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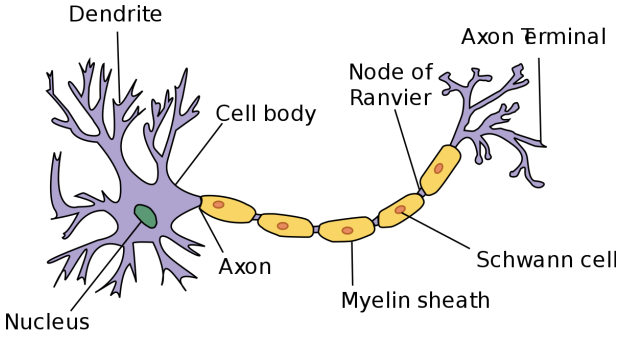
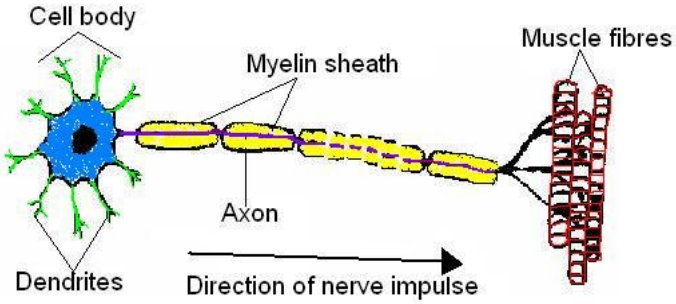
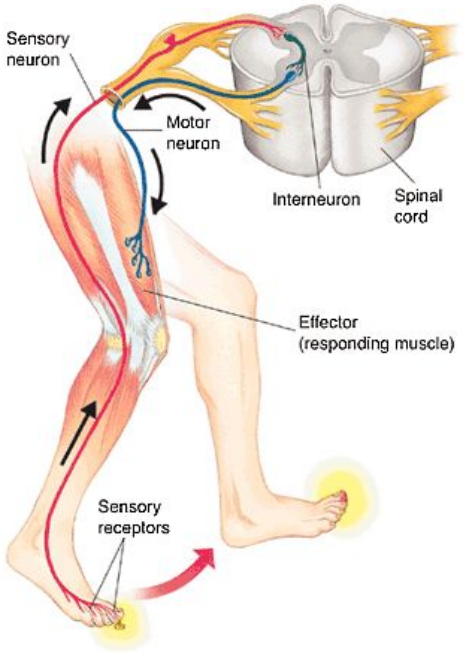
MCAS REVIEW 6: ANATOMY AND PHYSIOLOGY

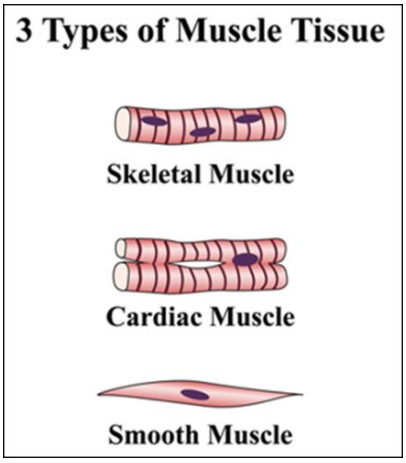
NERVOUS SYSTEM: BRAIN, SPINAL CORD AND NEURONS



- *Controls all aspects of body function*
- *Responds to external stimuli*
- *Neurons: cells that send and receive impulses*
- **Impulses:** electrochemical signals that travel across neurons
- **Sensory Neurons:** (to central nervous system) Help you sense things such as taste, sight, touch, hearing
- **Motor** neurons: (away from CNS) - Help you move
- **Central Nervous System** = brain and spinal cord
- **Neurotransmitters** = chemicals to move between neurons

