Lunch in Motion

Trace how digestion supplies cells and helps regulate blood glucose.

HAP.10 "Obtain, evaluate, and communicate information explaining the relationship between the structures and functions of the digestive system, including absorption and chemical and mechanical digestion. a..."

NAME _____ DATE _____

1 READ AND MARK

Read it twice

YOUR JOB Underline digestive structures, circle the actions they perform, and number two sentences that connect digestion to another organ system or to stable blood glucose.

What Happens to Lunch?

1. At lunch, a student bites into a crisp apple and a cheese sandwich. Teeth cut and grind the food into smaller pieces, increasing the area exposed to digestive fluids. Salivary glands release saliva that moistens the bite; its amylase begins splitting starch into smaller sugars. The tongue moves the food into a swallowable ball, and the esophagus pushes it toward the stomach with waves of muscle contractions. There, stomach walls squeeze and mix the food without changing its molecules. Gastric enzymes then break bonds in proteins, changing the molecules themselves. The first action is mechanical digestion; the second is chemical digestion. The mixture enters the small intestine.

2. The small intestine receives help from organs that food never enters. The pancreas sends enzymes through a duct into the intestine; these enzymes split starch, proteins, and fats into smaller molecules. It also releases bicarbonate, which reduces acidity from the stomach so intestinal enzymes can work. The liver makes bile, which is stored in the gallbladder and delivered to the intestine. Bile spreads large fat droplets into tiny ones, giving enzymes more surface to work on; bile does not itself break chemical bonds in fat. Intestinal muscles keep the mixture moving while these changes occur.

3. The inner wall of the small intestine has fingerlike villi that provide a large surface for absorption. Glucose and amino acids cross into tiny blood vessels; most digested fats enter lymph vessels before reaching the blood. The circulatory system carries absorbed nutrients to cells for energy and repair. After a meal, rising blood glucose triggers the pancreas to release insulin into the blood. Insulin helps many cells take up glucose and signals the liver to store some as glycogen, preventing blood glucose from staying too high. During activity, the liver can release glucose from stored glycogen, helping keep blood glucose within a useful range.

2 ANSWER WITH EVIDENCE

Use the passage

1. How do teeth and saliva change the sandwich in different ways? Identify which change is mechanical and which is chemical, and explain why.

2. Why does the small intestine need both pancreatic secretions and liver bile to process a meal containing fats and proteins?

3. How do villi and two different vessel types help the body use nutrients after digestion?

4. After a meal, how do the pancreas, liver, and circulatory system work together to keep blood glucose from staying too high?

3 YOUR TURN

Your own words

Imagine you eat a peanut butter sandwich before a long walk. In one paragraph, explain how physical and chemical digestion, all three accessory organs named in the passage, absorption, and at least two other organ systems work together to supply your body with nutrients and keep blood glucose within a useful range.

Lunch in Motion

PART 1 · READ AND MARK

Underline digestive structures, circle the actions they perform, and number two sentences that connect digestion to another organ system or to stable blood glucose. Accept any marking that follows this job and points at the right text.

PART 2 · ANSWERS

#	QUESTION	ANSWER
1	How do teeth and saliva change the sandwich in different ways? Identify which change is mechanical and which is chemical, and explain why.	**Teeth grind food into smaller pieces without changing its molecules, so that change is mechanical. Salivary amylase splits starch molecules into smaller sugars, so that change is chemical.**
2	Why does the small intestine need both pancreatic secretions and liver bile to process a meal containing fats and proteins?	**Pancreatic enzymes split fats and proteins into smaller molecules, and pancreatic bicarbonate reduces acidity so the enzymes can work. Liver bile spreads fat into tiny droplets, increasing the surface enzymes can reach.**
3	How do villi and two different vessel types help the body use nutrients after digestion?	**Villi provide a large surface for absorption. Glucose and amino acids enter blood vessels, while most digested fats enter lymph vessels before reaching the blood.**
4	After a meal, how do the pancreas, liver, and circulatory system work together to keep blood glucose from staying too high?	**The pancreas releases insulin into the blood. Insulin helps cells take up glucose and signals the liver to store some as glycogen; blood carries absorbed glucose to cells.**

PART 3 · YOUR TURN (SAMPLE ANSWER)

My teeth grind the sandwich, increasing the area exposed to digestive fluids. Salivary glands add amylase, which begins breaking down starch in the bread. In the small intestine, pancreatic enzymes split food molecules, while bile made by the liver spreads peanut butter fats into small droplets for enzymes to reach. Villi absorb sugars into blood and most digested fats into lymph. The circulatory system delivers glucose to my leg muscles, which use it during the walk. As blood glucose rises after eating, pancreatic insulin helps cells take up glucose and signals the liver to store some; later, the liver can release glucose to help stabilize blood glucose.

Accept explanations that distinguish physical breakup from molecular change and describe bile as spreading fat, not chemically breaking it down. For Your Turn, look for accurate links to the circulatory and muscular systems as well as blood glucose regulation.