

Name:

---

## Chapter 7 Cell Transport

Multiple Choice: Identify the letter of the choice that best completes the statement or answers the question.

1. Which of the following types of molecules are the major structural components of the cell membrane?
  - A. phospholipids and cellulose
  - B. nucleic acids and proteins
  - C. phospholipids and proteins
  - D. proteins and cellulose
  - E. glycoproteins and cholesterol
  
2. The presence of cholesterol in the plasma membranes of some animals
  - A. enables the membrane to stay fluid more easily when cell temperature drops.
  - B. enables the animal to remove hydrogen atoms from saturated phospholipids.
  - C. enables the animal to add hydrogen atoms to unsaturated phospholipids.
  - D. makes the membrane less flexible, allowing it to sustain greater pressure from within the cell.
  - E. makes the animal more susceptible to circulatory disorders.
  
3. According to the fluid mosaic model of cell membranes, which of the following is a true statement about membrane phospholipids?
  - A. They can move laterally along the plane of the membrane.
  - B. They frequently flip-flop from one side of the membrane to the other.
  - C. They occur in an uninterrupted bilayer, with membrane proteins restricted to the surface of the membrane.
  - D. They are free to depart from the membrane and dissolve in the surrounding solution.
  - E. They have hydrophilic tails in the interior of the membrane.
  
4. In order for a protein to be an integral membrane protein it would have to be which of the following?
  - A. hydrophilic
  - B. hydrophobic
  - C. amphipathic
  - D. completely covered with phospholipids
  - E. exposed on only one surface of the membrane
  
5. Of the following functions, which is most important for the glycoproteins and glycolipids of animal cell membranes?
  - A. facilitated diffusion of molecules down their concentration gradients
  - B. active transport of molecules against their concentration gradients
  - C. maintaining the integrity of a fluid mosaic membrane
  - D. maintaining membrane fluidity at low temperatures
  - E. a cell's ability to distinguish one type of neighboring cell from another

6. What kinds of molecules pass through a cell membrane most easily?
- A. large and hydrophobic
  - B. small and hydrophobic
  - C. large polar
  - D. ionic
  - E. monosaccharides such as glucose
7. Which of the following is a characteristic feature of a carrier protein in a plasma membrane?
- A. It is a peripheral membrane protein.
  - B. It exhibits a specificity for a particular type of molecule.
  - C. It requires the expenditure of cellular energy to function.
  - D. It works against diffusion.
  - E. It has few, if any, hydrophobic amino acids.
8. Which of the following would likely move through the lipid bilayer of a plasma membrane most rapidly?
- A.  $\text{CO}_2$
  - B. an amino acid
  - C. glucose
  - D.  $\text{K}^+$
  - E. starch
9. Which of the following statements is correct about diffusion?
- A. It is very rapid over long distances.
  - B. It requires an expenditure of energy by the cell.
  - C. It is a passive process in which molecules move from a region of higher concentration to a region of lower concentration.
  - D. It is an active process in which molecules move from a region of lower concentration to one of higher concentration.
  - E. It requires integral proteins in the cell membrane.
10. Water passes quickly through cell membranes because
- A. the bilayer is hydrophilic.
  - B. it moves through hydrophobic channels.
  - C. water movement is tied to ATP hydrolysis.
  - D. it is a small, polar, charged molecule.
  - E. it moves through aquaporins in the membrane.
11. Celery stalks that are immersed in fresh water for several hours become stiff and hard. Similar stalks left in a salt solution become limp and soft. From this we can deduce that the cells of the celery stalks are
- A. hypotonic to both fresh water and the salt solution.
  - B. hypertonic to both fresh water and the salt solution.
  - C. hypertonic to fresh water but hypotonic to the salt solution.
  - D. hypotonic to fresh water but hypertonic to the salt solution.

E. isotonic with fresh water but hypotonic to the salt solution.

12. A cell whose cytoplasm has a concentration of 0.02 M glucose is placed in a test tube of water containing 0.02 M glucose. Assuming that glucose is not actively transported into the cell, which of the following terms describes the tonicity of the external solution relative to the cytoplasm of the cell?

- A. turgid
- B. hypertonic
- C. hypotonic
- D. flaccid
- E. isotonic

13. Which of the following statements correctly describes the normal tonicity conditions for typical plant and animal cells?

- A. The animal cell is in a hypotonic solution, and the plant cell is in an isotonic solution.
- B. The animal cell is in an isotonic solution, and the plant cell is in a hypertonic solution.
- C. The animal cell is in a hypertonic solution, and the plant cell is in an isotonic solution.
- D. The animal cell is in an isotonic solution, and the plant cell is in a hypotonic solution.
- E. The animal cell is in a hypertonic solution, and the plant cell is in a hypotonic solution.

14. Which of the following membrane activities require energy from ATP hydrolysis?

- A. facilitated diffusion.
- B. movement of water into a cell
- C.  $\text{Na}^+$  ions moving out of the cell
- D. movement of glucose molecules
- E. movement of water into a paramecium

15. What are the membrane structures that function in active transport?

- A. peripheral proteins
- B. carbohydrates
- C. cholesterol
- D. cytoskeleton filaments
- E. integral proteins

16. White blood cells engulf bacteria through what process?

- A. exocytosis
- B. phagocytosis
- C. pinocytosis
- D. osmosis
- E. receptor-mediated exocytosis

17. Glucose diffuses slowly through artificial phospholipid bilayers. The cells lining the small intestine, however, rapidly move large quantities of glucose from the glucose-rich food into their glucose-poor cytoplasm. Using this information, which transport mechanism is most probably functioning in the intestinal cells?

- A. simple diffusion
- B. phagocytosis
- C. active transport pumps

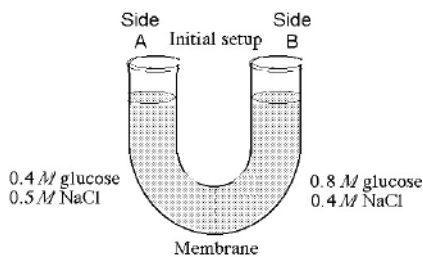
- D. exocytosis
- E. facilitated diffusion

18. Which of the following processes includes all others?

- A. osmosis
- B. diffusion of a solute across a membrane
- C. facilitated diffusion
- D. passive transport
- E. transport of an ion down its electrochemical gradient

\* \* \* \* \*

Refer to the figure below to answer the following questions.



The solutions in the arms of a U-tube are separated at the bottom of the tube by a selectively permeable membrane. The membrane is permeable to sodium chloride but NOT to glucose. Side A is filled with a solution of 0.4 M glucose and 0.5 M sodium chloride (NaCl), and side B is filled with a solution containing 0.8 M glucose and 0.4 M sodium chloride. Initially, the volume in both arms is the same.

19. At the beginning of the experiment,

- A. side A is hypertonic to side B.
- B. side A is hypotonic to side B.
- C. side A is isotonic to side B.
- D. side A is hypertonic to side B with respect to glucose.
- E. side A is hypotonic to side B with respect to sodium chloride.

20. If you examine side A after 3 days, you should find

- A. a decrease in the concentration of NaCl and glucose and an increase in the water level.
- B. a decrease in the concentration of NaCl, an increase in water level, and no change in the concentration of glucose.
- C. no net change in the system.
- D. a decrease in the concentration of NaCl and a decrease in the water level.
- E. no change in the concentration of NaCl and glucose and an increase in the water level.