

11-3 Human Digestion

1. What happens to food after you chew and swallow it?

Objective

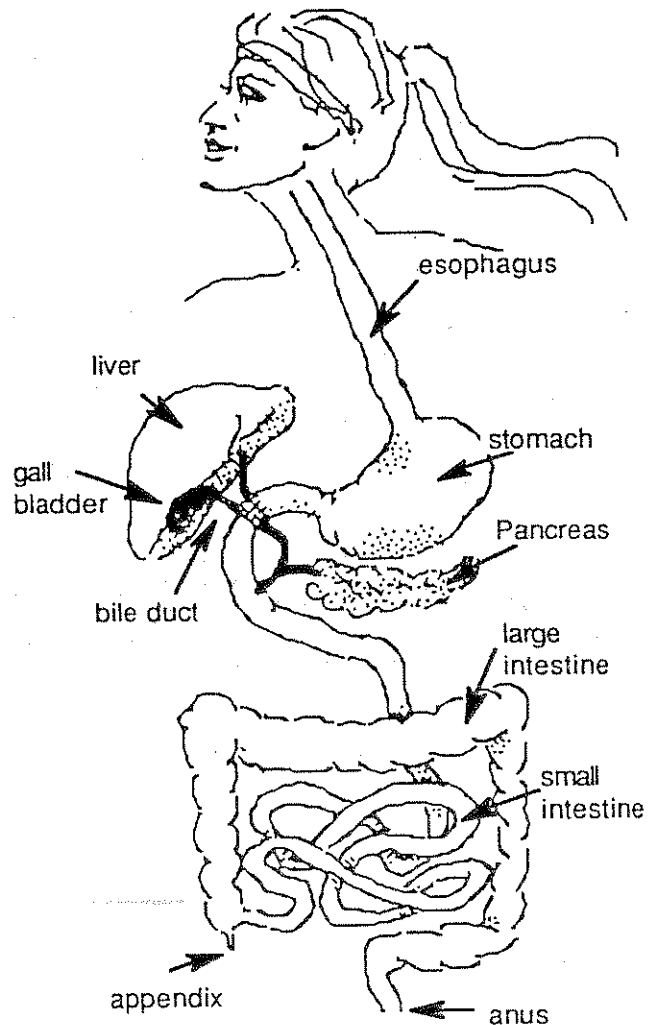
On a quiz, you should be able to name the different parts of the human digestive system, list their functions and be able to define peristalsis, ulcer and digestion.

The digestive tract includes a long tube that runs through the body from **mouth to anus**. After you have swallowed food, it passes through your digestive tract where various different digestive functions are performed in each of the different areas of the digestive tube. Any food not digested will leave the body as waste through the anus. Study the drawing of the human digestive system at the right.

- Trace the path of food through the digestive tube, from mouth to anus. Next, notice that food does not actually pass through each of the organs shown in the drawing above. List those digestive organs that the food does not actually pass through.
- List the names of each part of the digestive tube, in order from mouth to anus, through which food does pass.

Examine that part of the drawing that shows the relationships between the small intestine and the liver, pancreas and gall bladder and its ducts.

It's now important to learn the general function of each area of the digestive tract. Study the following chart so you can answer questions about the functions later in this assignment.



Structure	General Function
Mouth and teeth	Chews and breaks up food so enzymes can get at it. Mixes food with saliva
Salivary glands (mouth)	Produces saliva which contains an enzyme that <u>digests starch</u>
Esophagus	Carries swallowed food to stomach
Stomach	Stores food, adds hydrochloric acid and enzymes to the food in order to <u>digest protein</u> , absorbs foods that do not need digestion and water into the blood stream
Small intestine	Digestive juices are added here that <u>digest starches, proteins, & fats</u> . The products of digestion are <u>absorbed</u> into the blood stream here also.
Liver & Pancreas	Produces substances that aid digestion in the small intestine
Large intestine (also called the colon or bowel)	Absorbs water into the blood stream from the remaining undigested material. No further digestion takes place here. The lower portion of the large intestine (the rectum) holds the undigested waste material until it is eliminated.
Anus	External opening of the digestive tube to the outside. Two circular muscles keep the opening closed until waste material is eliminated to the outside. Eliminated waste is referred to as a stool or bowel movement.

Remember that the definition for digestion is as follows: **DIGESTION:** A process where large food molecules are enzymatically broken down into smaller food molecules for use by the cells.

4. Where does digestion begin in the human digestive system and with what large molecules?
5. Which part of the digestive system digests the most different kinds of food molecules? What are the food molecules digested here?
6. Assume that a person's digestive system could digest food but NOT absorb the products of digestion due to a disease. What would be the result for that person

some weeks later? Explain.

