

Chapter Twenty-four: The Digestive and Urinary Systems Teacher Notes

Lesson One: The Digestive System

-Digestive System at a Glance

-Digestive System-the organs that break down food so that it can be used by the body.

-digestive tract-includes mouth, pharynx, esophagus, stomach, small intestine, large intestine, rectum, and anus

-can be more than 9 meters long

-liver, gallbladder, pancreas, and salivary glands are also part of the digestive system (food doesn't pass through these organs)

-Breaking Down Food

-mechanical digestion-breaking, crushing, and mashing of food

-chemical digestion-large molecules are broken down into nutrients

-three major types of nutrients

-carbohydrates

-proteins

-fats

-enzymes break nutrients into smaller particles that the body can use

-Digestion Begins in the Mouth

-Teeth

-important for mechanical digestion by breaking down and grinding food

-teeth are covered with enamel

-enamel is the hardest material in the body and protects nerves and softer material inside the tooth

-types of teeth

-molars-grinding food

-premolars-mashing food

-incisors and canines-are for shredding food

-Saliva

-contains an enzyme that begins the chemical digestion of carbohydrates

-changes complex carbohydrates into simple sugars

-Leaving the Mouth

-tongue pushes it into the throat leading to a long, straight tube called the esophagus

-esophagus squeezes the mass of food with rhythmic muscle contractions called peristalsis

-peristalsis forces food into the stomach

-Harsh Environment of the Stomach

-stomach-the saclike, digestive organ between the esophagus and the small intestine that breaks down food into a liquid by the action of muscles, enzymes, and acids.

-stomach continues mechanical digestion by squeezing the food with muscular contractions

-tiny glands in the stomach produce enzymes and acid

- enzymes and acids work together to break food into nutrients
- stomach acid kills most bacteria that you swallow with your food
- Leaving the Stomach
 - chyme is released into the small intestine through a small ring of muscle that works like a valve
 - valve keeps food in the stomach until the food has been thoroughly mixed with digestive fluids
- The Pancreas and Small Intestine
 - The Pancreas-the organ that lies behind the stomach and that makes digestive enzymes and hormones that regulate sugar levels.
 - pancreatic fluid flows into the small intestine to digest chyme and contains bicarbonate which neutralizes the acid in chyme
 - pancreas also functions as a part of the endocrine system by making hormones that regulate blood sugar
 - The Small Intestine-the organ between the stomach and the large intestine where most of the breakdown of food happens and most of the nutrients from food are absorbed.
 - about 6 meters long; larger than a tennis ball court
- The Liver and Gallbladder
 - liver-the largest organ in the body; it makes bile, stores and filters blood, and stores excess sugars as glycogen.
 - can be as large as a football
 - located toward right side, slightly higher than your stomach
 - helps digestion by
 - making bile to break up fat
 - stores nutrients
 - breaks down toxins
 - Breaking Up Fat
 - gallbladder-a sac-shaped organ that stores bile produced by the liver
 - bile is squeezed from the gallbladder into the small intestine where the bile breaks large fat droplets into very small droplets
 - Storing Nutrients and Protecting the Body
 - nutrients are absorbed into the bloodstream and carried through the body
 - nutrients not needed right away are stored in the liver and then released into the bloodstream as needed
 - liver also captures and detoxifies many chemicals in the body
- The End of the Line
 - Large Intestine-the wider and shorter portion of the intestine that removes water from mostly digested food and that turns the waste into semisolid feces, or stool.
 - In the Large Intestine
 - most material enters as a soupy mixture
 - the water in the mixture is absorbed and the liquid is turned into feces or stool
 - humans can't digest cellulose (grains, fruits, and vegetables contain this carbohydrate); commonly known as fiber
 - keeps stool soft and moving through the large intestine

-Leaving the Body

-rectum is the last part of the large intestine and stores feces until they can be expelled

-feces leaves the body through the anus

Lesson Two: The Urinary System

-Cleaning the Blood

-Urinary System-the organs that produce, store, and eliminate urine

-The Kidneys as Filters

-Kidney-one of the pair of organs that filter water and wastes from the blood and that excrete products as urine.

-filters about 2,000 L of blood each day

-body only contains about 5.6 L so it filters about 350 times per day

-nephron-the unit in the kidney that filters blood

-steps to filtering blood

-large artery brings blood into each kidney

-tiny blood vessels branch off the main artery and pass through part of each nephron

-water and other small substances (salt, glucose, amino acids, and urea) are forced out of the blood vessels and into the nephrons

-as substances flow through the nephrons most of the water and some nutrients are moved back into blood vessels that wrap around the nephrons; a concentrated mixture of waste materials is left behind in the nephrons

-cleaned blood (which has slightly less water and much less waste) leaves each kidney in a large vein to recirculate in the body

-the yellow fluid that remains in the nephrons is called urine; urine leaves each kidney through a slender tube called the ureter and flows into the urinary bladder where it is stored

-urine leaves the body through another tube called the urethra; urination is the process of expelling urine from the body

-Water In, Water Out

-Sweat and Thirst

-sweat is a way your body loses water to reduce temperature

-thirst occurs when mouth dries out because of a drop of water content in blood which makes you feel thirsty

-Antidiuretic Hormone-hormone released as body reacts to water shortage

-signals kidneys to take water from the nephrons

-nephrons return water to the bloodstream

-if there is too much water ADH hormone is released to have nephrons hold more water

-Diuretics-cause kidneys to make more urine which decreases the amount of water in blood

-Urinary System Problems

-bacterial infections-bacteria get into the bladder and ureters through the urethra and cause painful infections; these should be treated early before they damage the kidneys

-kidney stones-salts and wastes collect inside kidneys forming stones; can interfere with urine flow and cause pain; most pass naturally but some need to be removed by a doctor

-kidney disease-damage to nephron can prevent normal kidney functioning and can lead to kidney disease; if they don't function properly a kidney machine is used to filter waste from the blood