

Body Systems, Homeostasis, Feedback (Test Monday, January 22) KEY

Movement of Molecules:

1. What is the difference between diffusion and active transport? Draw a diagram for each one.

Diffusion is the movement of molecules from an area of high concentration to an area of low concentration until the molecules are evenly spread out. This can happen easily through a cell membrane for small molecules, cell membranes need special protein channels or transport proteins for larger molecules to diffuse through the membrane. This does not require cell energy.

Active transport is the movement of molecules from an area of low concentration to an area of high concentration. In a cell it involves special transport proteins and energy from the cell to move these molecules against the concentration gradient so they become more concentrated.

Review the Cell Model Lab.

2. What materials could go through the membrane? Explain why.

The smaller molecules (water and glucose) could move through the membrane. The larger molecule (starch) could not move through. In this case it was determined by size. It was only diffusion of molecules – no active transport or use of energy or transport proteins.

3. How is the model similar and different from living cell membranes?

Cell membranes also regulate what goes in and out of the cell. In a cell it is sometimes determined by size, but transport proteins can bring in larger molecules. Cells can also move molecules against the concentration gradient with active transport and this cannot happen with dialysis tubing.

Draw and label the following body systems:

1. Circulatory System (heart, arteries, veins, capillaries. Extra: vena cava, aorta)

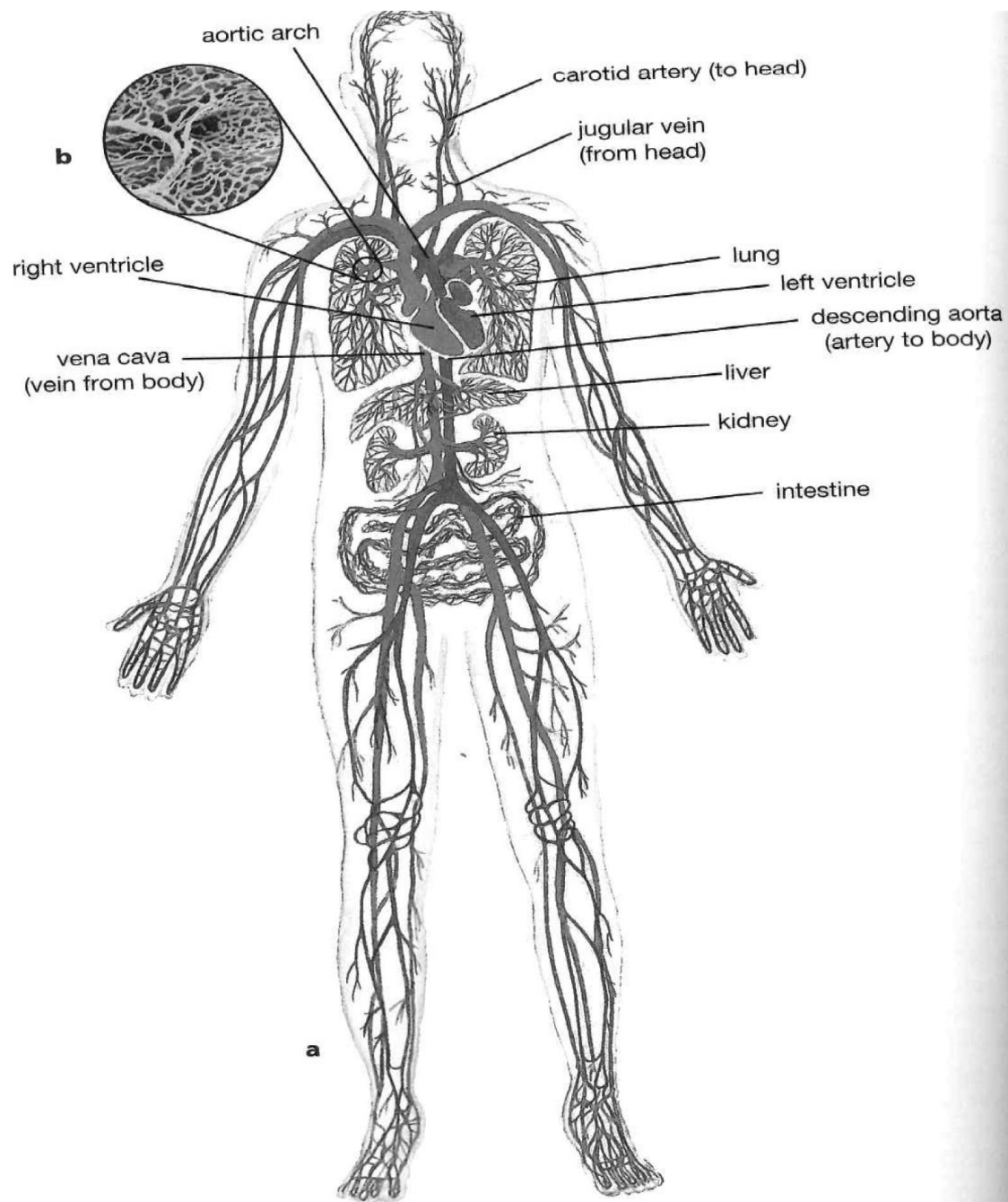
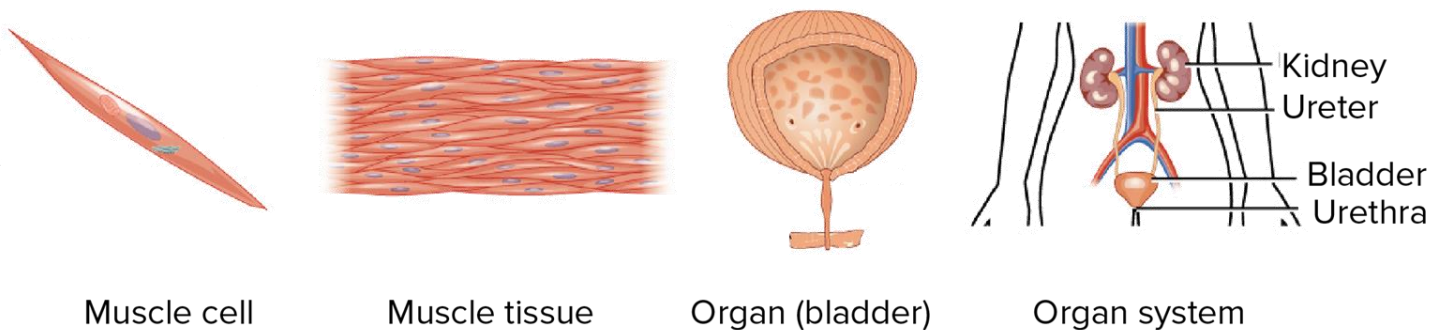
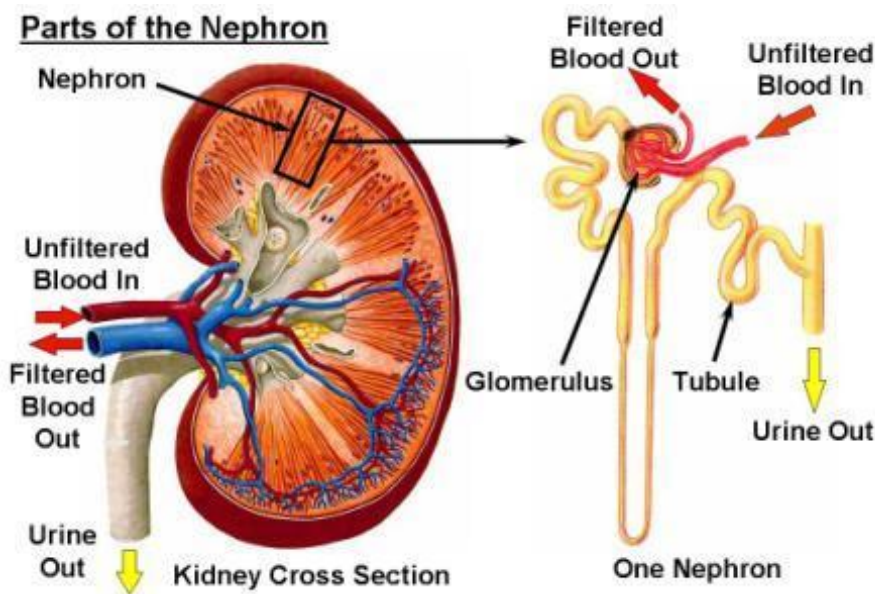


Figure E4.9 Human circulatory system. (a) Some of the components of the human circulatory system. Blood vessels branch repeatedly to form smaller and smaller vessels, eventually ending in capillaries. (b) Colored electron micrograph of a capillary bed (photographed at 100 \times). Very fine capillaries (pink) branch off blood vessels (gray).