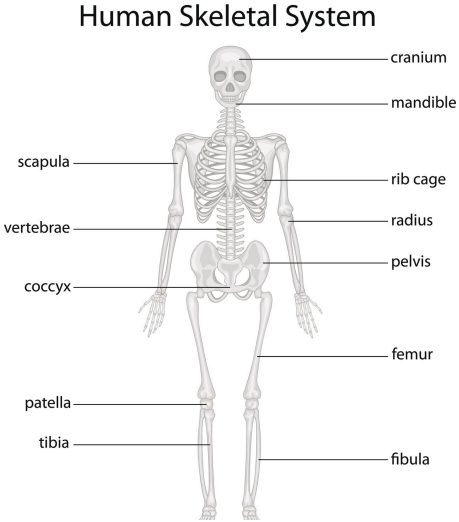






MUSCULAR SYSTEM

- *In charge of movement*
- Actin and Myosin = filaments
- **Skeletal muscle:** attached to bones, help bones move, voluntary
- **Smooth muscle:** line digestive tract, move food, involuntary
- **Cardiac muscle:** only found in heart, involuntary
- Tendon = connect bone to muscle

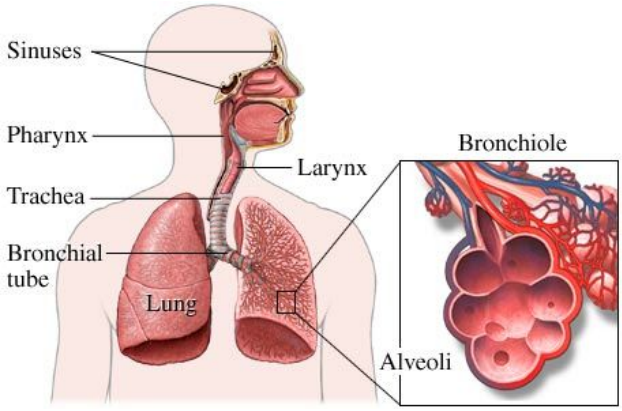


SKELETAL SYSTEM

- *Protects internal organs*
- ***Bone marrow produces blood cells!!!**
- Joints = where bones connect, bend, and rotate (ex. elbow, hip)
- Ligaments = connect bone to bone

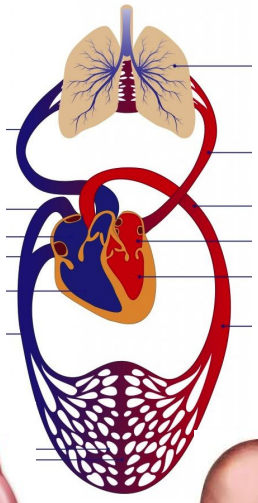
RESPIRATORY SYSTEM

- *Exchange of O_2 and CO_2 (happens in the ALVEOLI)*
- Different parts to move oxygen from air into lungs
- **Diaphragm** = muscle that lets air in to lungs
- Cilia and mucus clean respiratory tract
- Nose→ Pharynx → Trachea → Bronchi → Bronchioles → alveoli → Gas exchange and then back



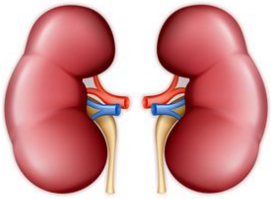
CIRCULATORY SYSTEM

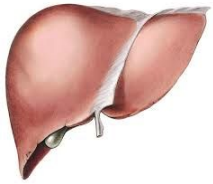
- *Moves **oxygen** and other **nutrients** through body (via the blood)*
- Parts of the heart: ATRIA and VENTRICLES
- Blood stops at lungs to pick up oxygen
- Blood stops at body cells to deliver oxygen
- **Arteries**: away from heart
- **Veins:** to heart
- **Capillaries:** for gas exchange



EXCRETORY SYSTEM

- **Kidneys:** filter wastes and water from blood
- **Liver:** filter toxins from blood
- **Bladder:** releases wastes in the form of urine