7. When a bowel movement or "stool" contains excess amounts of water, this is referred to as diarrhea. This is usually brought about by a bacterial or viral infection. What part of the digestive system would be infected? Why did you select this answer? (See chart)
8. The liver and pancreas produce substances that empty into which part of the digestive tract?
9. Examine the chart below. Reread and review the completed chart provided earlier and then see if you can fill in the functions on a chart like the one below, from memory, on your own paper. []

Structure	Function
Mouth & salivary glands	
Esophagus	
Stomach	
Small intestine	
Liver and pancreas	
Large intestine	
Anus	

Check your response with the original chart and make any necessary corrections or additions. []

Peristalsis

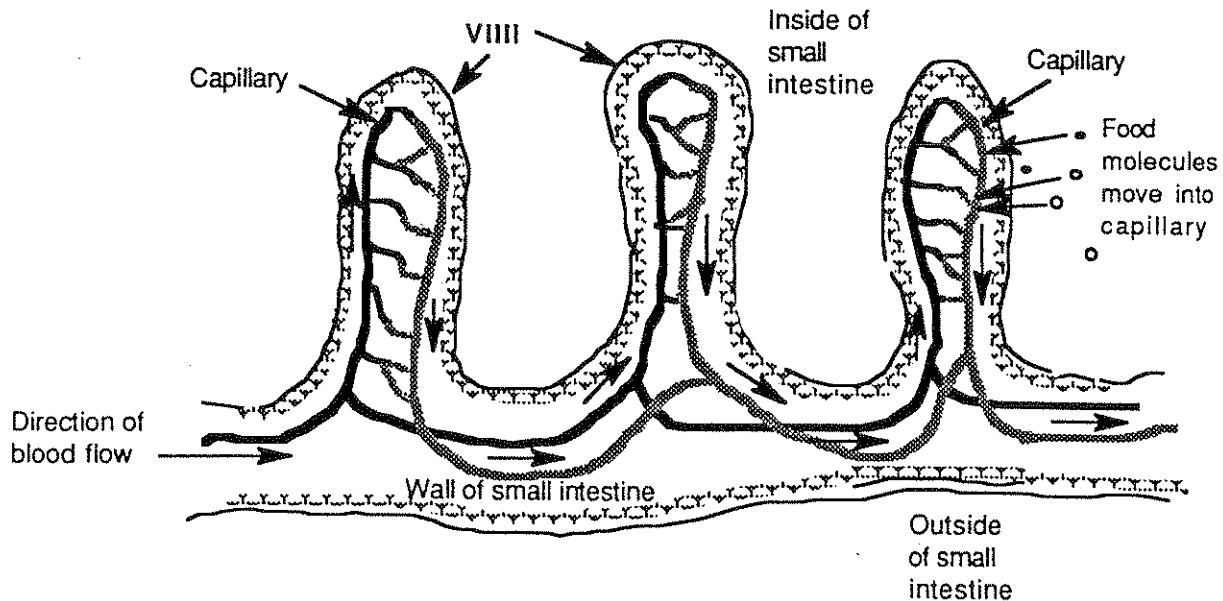
Our digestive tract is composed of a tube that moves food from the mouth to the anus. Food is slowly moved through the tube by a processes called **peristalsis**. The esophagus, stomach and intestine are lined with **smooth muscle fibers** that run the length of the tube. Muscle fibers also circle the tube. These circular and longitudinal fibers contract slowly, creating waves of contractions that move the food through the tube.

Ulcers

Recall that the stomach produces **hydrochloric acid** needed for the enzyme pepsin to digest protein. The acid is very strong and if placed on skin, would burn it badly. In fact, the acid is strong enough to burn holes in wood and cause metal to corrode. Why does the acid not burn the inner lining of the stomach in the same way? The lining of the stomach secretes a protective **mucus** that covers the delicate cells which would otherwise be exposed to the acid. Sometimes the stomach produces excessive amounts of hydrochloric acid and the mucus is inadequate in protecting the stomach lining. The inner cells of the stomach will then be destroyed by the acid. Sometimes the acid will eat a hole through the stomach wall. Even minor damage to the stomach wall is very painful and requires medical attention. This condition is known as a **stomach ulcer**. As acid passes from the stomach into the small intestine, damage may also occur to the intestinal lining. This is know as a **duodenal ulcer**. Stomach (or peptic) ulcers are caused by a bacteria called *Helicobacter pylori* and can be cured in about two weeks with antibiotics.

Villi, Microscopic Absorption Units of the Intestine

The drawing below shows a microscopic view of the wall of the small intestine. The inner part of the intestinal wall is covered with thousands of microscopic finger-like projections called villi. Each villus contains a capillary network ready to absorb the products of digestion as they diffuse from the inner cavity of the intestine where digestion takes place.

