

Reading Comprehension of the digestive tract

Digestion is a process that break-down food into small molecule called nutrient. These small molecule called nutrients pass through the cell membrane or absorb into the cell. These different types of nutrients are used for building-blocks to make new compounds and fuel to make energy. There are two types of digestion, which are mechanical and chemical. In mechanical digestion teeth are used to cut and crush food into small pieces. The cutting and crushing of food increase the surface area exposed for further process of digestion. The exposed surface area from the process of mechanical digestion increased the area to be exposed to the chemicals to break-down the pieces of food into smaller pieces, so that it can pass through the cell membrane. The chemicals used for digestion are enzymes, acid and saliva.

Proteases are enzymes that break down protein into amino acid. **Amylase** break down starch, which is a polysaccharide (examples: rice, potato) into glucose (is a monosaccharide). Lipase break down lipid (fats) into small droplets of lipids. All words that end in **ase** are enzymes.

Protein is made of many amino acid molecules.

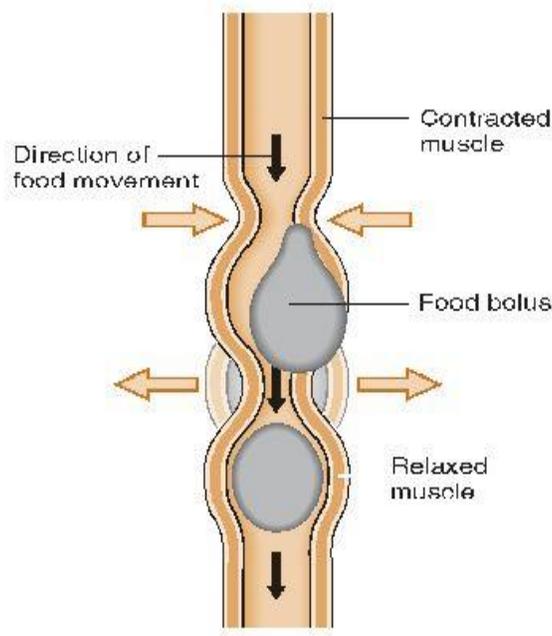
Starch is made of many glucose molecules.

Examples of food made of protein are steak, fish, chicken, egg and soy beans, etc.

Examples of food made of starch are bread, rice, potato, etc.

Examples of food made of lipid are bacon, oil, grease, fat, and etc.

Analyze the diagram of peristalsis movement



Squeeze section-dilate section-Squeeze section-dilate section-Squeeze section-dilate section.

Food or nutrients move through the digestive system by peristalsis movement. In peristalsis movement a section of the digestive tract is squeezing and the other section of the tract is relaxed. Thus, food is push forward in the digestive tract.

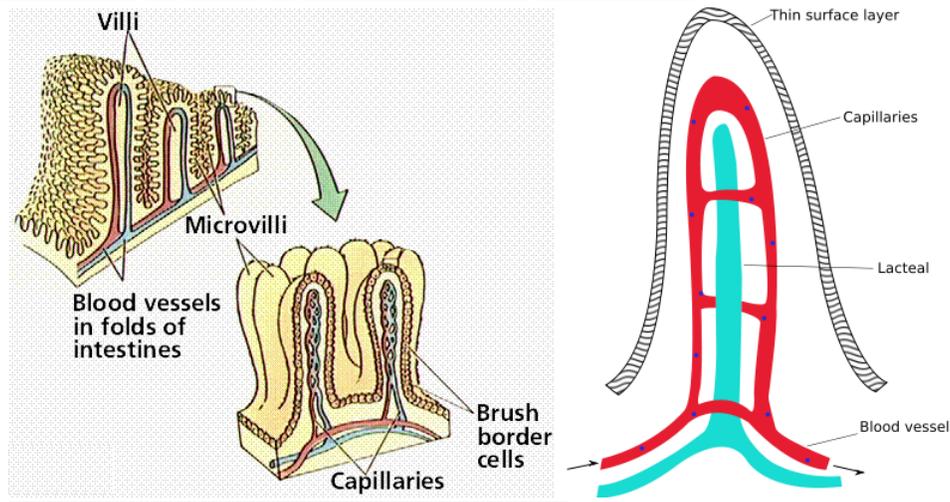
The stomach secretes hydrochloric acid (HCl) and pepsinogen. Hydrochloric acid (HCl) lowers pH of the stomach so pepsinogen is activated to pepsin. Pepsin is an enzyme that controls the hydrolysis or the breakdown of proteins into peptides. The stomach also mechanically churns (or mix) the food. Chyme is the mixture of acid, enzyme and food in the stomach, which leaves the stomach and enters the small intestine.

