The function of the digestive system is to break down food into its components for use by the body. This is accomplished both mechanically and chemically. Mechanical digestion changes large pieces of food into smaller pieces. Chemical digestion adds enzymes to food and changes it to smaller compounds.

The digestive system is composed of two parts; the alimentary canal and the accessory organs. The alimentary canal is a tube running from the mouth to the anus and in an adult is about nine meters in length. The pharynx, esophagus, stomach, small intestine, large intestine or colon and anus are included in the alimentary canal. The accessory organs aid in the digestive process and include the teeth, tongue, salivary glands, pancreas, and liver.

The Human Digestive System Vocabulary List

- amino acid
- anus
- bile
- bolus
- calorie
- carnivore
- digestion
- duodenum
- enzyme
- epiglottis
- esophagus
- fat-soluble vitamin
- gall bladder
- gastrin
- herbivore
- ileum
- ingestion
- intestine (large and small)
- jejunum
- liver
- microvillus
- mineral
- omnivore
- pancreas
- pepsin
- peristalsis
- pharynx
- protein
- rectum
- saliva
- salivary gland
- stomach
- teeth
- villi
- vitamin
- water-soluble vitamin
amino acid
anus
bile
bolus
calorie
carnivore
digestion
duodenum
enzyme
epiglottis
esophagus
fat-soluble vitamin
gall bladder
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herbivore
ileum
ingestion
intestine (large and small)
jejunum
liver
microvillus
mineral
omnivore
pancreas
pepsin
peristalsis
pharynx
protein
rectum
saliva
salivary gland
stomach
teeth
villi
vitamin
water-soluble vitamin
1. The ________________ are used for grinding food.
2. The ________________ produce saliva.
3. The flap of tissue that covers the windpipe and keeps food from entering it is called the ________________.
4. The ________________ is a long, muscular tube that connects the throat to the stomach.
5. The large, lobed organ that regulates the nutrient content of the blood is the ________________.
6. The ________________ is a J-shaped muscular organ that stores and helps digest food.
7. A long, slender digestive organ that secretes several digestive enzymes is the ________________.
8. The long, tubelike section of the digestive tract where most food digestion and absorption take place is the ________________.
9. The ________________ is a long tube that is the site of most reabsorption.
10. The ________________ is a small storage sac near the liver in which bile is stored.
11. ________________ are the building blocks of proteins.
12. A ________________ is the amount of heat required to raise the temperature of one gram of water by 1° C.
13. A ________________ is an animal that eats only meat.
14. ________________ is the chemical breakdown of foods into simpler substances.
15. A ________________ is a member of the class of proteins that aid in the breakdown of foods.
16. An inorganic element or compound is a ________________.
17. A ________________ is an animal that consumes both plant and animal matter.
18. ________________ is a digestive enzyme.
19. The last section of the small intestine is called the _________________.

20. A ________________ is an organic molecule that is essential for good nutrition.

21. A digestive hormone secreted in the stomach that stimulates the secretion of other digestive juices is _________________.

22. The ________________ is the region of the gut behind the mouth cavity.

23. ________________ is a large molecule composed of amino acids.

24. A lump of food moistened with saliva is a _________________.

25. Vitamins that are soluble in water are _________________.

26. ________________ is a watery fluid that contains amylase; begins the breakdown of starch into sugars.

27. The tiny, finger-like projections that increase the surface area of the small intestine and aid in absorption are the _________________.

28. ________________ is a greenish fluid produced in the liver.

29. The ________________ is the first thirty centimeters of the small intestine devoted solely to digestion.

30. The ________________ is the exit point of the alimentary canal.

31. A ________________ is an animal that eats only plant material.

32. ________________ is the taking of food pieces into the body.

33. The middle 3-centimeter section of the small intestine is called the _________________.

34. ________________ are tiny hair-like projections on epithelial cells lining the small intestine.

35. ________________ are vitamins that are insoluble in water, i.e. A, D, E, and K.

36. ________________ is the wave-like swallowing movement of the esophagus.