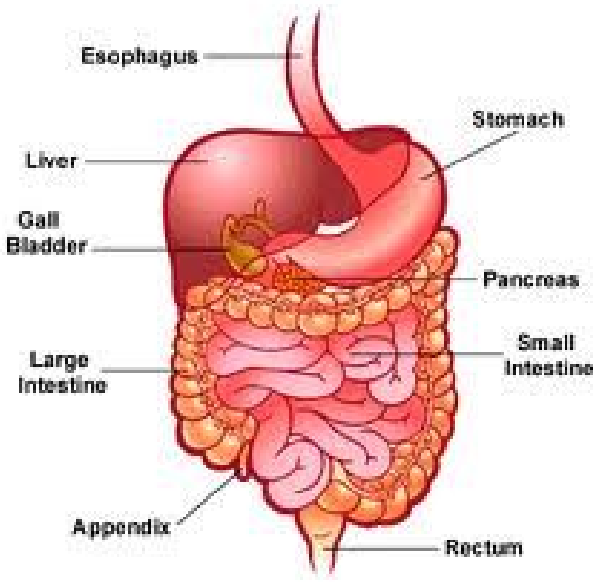




DIGESTIVE SYSTEM

- *Breaks down foods into smaller pieces so they can be absorbed and used by the body.*

- **Carbohydrate**s: first broken down in **MOUTH**.
  - AMYLASE: enzyme in mouth (saliva)
- **Protein**s first broken down in **STOMACH** using acids and enzymes
  - PEPSIN: enzyme in stomach
- **Fats** first broken down in **SMALL INTESTINE**
- **Small intestine** finishes digestion and absorbs nutrients
- **VILLI**: small bumps in small intestine that *absorb nutrients* and *send them into the bloodstream*.
- **Large intestine** absorbs waters, **rectum** stores feces



ENDOCRINE SYSTEM

- Sends chemical signals throughout body (**hormones)**
- Glands produce hormones

PRACTICE QUESTIONS

_____1. In the human heart, a group of cells in the wall of the right atrium produces nerve impulses that stimulate cardiac muscle. What do these nerve impulses directly control?

a. the amount of oxygen in the blood
b. the release of platelets into the blood
c. the speed at which the heart pumps blood
d. the path blood takes when it leaves the heart

___2. Which of the following statements **best** explains why oxygen diffuses from the alveoli into the blood?

A. The diaphragm draws oxygen into the alveoli at a rapid speed.

B. Alveoli cells contain hemoglobin to transfer gases to the blood.

C. The concentration of oxygen is greater in the alveoli than in the blood.

D. Red blood cells move one at a time through the capillaries surrounding the alveoli.

_____3. Which of the following statements **best** explains why offspring produced by sexual reproduction often look similar to, but not exactly the same as, their parents?

A. The offspring have genetic material from both the mother and the father.

B. The cells of the offspring contain all the dominant genes from the parents.

C. The cells of the offspring undergo mitosis many times as the offspring grow and develop.

D. The offspring have a period of embryonic development, rather than being born immediately after fertilization.

_____4. Besides producing cholesterol and bile, which of the following is a function of the liver?

a. digesting fiber
b. making red blood cells
c. removing toxins from blood
d. storing stomach contents for digestion

____5. Nerve cells use which of the following to communicate with each other?

a. Antibodies
b. Electrochemical signals
c. Enzymes
d. Simple Sugars

____6. Which of the following statements best compares sensory neuron function and motor neuron function in the human body?

A. Sensory neurons are voluntarily controlled, whereas motor neurons are involuntarily controlled.

B. Sensory neurons respond to light and sound stimuli, whereas motor neurons respond to touch stimuli.

C. Sensory neurons send signals to motor neurons, whereas motor neurons send signals to the central nervous system.

D. Sensory neurons send signals to the central nervous system, whereas motor neurons receive signals from the central nervous system.

_____7. Scientists compared levels of a particular chemical found in the blood of two groups of male birds. The average concentration of the chemical was significantly higher in one group of males than in the other group of males. It was determined that the chemical caused different mating behaviors depending upon its concentration in the blood.
Based on the information, this chemical is **most likely** which type of compound?

a. an antibody
b. a hormone
c. a nucleic acid
d. a sugar

____8. High levels of carbon dioxide in the blood trigger which of the following responses in the body?

a. An increase in the rate of digestion
b. An increase in the rate of breathing
c. A decrease in the speed of the pulse
d. A decrease in the production of sweat

____9. Which of the following statements describes how human traits are inherited?

a. Children receive half of their genes from each parent.
b. Only dominant traits are passed from parents to their children.
c. Traits skip a generation, passing directly from grandparents to their grandchildren.
d. Female children receive genes only from their mothers, and male children receive genes only from their fathers.