Accessory (extra) digestive organs that help digestion, but are not solely part of the digestive system are the: gall bladder, liver, and pancreas secrete other enzymes and base to further digestion.

The **liver** is an organ that produces **bile**, which is a chemical that breaks down fats or lipids into small droplets that can be further broken apart in the small intestine. The gall bladder is an organ that is connected to the liver that acts as the **storage area for bile**, which was produced by the liver. The **gall bladder** is also connected to the small intestine by the **bile duct**, which secretes bile into the small intestine to help the digest fats or lipids.

The **pancreas** is an organ that can act also as an exocrine gland that makes and releases or secretes enzymes (for example **lipase** break down the small droplets of lipids or fats into molecules, **protease** break down proteins or peptides into amino acids, **amylase** break down polysaccharides into monosaccharides.). The pancreas also secretes a **pH base** into the small intestine that neutralizes the pH acid from the stomach or chyme that empties into the small intestine, so that it will not damage the small intestine.

How can we absorb large quantity of nutrients in the digestive tract?



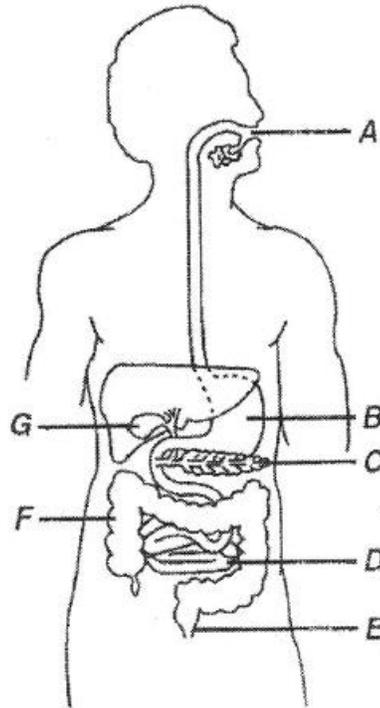
The small intestine has billions of **villus** and **microvillus** to absorb large quantity of nutrients. The villus and microvillus is a finger-like projection to increase the amount of **surface area** to absorb nutrients. Therefore, **increase of surface area for absorption** of nutrients in the small intestine is cause by the microvilli of the villus. Thus, this provides a large area so that, large quantity of food or nutrient can be

absorbed into the body. The **blood vessels** which are the **capillaries** in the microvillus take in amino acids & carbohydrates (monosaccharides), minerals, & vitamins. The **lacteals** of the microvillus take in lipids or fats.

The majority of liquids or water is absorbed in the large intestine by the process of osmosis (diffusion). The rectum is the continuation of the large intestine, and is a storage area for digestive waste product that is called **fecal**. The fecal is release to the outside of the body through the anus, which is part of the excretory system.

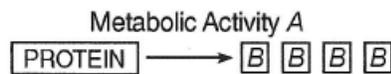
Questions 1 through 5 refer to the following:

Using the diagram below, give the letter and identify the organ that is most closely related to the statement.



- 1) The chemical digestion of proteins begins in this organ in the given diagram.
- 2) This organ in the given diagram contains many villi.
- 3) The chemical hydrolysis of carbohydrates begins in this organ in the given diagram.
- 4) Most water reabsorption occurs in this organ in the given diagram.
- 5) This organ in the given diagram produces and secretes enzymes that help to complete the digestion of carbohydrates and polypeptides.

- Which sequence represents the correct order of events for the production of necessary complex molecules after food is taken in by a multicellular animal?
 - digestion → absorption → circulation → diffusion → synthesis
 - diffusion → synthesis → absorption → digestion → circulation
 - synthesis → digestion → absorption → diffusion → circulation
 - circulation → diffusion → synthesis → absorption → digestion
- The interaction of which two systems provides the molecules needed for the metabolic activity that takes place at ribosomes?
 - reproductive and excretory
 - respiratory and muscular
 - digestive and circulatory
 - immune and nervous
- The pancreas is an organ connected to the digestive tract of humans by a duct (tube) through which digestive enzymes flow. These enzymes are important to the digestive system because they
 - form the acids that break down food
 - form proteins needed in the stomach
 - change food materials into wastes that can be passed out of the body
 - change food substances into molecules that can pass into the bloodstream and cells
- The diagram below represents one metabolic activity of a human.