37. The ________________ is a muscular tube at the end of the large intestine.
Here is a story that is strange, but true. On June 6, 1812, Alex St. Martin had a serious accident. The musket he was carrying accidently went off and shot him in the side. When Dr. William Beaumont, an Army doctor stationed nearby, arrived at the scene of the accident, he thought St. Martin’s chances for survival were very slim. A tunnel, 10 centimeters wide, formed from his stomach to the outside of his body. St. Martin had to keep this hole covered to keep food and liquids from oozing out.

The strange way that St. Martin’s wound healed gave Dr. Beaumont an excellent opportunity to study what happened inside a stomach. Dr. Beaumont hired St. Martin to work for him so he could do experiments on St. Martin’s stomach. Most of the experiments involved placing pieces of food in St. Martin’s stomach and removing them later to see what digestion did to the food. Here, in Dr. Beaumont’s own words, is an account of the first experiments done on St. Martin’s stomach:

August 1, 1825. At 12 o’clock A.M., I introduced through the perforation, into the stomach, the following articles of diet, suspended by a silk string, and fastened at proper distances, so as to pass in without pain--:

- a piece of high seasoned a la mode beef;
- a piece of raw, salted, fat pork;
- a piece of raw, salted, lean beef;
- a piece of boiled, salted beef;
- a piece of stale bread, an a bunch of raw, sliced cabbage; each piece weighing about two drachmas; the lad continuing his usual employment around the house.

At 1 o’clock P.M., withdrew and examined them--found the cabbage and bread about half digested: the piece of meat unchanged. Returned them to the stomach.

At about 2 o’clock, P.M., withdrew them again--found cabbage, bread, pork, and boiled beef all cleanly digested, and gone from the string; the other pieces of meat but very little affected. Returned them to the stomach again.

At 3 o’clock, P.M., examined again--found the a la mode beef partly digested: the raw beef was slightly macerated on the surface, but its general texture was firm and entire. The smell and taste of the fluids of the stomach were slightly rancid; and the boy complained of some pain and uneasiness at the breast. Returned them again.

(Beaumont, W. Experiments and Observations on the Gastric Juice and the Physiology of Digestion. Pittsburgh, Allen, 1833.)
Materials:
- nylon thread
- graduated cylinder
- room temperature water
- 40°C water bath
- 50 ml glass beakers (3 per group)
- thermometers
- stirring rods
- pH paper
- Foods: should include, but not limited to, beef jerky, hard-boiled egg white, fruits, vegetables, hard bread, and anything students bring to test.
- hydrochloric acid (16ml/1 liter of water)
- pepsin (1 g/200 ml of water)

Procedure:
1. Label three beakers A, B, and C. Each of these will be an artificial stomach.
2. Put 40 ml of water in beaker A.
3. Leave at room temperature.
4. Use pH paper to determine the pH.
5. Measure 20 ml of hydrochloric acid and 20 ml of pepsin into beaker B and C. Mix thoroughly.
6. Use pH paper to determine the pH.
7. Place beaker B in a 40°C water bath. Leave beaker C at room temperature.
8. Tie a piece of nylon thread to three bite-sized pieces of each of the following foods: beef jerky, hard-boiled egg white, fruits, vegetables, hard bread.
9. The thread should be long enough to suspend into the liquid in each “stomach”.
10. Suspend one piece of each food in the three “stomachs”.
11. Gently swirl each stomach every 10 minutes and record the results.

Discussion Questions:
1. What is the importance of Alex St. Martin’s accident?
2. Why are three beakers used in this experiment?
3. What conditions did you test that are the same as a human stomach?
4. How does the pH of each beaker compare to that of a real stomach?
5. How does the temperature of each beaker compare to that of a real stomach?
6. What can you conclude about beaker A?

7. Compare your results for beakers B and C. How can you account for any differences?

8. Why was nylon thread used instead of cotton thread?

9. Each of the foods tested is primarily composed of proteins, fats or carbohydrates. Based on your observations, which type of nutrient is most affected by gastric juices?
### 10 minutes

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Diagram of the Human Digestive System