___10. Inhalation is the process that draws air into the lungs. How does the muscular system work with the respiratory system to make inhalation possible?

a. The chest muscle relaxes to let air flow into the respiratory system
b. The smooth muscles of the esophagus relax to let air flow into the respiratory system.
c. The diaphragm muscle contracts to expand the chest and draw air into the respiratory system.
d. The skeletal muscles of the neck contract to pull on the pharynx and draw air into the respiratory system.

___11. Which part of the digestive system eliminates solid wastes from the human body?

a. Kidneys
b. Liver
c. Pharynx
d. Rectum

___12. What is the typical path that dietary cholesterol takes through the digestive system, from the mouth to where it is absorbed into the bloodstream?

a. mouth → esophagus → pharynx → small intestine → stomach
b. mouth → pharynx → esophagus → small intestine → stomach
c. mouth → pharynx → esophagus → stomach → small intestine
d. mouth → esophagus → stomach → pharynx → small intestine

____13. Which of the following does the human digestive system break down for the body's cells to use for energy, repair, and growth?

a. Carbohydrates, fats and oxygen
b. Carbohydrates and proteins only
c. Carbohydrates and fats only
d. Carbohydrates, fats, and proteins

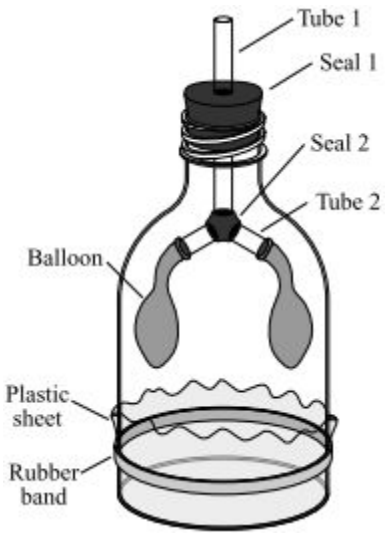
___14. A high respiratory rate usually indicates that a person's body needs more

a. Antibodies
b. Carbon Dioxide
c. Oxygen
d. Platelets

___15. Which of the following is the **best** example of the human body maintaining homeostasis?

a. The heart beats using cardiac muscle.
b. The breathing rate increases during exercise.
c. The nose and ears contain cartilage for flexibility.
d. The digestive system uses enzymes to break down food.

___16. A student built a model to demonstrate how air is moved into and out of the human respiratory system. A diagram of the student's model is shown below.



Which of the following parts of the model is matched with the part of the respiratory system it represents?

a. plastic sheet—lung
b. Balloon—larynx
c. Tube 1 - Trachea
d. seal 2—pharynx

___17. The concentration of which gas is higher in exhaled air than in inhaled air?

a. Carbon Dioxide
b. Helium
c. Nitrogen
d. Oxygen

___18. A certain disease in humans is caused by swelling in the kidneys. The swelling affects the ability of the kidneys to function properly.
Which of the following **most likely** occurs in the body as a result of this disease?

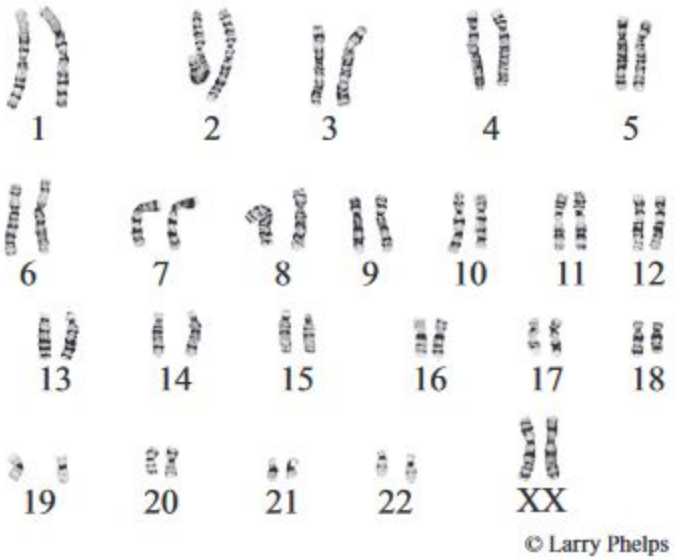
a. Nervous system functioning increases.
b. Nitrogenous waste builds up in the blood.
c. Other body organs do the work of the kidneys.
d. Hormones are transported by the muscular system.

