

Name: _____ **KEY** _____ Block: _____ Date: _____

Digestive Enzyme Analysis 2020 - Spangler

Directions: Use the [Digestive Enzyme Chart](#), your knowledge of enzymes and the human digestive system to answer these questions.

You are responsible for knowing the names and functions of all of these enzymes!

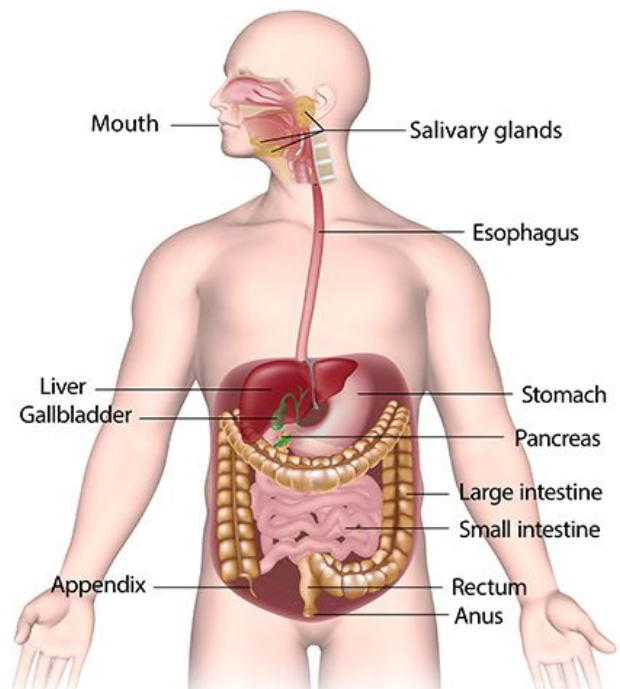
1. In one sentence or less, describe the goal of digestion.

The goal of digestion is the physical and chemical breakdown of biomolecules in food into their building blocks so they can be absorbed for use in cells.

2. Describe the progression of the digestion of carbohydrates.

Starches are first chemically digested into disaccharides by salivary amylase in the mouth. Starches and Disaccharides are in the stomach after swallowing, but they are not digested further there. When chyme moves to the small intestine, carbohydrate digestion resumes with more amylases, disaccharidases, etc where carbohydrate digestion is completed (and they are fully digested) and glucose is absorbed.

The Digestive System



3. How is this progression similar to protein digestion?

Proteins are also digested in the small intestine (trypsin, carboxypeptidase, etc.) but they are NOT digested in the mouth and they ARE digested in the stomach (pepsin).

4. The names of which enzymes give a very strong context clue about their function?

Salivary amylase (in saliva, amylase breaks down amylose)
Pancreatic nuclease (produced by pancreas, breaks down nucleic acid)
There are many other examples!

5. In which organ does the digestion of biomolecules end? Small Intestine

6. What is the most common source of enzymes? Lining of Small Intestine

7. What is the most common organ of enzyme activity? Small Intestine

8. Look at the diagram of the digestive system. Which parts have no enzyme activity?

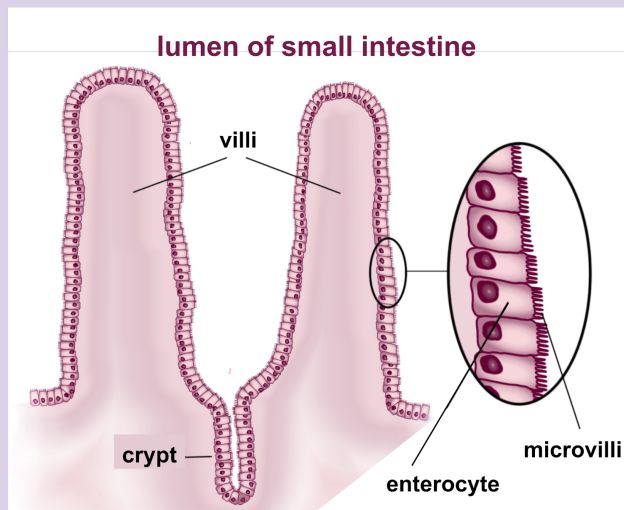
Esophagus, large intestine, rectum, anus (and all accessory organs)

9. Why aren't any of the enzymes active in the pancreas?

Food does not pass through the pancreas

10. Do a quick google search for the structure of the small intestine. Why is that a good location for digestion to end? What specialized structures line the small intestine that help with absorption of the products of digestion? How is structure related to function in the small intestine?

