbed. Finally, it gets rid of what cannot be digested.

What are mechanical and chemical digestion?

Mechanical digestion is the action of breaking down food into smaller pieces by chewing and by the mixing action of smooth muscles in the stomach and small intestine. **Chemical digestion** is the action of breaking down larger molecules into smaller molecules that cells can absorb by digestive enzymes. **Amylase** (AM uh lays), an enzyme in saliva, starts chemical digestion by breaking down starches into sugars. ☑

Reading Check

1. **Compare** What type of digestion uses enzymes to break down food?

How is food forced through the esophagus?

The tongue pushes chewed food to the back of the mouth which stimulates the swallowing reflex. Chewed food enters the **esophagus** (ih SAH fuh gus), a muscular tube that connects the pharynx, or throat, to the stomach. Smooth muscles that line the esophagus contract in a rhythm to move food through the digestive system in a process called **peristalsis** (per uh STAHL sus).

What is the function of the epiglottis?

The epiglottis is a small plate of cartilage that covers the opening to the trachea. If the opening is not closed, food can enter the trachea, which will trigger a coughing reflex. The body coughs to keep the food from entering the lungs.

How does digestion continue in the stomach?

Refer to the figure below as you follow the path of food through the digestive system. Food moves through the esophagus, passes through a circular muscle called a sphincter and into the stomach. The stomach walls are made of three layers of smooth muscle. During mechanical digestion, these smooth muscles contract. These contractions, called peristalsis, break food into smaller pieces and mix food with acid that is secreted by stomach glands, called gastric glands. The condition commonly known as heartburn is the result of some acid leaking through the sphincter back into the esophagus.

The acidic environment in the stomach aids the action of **pepsin**, an enzyme involved in the chemical digestion of proteins. Mucus secreted by the lining of the stomach helps protect the stomach from the acid and pepsin.

Contractions of the muscular walls of the stomach push food farther along the digestive tract. Food passes through the pyloric sphincter at the lower end of the stomach and enters the small intestine.

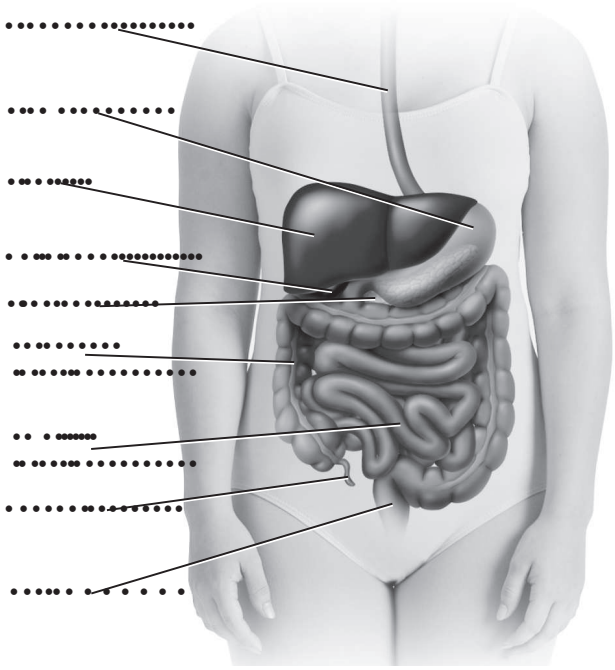
Think it Over

2. Draw Conclusions
What part of the digestive tract could be damaged by constant heartburn?

_____

Picture This

3. Circle the structures that secrete digestive juices but do not hold food on its way through the body.

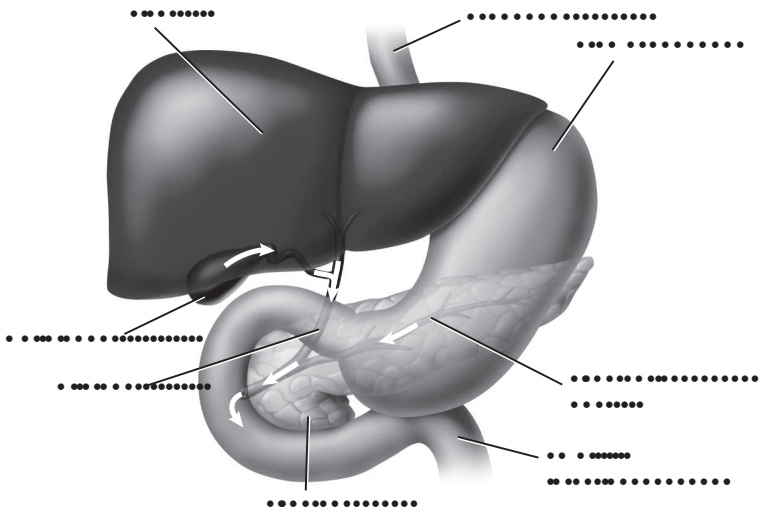


What is the role of the small intestine?

The **small intestine** is a muscular tube that connects the stomach and the large intestine. Smooth muscles in the wall of the small intestine continue mechanical digestion and move food farther along the digestive tract.

The small intestine completes chemical digestion with the help of the pancreas, liver, and gallbladder, as illustrated in the figure below. The pancreas makes enzymes that digest carbohydrates, proteins, and fats. It also makes hormones, which you will learn about later. The **liver** is the organ that makes bile. Bile helps break down fats. Extra bile is stored in the gallbladder to be released into the small intestine when needed.

The small intestine is lined with fingerlike structures called **villi** (VIH li) (singular, villus). Chemical digestion is completed and most of the nutrients from food are absorbed through the villi. Villi increase the surface area of the small intestine. Food that cannot be digested moves into the large intestine as a thick liquid substance called chyme (KIME).



What is the main function of the large intestine?

The **large intestine** is the end part of the digestive tract. It includes the colon, rectum, and appendix. The appendix is a saclike structure that has no known function.

Some bacteria normally live in the colon. They make vitamin K and certain B vitamins that the body can use.

The main function of the colon is to absorb water from the chyme. The remaining material is a more solid material called feces. Smooth muscle contractions, called peristalsis, move feces toward the rectum. Feces exit the body through the anus. ☑

Picture This

4. Label the structure that produces bile and the structure that stores bile.

Reading Check

5. Explain the function of the colon.