

Chapter Twenty-three: Circulation and Respiration

Teacher Notes

Lesson One: The Cardiovascular System

- Your Cardiovascular System
 - Cardiovascular System-a collection of organs that transport blood throughout the body.
 - cardio means heart
 - vascular means blood vessels
 - includes veins, arteries, and capillaries
- The Heart
 - heart is an organ made mostly of cardiac muscle tissue
 - is about the size of your fist and almost in the center of your chest cavity
 - has a left and right side
 - right side pumps oxygen-poor blood to the lungs
 - left side pumps oxygen-rich blood to the body
 - each side has an upper chamber and a lower chamber
 - upper chamber is called the atrium
 - lower chamber is called the ventricle
 - valves are located between the atria and ventricles and in places where large arteries are attached to the heart
- Blood Vessels-hollow tubes that carry blood through body
 - Arteries-a blood vessel that carries blood away from the heart to the body's organs.
 - have thick walls that contain smooth muscle
 - blood pressure is the pressure at which blood is pumped into arteries
 - pulse is caused by the rhythmic change in pressure
 - Capillaries-a tiny blood vessel that allows an exchange between blood and cells in other tissue.
 - nutrients, oxygen, and other substances leave blood through capillaries
 - carbon dioxide and waste leave body cells and are carried away by capillaries.
 - exchanges are possible because walls of capillary walls are only one cell thick
 - Veins-a vessel that carries blood to the heart.
 - valves keep the blood from flowing backward
 - as muscles contract they squeeze veins and help push blood toward the heart
- Two Types of Circulation
 - pulmonary circulation-the flow of blood from the heart to the lungs and back to the heart through the pulmonary arteries, capillaries, and veins.
 - systemic circulation-the flow of blood from the heart to all parts of the body and back to the heart.
- Cardiovascular Problems
 - Atherosclerosis-happens when cholesterol builds up inside of blood vessels. This build up causes blood vessels to become narrower and less elastic.

- this may cause a person to have a heart attack
- High Blood Pressure
 - hypertension-caused by abnormally high pressure which causes a greater risk of heart attack, heart failure, kidney disease, and stroke.
 - stroke-is when a blood vessel in the brain becomes clogged or ruptured. Part of the brain receives no oxygen causing brain cells to die.
- Heart Attacks and Heart Failure
 - heart attack-happens when heart muscle cells die and part of the heart muscle is damaged. This usually occurs when arteries become blocked.
 - heart failure-happens when the heart cannot pump enough blood to meet the body's needs.
 - the brain, lungs, and kidneys may be damaged by a lack of oxygen or nutrients or by the buildup of fluids.

Lesson Two: Blood

- What is Blood
 - Blood-the fluid that carries gases, nutrients, and wastes through the body and that is made up of plasma, red blood cells, platelets, and white blood cells.
 - Plasma-fluid part of blood
 - is a mixture of water, minerals, nutrients, sugars, proteins, and other substances
 - red blood cells, white blood cells, and platelets are found in plasma
 - Red Blood Cells
 - most blood cells in body
 - take oxygen to every cell in your body
 - each has hemoglobin-an oxygen-carrying protein
 - transport oxygen throughout the body
 - Platelets
 - pieces of larger cells found in bone marrow
 - last only 5 to 10 days
 - platelets clump together to stop bleeding and help to create blood clots
 - White Blood Cells
 - help keep you healthy and destroy pathogens
 - work in many ways
 - some squeeze blood vessels and move around tissues searching for pathogens to attack and destroy
 - others release antibodies to destroy pathogens
 - can destroy body cells that have died or become damaged
 - are made in bone marrow and mature in the lymphatic system
 - help clean wounds
- Body Temperature Regulation
 - blood regulates temperature when brain sends a signal to blood vessels to enlarge and send heat to skin causing temperature to lower. It then instructs them to return to normal.
- Blood Pressure-the force that blood exerts on the walls of the arteries

- systolic pressure-(first number) is the pressure inside large arteries when the ventricles contract.
- diastolic pressure-(second number) pressure inside arteries when the ventricles relax
- Blood Type
 - every person has one of four types – A, B, AB, or O
 - refers to the type of antigens or surface chemicals on the blood
- Blood Types and Transfusions
 - transfusion-the injection of blood or blood components into a person to replace blood that has been lost because of surgery or and injury
 - Type A can receive A, O; can donate to A, AB
 - Type B can receive B, O; can donate to B, AB
 - Type AB can receive all; can donate to AB only
 - Type O can receive only O; can donate to all

Lesson Three: The Lymphatic System

- Vessels of the Lymphatic System
 - Lymphatic System-a collection of organs whose primary function is to collect extracellular fluid and return to the blood.
 - Lymph-the fluid that is collected by the lymphatic vessels and nodes.
- Other Parts of the Lymphatic System
 - Bone Marrow-soft tissue inside of bones
 - where most red blood cells, white blood cells, and lymphocytes are produced
 - lymphocytes are a type of white blood cell that helps your body fight pathogens
 - Lymph Nodes-oval mass of lymphatic tissue found in the lymphatic vessels that filter lymph.
 - concentrated in the armpits, neck, and groin
 - contain lymphocytes called killer T cells that surround and destroy pathogens
 - other lymphocytes called B cells that produce antibodies that attach to pathogens
 - Thymus-the main gland of the lymphatic system; it produces mature T lymphocytes.
 - located behind breastbone just above the heart
 - Spleen-the largest lymphatic organ in the body
 - stores and produces lymphocytes
 - is soft and spongy and located in the upper left side of your abdomen
 - produces, monitors, stores, and destroys blood cells
 - two important functions
 - the white pulp fights infections
 - the red pulp removes unwanted materials from the blood
 - Tonsils-small, rounded masses of lymphatic tissue located in the pharynx in the passage from the mouth to the pharynx.
 - help defend the body against infection

-traps pathogens that enter the throat

Lesson Four: The Respiratory System

-Respiration and the Respiratory System

-Respiration-the exchange of oxygen and carbon dioxide between living cells and their environment; includes breathing and cellular respiration.

-Respiratory System-a collection of organs whose primary function is to take in oxygen and expel carbon dioxide.

-Nose, Pharynx, and Larynx

-nose-main passageway into and out of the respiratory system

-pharynx-the passage from the mouth to the larynx and esophagus

-food and drink also pass to the stomach

-branches into two tubes

-one tube the esophagus leads to the stomach

-the other is the larynx and leads to the lungs

-larynx-the area of the throat that contains the vocal chords and produces vocal sounds.

-vocal chords-pair of elastic bands that stretch across the larynx

-when air flows between the chords they vibrate making sound

-Trachea-the tube that connects the larynx to the lungs

-also known as the windpipe

-Bronchi and Alveoli

-Bronchus-one of the two tubes that connect the lungs with the trachea.

-Alveoli-any of the tiny air sacs of the lungs where oxygen and carbon dioxide are exchanged.

-Breathing

-diaphragm-is a dome-shaped muscle beneath the lungs.

-Breathing and Cellular Respiration

-oxygen is used by cells to release energy stored in molecules of glucose

-Respiratory Disorders

-include asthma, emphysema, and severe acute respiratory syndrome (SARS)

-asthma-causes bronchioles to narrow

-has difficulty breathing

-triggered by irritants such as dust or pollen

-SARS is caused by a virus

-has fever and difficulty breathing

-emphysema-happens when alveoli have been damaged

-people have trouble getting the oxygen they need