____19. Low blood pressure can be life-threatening. To help maintain a stable blood pressure, receptors in the heart detect changes in blood pressure. Information about blood pressure changes is then sent to the brain. If blood pressure is too low, the brain sends a message to the heart to beat faster.

Based on this information, which of the following systems are directly involved in keeping blood pressure stable?

a. circulatory, muscular, nervous
b. circulatory, immune, skeletal
c. excretory, immune, muscular
d. excretory, nervous, skeletal

____20. The chromosomes of a human female are shown below. The chromosomes are arranged in pairs. The 23rd pair, labeled XX, is the sex chromosomes.



Which of the following would the female normally pass on to her child?

a. all 46 of the chromosomes
b. 23 chromosomes, one from each pair
c. a random set of any 23 of the chromosomes
d. the first 11 chromosome pairs, plus one sex chromosome

_____21. Which of the following structures transmits nerve impulses between the brain and most motor and sensory neurons?

a. carotid artery
b. diaphragm
c. esophagus
d. spinal cord

____22. When astronauts are in low-gravity environments, their bodies begin to release stored calcium. As a result, which of the following **most likely** occurs when an astronaut returns to Earth?

a. The risk of inflamed tendons increases.
b. The chance of breaking a bone increases.
c. The stomach's level of functioning decreases.
d. The blood's ability to carry oxygen decreases.

23. A student in a kitchen does the following:

- smells something cooking in the oven
- walks to the oven
- sees a pizza
- takes the pizza out of the oven
- starts chewing the pizza
- tastes the pizza

The student's nervous system has a role in all these actions

a. Describe the function of sensory neurons.
b. Identify **two** specific actions from the list above that require sensory neurons.
c. Describe the function of motor neurons.
d. Identify **two** specific actions from the list above that require motor neurons.

24. Cholesterol is a waxy, organic substance found in body cells and in blood. The human body uses cholesterol to make cell membranes, vitamin D, hormones, and bile (a liver product). There are two major types of cholesterol, both produced by the liver.

- LDL cholesterol is called “bad cholesterol.” Excess amounts of LDL cholesterol in the blood mix with other substances and stick to the walls of arteries. The arteries become narrow and lose flexibility as these cholesterol layers build up and harden (a condition called atherosclerosis).
- HDL cholesterol is called “good cholesterol.” HDL cholesterol can help transport LDL cholesterol out of the blood to be processed and eliminated from the body.

Total cholesterol levels in the body can be affected by genetics and diet. For example, a person may inherit genes that result in low cholesterol or high cholesterol; or a person may eat large amounts of animal products, such as meat, dairy, and eggs, that are high in cholesterol.

Exercise, medications, or changes in diet may help lower LDL blood cholesterol levels in humans. Increasing the amount of fiber in a diet, for example, is one specific action that may lower LDL cholesterol levels.

Blood carries oxygen to body cells.

a. Identify the process in body cells that directly requires oxygen **and** identify the structure in blood that transports oxygen to body cells.

Individuals monitor their total cholesterol levels to try to assess their risk of atherosclerosis

b. Describe the effect of atherosclerosis on the amount of oxygen supplied to body cells. Explain your answer.

Additional health problems such as heart attacks and strokes cause cells to become damaged or die due to lack of oxygen.

c. Explain why cells die if they cannot perform the process you identified in part (a) because they do not receive oxygen for an extended period of time.