Teacher Notes – Organ Systems

Hutchinson

**1. Skeletal System** – Composed of 206 bones in an adult each of which is an organ.

a. Protection – The vital organs like the heart, and lungs are **protected** by the rib cage. The spinal cord is **protected** by the vertebrate bones. The brain is **protected** by the skull.

b. Storage – Bones store minerals like calcium, magnesium, and phosphorous (used for DNA, ATP etc.). Long bones like your arm and thigh store fat that can be used for energy in a special yellow marrow found in the middle of these long bones.

c. Movement – Skeletal muscles pull on the bones to produce movement.

d. Blood Cell Formation – Some bones are filled with a soft tissue called red bone marrow. The red marrow makes red blood cells.

f. Special cells called osteoblasts make bones.

g. There are two major types of tissue – compact bone and spongy bone. The spongy bone actually provides the strength for bones because all the little spaces act like trusses for a bridge.

h. See picture of bone page 527.

i. Most bone was cartilage when you were born allowing you to grow. The cartilage was replaced with bone as you grew. Growth plates or areas of cartilage still exist so that your bones can continue to grow. The end of the nose or the ear is made of cartilage.

j. Ligaments – Strong bands of elastic tissue that connects bones to bones in the joints. (i.e. ACL, MCL, Achilles).

**2. Muscular System** – Composed of 600+ muscles. Each muscle is an organ.

 a. 3 Types of Muscle – Smooth (moves food through the digestive tract)

 Skeletal muscle (enables bones to move), and Cardiac muscle (causes the h

 heart to beat).

 b. Tendons – Connect muscles to bone.

 c. Pairing – Muscles work in pairs. Flexors bend the body. Extensors straighten the body.

**3. Integumentary System** – Composed of Skin, Hair, Nails, Eyebrows, Eyelashes.

 a. Integument = Covering

b. Skin – Helps keep moisture in and germs etc. out. Nerve endings allow us to feel what is around us. It controls body temperature of 98.6 f. Small organs called sweat glands within the skin produce sweat which evaporates as skin cools.

c. Melanin – A substance in the skin that determines skin color. The more melanin the darker the skin.

d. The skin is the largest organ of the body.

e. The skin has 3 layers – **Epidermis** (made of epithelial tissue and contains several layers of cells, but is only as thick as 2 sheets of paper. The **epidermis** is thicker on the palms of the hands and the bottoms of the feet. Most epidermal cells are dead and filled with a protein called kertatin, which helps make the skin tough). The **dermis** is below the epidermis and is made mostly of connective tissue and is made of a protein called collagen. The hypodermis consists of mostly adipose tissue and is the storage site of most body fat and is the thickest layer of tissue.

f. See page 535 for picture of skin and component parts. See pages 536 -537 for hair and nails and moles

**4. Cardiovascular System** – Composed of the main organs heart, arteries, veins and capillaries.

 a. **Cardio = heart** **Vascular =vessel**

b. Blood – The body contains about 5L of blood. Blood is a connective tissue made of RBC’s, WBC’s, Platelets and Plasma (contains water, minerals, nutrients, sugars, proteins). The RBC’s, WBC’s, and platelets all float in the plasma.

c. Hemoglobin – A protein in RBC’s that gives the blood the red color and clings to the O2 molecules allowing the RBC’s to transport O2 to the body. The shape of the RBC’s provides a lot of surface area for absorbing and releasing O2.

d. RBC’s are made in the bone marrow. They lose their nucleus and other organelles before entering the blood stream. Without a nucleus with DNA to replace worn out proteins within the cell, the cells die within about 4 months or 120 days.

e. WBC’s fight off germs that are pathogens. Some search for pathogens. Some eat pathogens. Some remember pathogens. Some release chemicals called antibodies. The WBC’s are made in the bone marrow but mature in lymphatic organs like the lymph nodes, thymus and spleen.

f. Platelets – These cells are pieces of larger cells from the bone marrow. They only live for about 5-10 days. The platelets released chemicals when a vessel is damaged that cause the blood to clot.

g. Show pictures of heart, arteries, and capillaries from pages 548-549. No cell in the body is more than 3-4 cells away from a capillary. They are so small that blood cells and etc. must travel single file.

**5. Lymphatic System** – Also known as the immune system.

 a. Is a secondary circulatory system.

b. Collects leaked and extra fluids around the cells and return it to the blood. They system also cleans and fights off germs.

c. The lymph travels through the lymphatic system and dumps into large vessels of the neck.

d. Lymph Nodes – Organs located throughout. Small bean shaped structures where germs and dead cells are removed from the lymph. The nodes contain many WBC’s. When the body becomes infected with viruses or bacteria the WBC’s multiply and the nodes sometimes become swollen and painful.

e. Thymus – Located just above the heart. It stores and releases WBC’s.

f. Spleen – This is the largest lymph node in the body. It is located in the upper left side of the abdomen. The spleen filters blood and, like the thymus releases WBC’s. They help break down the used and worn out RBC’s into parts that can be recycled.

g. Tonsils – Made of tissue and located in the back of the throat and at the back of the tongue. They sometimes become badly infected and must be removed.

h. See book pages 555 for pictures of organs.

**6. Respiratory System** – Helps provide oxygen and remove carbon dioxide.

a. Respiration involves two parts – Breathing and Respiration. The breathing is inhaling O2 and exhaling CO2. The respiration involves the body using oxygen and glucose within the mitochondria to produce water, ATP and CO2.

b. Pharynx – This is the throat. Air, Food and Drink travel here on the way to the stomach. The throat branches into two separate tubes. The **esophagus** leads to the stomach. The **trachea** leads to the lungs.

c. Larynx – This is the voice box and is part of the trachea.

d. Trachea – The windpipe.

e. Bronchi – Each bronchus leads to a lung and branches into thousands of smaller tubes called bronchioles.

f. Lungs – These are two sponge-like organs. Each of the thousands of bronchiole tubes branch into form thousands of air bags called alveoli. Tiny blood vessels called capillaries surround each alveolus to exchange CO2 for O2.

g. Show pictures on page 558 of gas exchange at the cellular level.

**7. Digestive System** – Eating is only the beginning of digestion. Your body must change the meal into substances that your body can use.

a. The most obvious part of your digestive system includes your digestive tract. This tract is a series of tube like organs that join end to end. This tract may be up to 9 m long.

b. Two types of digestion – Mechanical and Chemical. The breaking, crushing, and mashing of food is mechanical. The breaking down of large molecules is chemical digestion.

c. Three basic types of nutrients in the food we eat – carbohydrates, proteins and fats. Some foods like a peanut butter and jelly sandwich contain all 3. Chemical enzymes of the digestive system break these nutrients down into smaller molecules the body can use. For example, proteins we eat can be broken down into smaller molecules called amino acids. These amino acids are small enough to flow in the blood stream.

d. Mouth – See page570.

e. Stomach – A muscular baglike organ attached to the lower esophagus. It continues digestion by using it’s smooth muscle to squeeze the food and mix it with digestive enzymes in the stomach and mixed with fluids from the liver and pancreas. The stomach also contains stomach acid to kill mist bacteria that you might swallow with your food. After a few hours of chemical and mechanical digestion the food is reduced to chime.

f. Small intestine – A valve keeps food in the stomach until it is ready to enter the small intestine. At that point small amounts are allowed to enter the small intestines so that the food has been thoroughly mixed with the fluids first. If you flattened out the small intestine it would be the size of a tennis court. The inside wall is covered with villi. The villi are covered with tiny nutrient-absorbing cells which dump the nutrients into the blood stream.

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