2. Urinary system (include nephron) (kidneys, ureter, bladder, urethra)



Nephron: Review the parts of the nephron. (vein, artery, capillaries, glomerulus, tubules).



1. What molecules are filtered out of the blood into the tubules and then reabsorbed into the blood?
(look over the nephron worksheet) water, salt, glucose, amino acids (small organic molecules)
2. What molecules are NOT filtered out of the blood?

Blood cells and blood plasma proteins

3. What molecules are not reabsorbed into the blood and instead go out the urine?
Urea and some salts and water
4. How does this process help regulate water, salt and toxin (urea) levels?

The nephron is signaled from the body and determines the amount of water to excrete through the urine (for example, if the person drank a lot of water, then it will be removed from the blood and sent out the tubules. If the body needs more water, then the water will be filtered out of the blood but then Reabsorbed back into the blood as needed) The same thing happens with salts – they are filtered into tubules but then reabsorbed back into blood vessel in the nephron as needed). Urea should all get filtered out of blood and not reabsorbed.

Draw/describe where the following systems interact and what materials are exchanged

1. Circulatory system and muscle The capillaries run right next to muscles tissue and muscles cells. When the cells are doing cellular respiration the oxygen from the blood diffuses into the cell (high concentration in blood towards low concentration in cells) and the carbon dioxide from the cells

diffuses into the blood. The blood also carries the Small Organic Molecules to the cells and the urea and other wastes away from the cells.

2. Circulatory system and lung The capillaries that are next to the lung cells will exchange oxygen and carbon dioxide. The oxygen will move from the lung cells to the blood and the carbon dioxide will diffuse from the blood to the lungs.
3. Circulatory system and kidney See the description of the nephron. The urea and excess salts and water will diffuse from blood to nephron tubules and then get carried out of the body in the urine. Other materials move from the blood vessels to the nephron tubules and then back into the blood as needed.
4. Circulatory system and intestine The blood vessels next to the intestine will carry the Small Organic Molecules (glucose, amino acids, fatty acids, glycerol) that diffuse across the intestinal walls into the blood. The blood carries these molecules to all parts of the body.

Define and give examples of:

1. Negative feedback An external stimulus or condition causes the body to react, the reaction brings the body back to the regular set point. The body gets cold, the nerves sense the temperature change and sends signals to the brain which then instructs the body to react (shivering, constrict blood vessels, put on a coat) and that brings the body temperature back up to normal. Look at Biology Calendar 1/16/2018
2. Positive feedback A stimulus causes a reaction in the body that then intensifies the reaction (an injury causes the blood to clot, once the clotting begins more clotting happens) See 1/16/2018 on Biology Calendar
3. Diffusion (see beginning of study guide)
4. Active Transport (See beginning of study guide)
5. Levels of organization in bodies (largest to smallest) organism to organ system to organ to tissue to cells

These are different conditions that must be maintained for homeostasis in a living organism. Give a brief description of where and what happens in the body to keep these conditions at optimal levels.

1. Temperature: Watch the Amoeba Sisters video (Link on 1/16/2018) or description above under Negative Feedback
2. pH: Recall the lab with pH – there are buffers (chemicals) in cells that can limit the change of pH. Also, carbon dioxide (which makes the blood acidic) is released through the lungs, so breathing rate can change the pH of the blood
3. water level: recall the work of the nephron (see above) also read the Careful Coordination article (1/16/2018)
4. salt level: Read the essay (Disposing of Wastes, 1/10/18) and look at description of nephron above.
5. toxins in blood: : Read the essay (Disposing of Wastes, 1/10/18) and look at description of nephron above.
6. blood pressure: Read the article (Careful Coordination, 1/16/2018)