Chapter 5 Exercises

Review Questions

1. Which plasma membrane component can be either found on its surface or embedded in the membrane structure?

a. protein
b. cholesterol
c. carbohydrate
d. phospholipid

2. Which characteristic of a phospholipid contributes to the fluidity of the membrane?

a. its head
b. cholesterol
c. a saturated fatty acid tail
d. double bonds in the fatty acid tail

3. What is the primary function of carbohydrates attached to the exterior of cell membranes?

a. identification of the cell
b. flexibility of the membrane
c. strengthening the membrane
d. channels through membrane

4. A scientist compares the plasma membrane composition of an animal from the Mediterranean coast with one from the Mojave Desert. Which hypothesis is most likely to be correct?

a. The cells from the Mediterranean coast animal will have more fluid plasma membranes.
b. The cells from the Mojave Desert animal will have a higher cholesterol concentration in the plasma membranes.
c. The cells' plasma membranes will be indistinguishable.
d. The cells from the Mediterranean coast animal will have a higher glycoprotein content, while the cells from the Mojave Desert animal will have a higher lipoprotein content.

5. Water moves via osmosis _____.

a. throughout the cytoplasm
b. from an area with a high concentration of other solutes to a lower one
c. from an area with a high concentration of water to one of lower concentration
d. from an area with a low concentration of water to higher concentration

6. The principal force driving movement in diffusion is the _____.

a. temperature
b. particle size
c. concentration gradient
d. membrane surface area

7. What problem is faced by organisms that live in fresh water?

a. Their bodies tend to take in too much water.
b. They have no way of controlling their tonicity.
c. Only salt water poses problems for animals that live in it.
d. Their bodies tend to lose too much water to their environment.

8. In which situation would passive transport *not* use a transport protein for entry into a cell?

a. water flowing into a hypertonic environment
b. glucose being absorbed from the blood
c. an ion flowing into a nerve cell to create an electrical potential
d. oxygen moving into a cell after oxygen deprivation

9. Active transport must function continuously because _____.

a. plasma membranes wear out
b. not all membranes are amphiphilic
c. facilitated transport opposes active transport
d. diffusion is constantly moving solutes in opposite directions

10. How does the sodium-potassium pump make the interior of the cell negatively charged?

a. by expelling anions
b. by pulling in anions
c. by expelling more cations than are taken in
d. by taking in and expelling an equal number of cations

11. What is the combination of an electrical gradient and a concentration gradient called?

a. potential gradient
b. electrical potential
c. concentration potential
d. electrochemical gradient

12. What happens to the membrane of a vesicle after exocytosis?

a. It leaves the cell.
b. It is disassembled by the cell.
c. It fuses with and becomes part of the plasma membrane.
d. It is used again in another exocytosis event.

13. Which transport mechanism can bring whole cells into a cell?

a. pinocytosis
b. phagocytosis
c. facilitated transport
d. primary active transport

14. In what important way does receptor-mediated endocytosis differ from phagocytosis?

a. It transports only small amounts of fluid.
b. It does not involve the pinching off of membrane.
c. It brings in only a specifically targeted substance.
d. It brings substances into the cell, while phagocytosis removes substances.

15. Many viruses enter host cells through receptor-mediated endocytosis. What is an advantage of this entry strategy?

a. The virus directly enters the cytoplasm of the cell.
b. The virus is protected from recognition by white blood cells.
c. The virus only enters its target host cell type.
d. The virus can directly inject its genome into the cell's nucleus.

16. Which of the following organelles relies on exocytosis to complete its function?

a. Golgi apparatus
b. vacuole
c. mitochondria
d. endoplasmic reticulum

17. Imagine a cell can perform exocytosis but only minimal endocytosis. What would happen to the cell?

a. The cell would secrete all its intracellular proteins.
b. The plasma membrane would increase in size over time.
c. The cell would stop expressing integral receptor proteins in its plasma membrane.
d. The cell would lyse.

18. Which of the following are only in plant cells?

a. gap junctions
b. desmosomes
c. plasmodesmata
d. tight junctions

19. The key components of desmosomes are cadherins and _____.

a. actin
b. microfilaments
c. intermediate filaments
d. microtubules

20. Diseased animal cells may produce molecules that activate death cascades to kill the cells in a controlled manner. Why would neighboring healthy cells also die?

a. The death molecule is passed through desmosomes.

b. The death molecule is passed through plasmodesmata.

c. The death molecule disrupts the extracellular matrix.

d. The death molecule passes through gap junctions.

Critical Thinking Questions

21. Why is it advantageous for the cell membrane to be fluid in nature?

22. Why do phospholipids tend to spontaneously orient themselves into something resembling a membrane?

23. How can a cell use an extracellular peripheral protein as the receptor to transmit a signal into the cell?

24. Discuss why the following affect the rate of diffusion: molecular size, temperature, solution density, and the distance that must be traveled.

25. Why does water move through a membrane?

26. Both of the regular intravenous solutions administered in medicine, normal saline and lactated Ringer's solution, are isotonic. Why is this important?

27. Describe two ways that decreasing temperature would affect the rate of diffusion of molecules across a cell's plasma membrane.

28. A cell develops a mutation in its potassium channels that prevents the ions from leaving the cell. If the cell's aquaporins are still active, what will happen to the cell? Be sure to describe the tonicity and osmolarity of the cell.

29. Where does the cell get energy for active transport processes?

30. How does the sodium-potassium pump contribute to the net negative charge of the interior of the cell?

31. Glucose from digested food enters intestinal epithelial cells by active transport. Why would intestinal cells use active transport when most body cells use facilitated diffusion?

32. The sodium/calcium exchanger (NCX) transports sodium into and calcium out of cardiac muscle cells. Describe why this transporter is classified as secondary active transport.

33. Why is it important that there are different types of proteins in plasma membranes for the transport of materials into and out of a cell?

34. Why do ions have a difficult time getting through plasma membranes despite their small size?

35. How does the structure of a plasmodesma differ from that of a gap junction?

36. Explain how the extracellular matrix functions.

37. Pathogenic *E. coli* have recently been shown to degrade tight junction proteins during infection. How would this provide an advantage to the bacteria?