Villi line the small intestine and they increase surface area so that absorption can occur more readily.

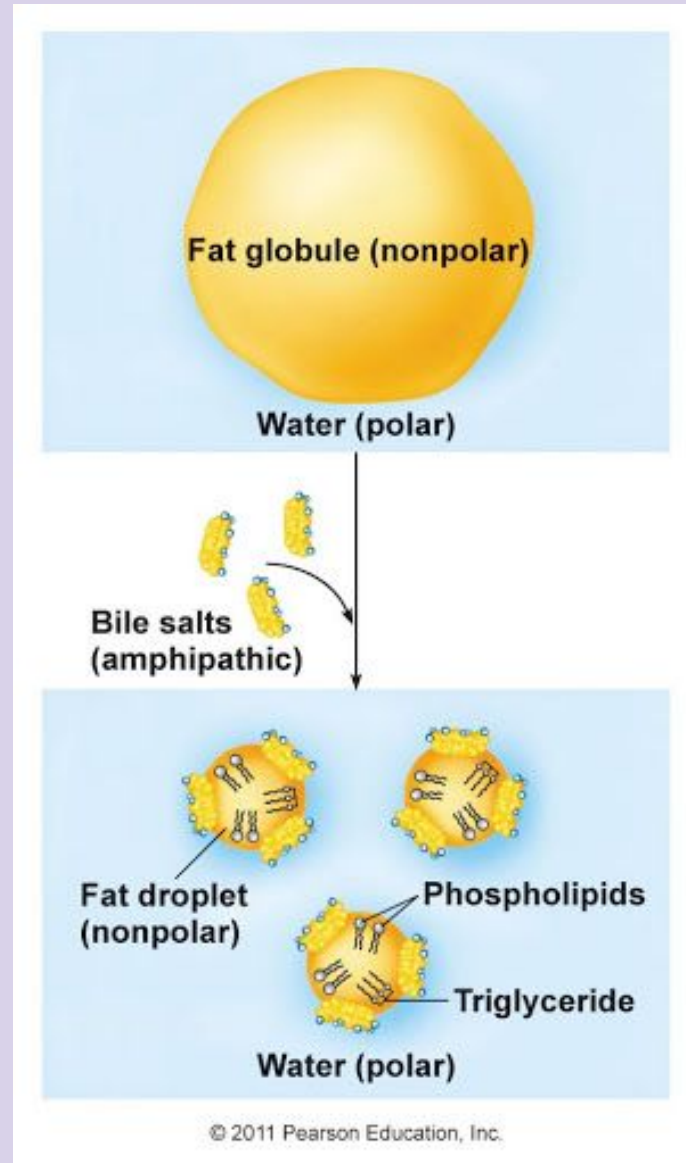


11. How do the final products of fat and nucleic acid digestion differ from the final products of carbohydrate and protein digestion?

The products of fat digestion are glycerol and fatty acids, the product of nucleic acid digestion are nucleotides. These are a bit larger than amino acids (protein) and glucose (carbs)

12. The liver produces bile (it is then stored in the gall bladder before release into the small intestine). Bile has a polar end and a nonpolar end, similar to dish soap. Bile works to emulsify fats in the small intestine. The emulsification of fats is mechanical digestion, not chemical. Knowing the properties of fats, why is an emulsifier helpful in the digestion of fats?

Since our food is quickly dissolved in water in the stomach, and lipids are hydrophobic, they will not readily dissolve. In order to dissolve fats and break them up mechanically, bile salts are used. See below - bile has a nonpolar end (yellow part in the diagram) that can pull on the hydrophobic fat and the hydrophilic (polar) region of the bile can mix with the polar water molecule. This act to break up the fat into smaller pieces (physical/mechanical digestion) so that enzymes can work more easily (surface area of substrate increases)



13. Trace the path of food through the human digestive system (from mouth to anus). Do you know what biomolecule is digested in each part? The salivary glands, liver, gallbladder and pancreas are known as 'accessory organs'. Why?

Mouth (carbohydrate digestion) -> esophagus -> stomach (protein digestion)
-> small intestine (all biomolecules digested here with the help of bile from the liver) -> large intestine (no digestion here, but reabsorption of water, minerals and further breakdown chemically of undigested food by bacteria) -> rectum -> anus

The accessory organs are necessary for digestion but food does not pass through (salivary glands, pancreas, liver, gallbladder)