Letters *A* and *B* are *best* represented by which row in the chart?

Row	Metabolic Activity A	B
(1)	respiration	oxygen molecules
(2)	reproduction	hormone molecules
(3)	excretion	simple sugar molecules
(4)	digestion	amino acid molecules

- Row 1
- Row 2
- Row 3
- Row 4

- Organ systems of the human body interact to maintain a balanced internal environment. As blood flows through certain organs of the body, the composition of the blood changes because of interactions with those organs.

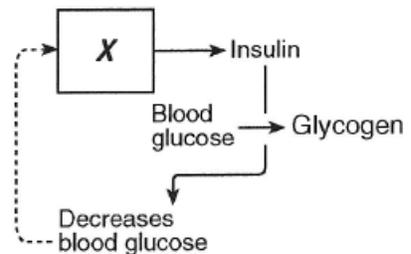
State *one* change in the composition of the blood as it flows through the digestive system.

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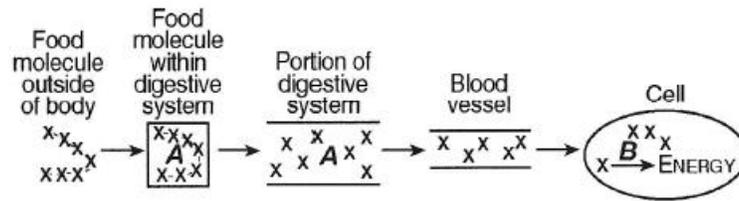
- Describe *one* example of diffusion in the human body. In your description be sure to:

- Identify the place where diffusion takes place.
- Identify a substance that diffuses there.
- Identify where that substance diffuses from and where it diffuses to, at that place.



Identify the organ labeled *X* in the diagram shown.

9) The diagram below represents events involved as energy is ultimately released from food.



Which row in the table below *best* represents the chain of Xs and letters A and B in the diagram?

X-X-X-X-X-X	A and B
(1) nutrient	antibodies
(2) nutrient	enzymes
(3) hemoglobin	wastes
(4) hemoglobin	hormones

A) 1

B) 2

C) 3

D) 4

The enzyme amylase will affect the breakdown of carbohydrates, but it will not affect the breakdown of proteins. The ability of an enzyme molecule to interact with specific molecules is most directly determined by the

- (1) shapes of the molecules involved
- (2) number of molecules involved
- (3) sequence of bases present in ATP
- (4) amount of glucose present in the cell

Many biological catalysts, hormones, and receptor molecules are similar in that, in order to function properly, they must

- (1) interact with each other at a high pH
- (2) interact with molecules that can alter their specific bonding patterns
- (3) contain amino acid chains that fold into a specific shape
- (4) contain identical DNA base sequences

In the human body, oxygen is absorbed by the lungs and nutrients are absorbed by the small intestine. In a single-celled organism, this absorption directly involves the

- (1) nucleus
- (2) chloroplasts
- (3) cell membrane
- (4) chromosomes

Which system is correctly paired with its function?

- (1) immune system—intake and distribution of oxygen to cells of the body
- (2) excretory system—remove potentially dangerous materials from the body
- (3) digestive system—transport energy-rich molecules to cells
- (4) circulatory system—produce building blocks of complex compounds

Which sequence represents the correct order of events for the production of necessary complex molecules after food is taken in by a multicellular animal?

- (1) diffusion → synthesis → absorption → digestion → circulation
- (2) circulation → diffusion → synthesis → absorption → digestion
- (3) digestion → absorption → circulation → diffusion → synthesis
- (4) synthesis → digestion → absorption → diffusion → circulation

57 The table below lists enzymes that function in different locations in the human body, and the temperature and pH ranges of these locations.

Enzyme	Location	Temperature (°C)	pH
ptyalin	mouth	36.7–37.0	6.5–7.0
pepsin	stomach	37.3–37.6	1.0–3.0
trypsin	small intestine	37.3–37.6	7.5–9.0

Different enzymes are secreted in each of the three locations. Ptyalin digests carbohydrates. Pepsin and trypsin both digest proteins. Discuss the activity of these enzymes. In your answer, be sure to:

- state how the activity of pepsin will most likely change after it moves with the food from the stomach to the small intestine [1]
- support your answer using data from the table [1]
- state how a fever of 40°C would most likely affect the activity of these enzymes and support your answer [1]
- identify the characteristic of enzymes that prevents ptyalin and trypsin from digesting the same type of food [1]