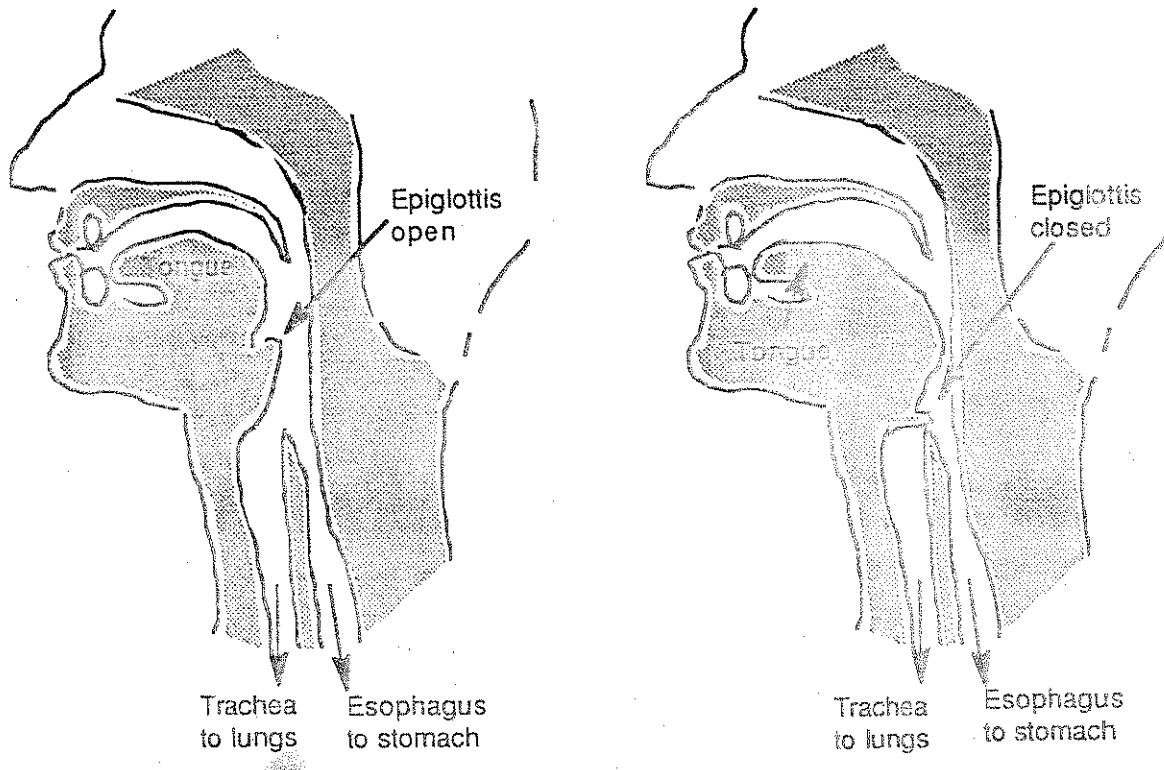


As protein, fat and starch molecules are broken into smaller molecules by the intestinal enzymes, they become small enough to diffuse through the pores in the membranes that cover the villi. Just inside of the villi are a rich supply of capillaries. The food molecules diffuse into the blood in the capillaries which take blood containing its new nutrients to the liver. The blood passes through the liver on its way back to the heart. As it passes through the liver, glucose enters liver cells which converts it to a type of "animal starch" called glycogen. If an animal has not eaten for days, the liver will convert stored glycogen back into glucose, which will diffuse into the blood and be distributed to all body cells in need.

10. Name some of the specific food molecules, in addition to glucose, that would be diffusing into the villi capillaries.
11. Under which conditions would the liver be converting glucose to glycogen and when would it be converting glycogen to glucose?

The Epiglottis: A Life Saver!

12. When you are thirsty and drinking a large volume of water or other liquid, can you breathe at the same time you are swallowing the liquid? Describe your experience.



In the above drawing on the left, the **epiglottis** is shown as a small flap of tissue that is held open so that air entering the nose can move past the tongue into the trachea. The trachea, or windpipe, takes the air to the lungs. If the epiglottis stayed open while we were drinking liquid, the liquid would go into the trachea and lungs. This would cause choking and possibly death from suffocation. The drawing on the right shows what happens to the epiglottis when we are swallowing liquid or food. As we swallow, the tongue moves back and the epiglottis closes off the opening to the trachea. This prevents liquid and food from entering the lungs. Examine the drawing at the right again. Notice that the opening to the esophagus is still clear allowing food and liquid to enter the stomach. Sometimes we talk or laugh when swallowing. This forces the epiglottis to open for a moment, allowing liquid or food to get stuck in the trachea opening. This causes us to choke. We usually can cough up the material. Unfortunately, some people have died from such a blockage.

13. Name the tubes that lead to the lungs and stomach. Which is closest to the front of the throat?
14. Describe how the epiglottis prevents choking when we swallow food or liquid.
15. Why can we not breath while we are swallowing large quantities of liquid?
16. What is an ulcer?
17. Define peristalsis.