

Advanced Cell Membrane MCQs

1. Which of the following is INCORRECT regarding the function of the cell membrane?

- A. The cell membrane separates internal cellular components from the external nonliving environment and maintains structural integrity.
- B. It controls the movement of substances into and out of the cell through selective permeability mechanisms.
- C. It allows all hydrophilic and hydrophobic substances to pass equally without restriction or selectivity.
- D. It contributes to maintaining homeostasis by regulating transport processes across the membrane.

2. Which of the following is INCORRECT regarding membrane composition?

- A. The fundamental structural unit of biological membranes is the lipid bilayer composed mainly of phospholipids.
- B. Phospholipids are the primary molecules responsible for forming the bilayer structure of membranes.
- C. Proteins and carbohydrates are completely absent from biological membranes and play no structural or functional role.
- D. Membranes contain lipids, proteins, and some carbohydrates contributing to their structure and function.

3. Which of the following is INCORRECT regarding phospholipid structure?

- A. Phospholipids consist of hydrophilic polar heads and hydrophobic nonpolar tails.
- B. The hydrophobic tails face outward toward the aqueous environment on both sides of the membrane.
- C. The hydrophilic heads are oriented toward aqueous environments inside and outside the cell.
- D. The bilayer arrangement results from interactions between hydrophilic and hydrophobic regions.

4. Which of the following is INCORRECT regarding types of phospholipids?

- A. Choline and ethanolamine head groups are among the most abundant phospholipid classes.
- B. Phospholipids with choline or ethanolamine head groups typically have no net charge.
- C. Serine and inositol head groups carry net negative charges.
- D. All phospholipid head groups in membranes carry a positive net charge.

5. Which of the following BEST describes membrane fluidity?

A. Membrane fluidity is determined solely by the presence of proteins and is independent of lipid composition.

B. Membrane fluidity is influenced by temperature and the types of lipids present in the bilayer.

C. Membrane fluidity is constant under all physiological conditions regardless of environmental changes.

D. Membrane fluidity is only affected by carbohydrate components attached to membrane proteins.

6. Which of the following is INCORRECT regarding membrane fluidity?

A. Membrane lipids are held together mainly by weak hydrophobic interactions.

B. Most membrane lipids and some proteins can move laterally within the membrane.

C. Molecules frequently undergo transverse (flip-flop) movement across the membrane.

D. Lateral movement of lipids contributes to membrane flexibility and dynamic behavior.

7. Which of the following is INCORRECT regarding temperature effects on membranes?

A. As temperature decreases, membranes become more rigid due to tighter packing of phospholipids.

B. Higher temperatures generally increase membrane fluidity.

C. Membranes transition from fluid to solid states as temperature drops.

D. Lower temperatures always increase membrane fluidity by increasing lipid movement.

8. Which of the following is INCORRECT regarding unsaturated fatty acids?

A. Unsaturated fatty acids contain kinks that prevent tight packing of phospholipids.

B. Membranes rich in unsaturated fatty acids are generally more fluid.

C. Unsaturated fatty acids increase rigidity of membranes compared to saturated fatty acids.

D. The presence of double bonds contributes to increased membrane flexibility.

9. Which of the following is INCORRECT regarding cholesterol function in membranes?

A. Cholesterol modulates membrane fluidity depending on temperature conditions.

B. At high temperatures, cholesterol reduces membrane fluidity by restricting phospholipid movement.

C. At low temperatures, cholesterol prevents tight packing and increases fluidity.

D. Cholesterol has no role in regulating membrane fluidity under any physiological condition.

10. Which of the following BEST describes membrane asymmetry?

- A. Both layers of the lipid bilayer are identical in composition and function.
- B. Membrane asymmetry results from identical distribution of proteins and carbohydrates on both sides.
- C. Membrane asymmetry means the inner and outer leaflets differ in composition and organization.
- D. Carbohydrates are equally distributed on both sides of the membrane bilayer.

11. Which of the following is INCORRECT regarding membrane proteins?

- A. Membrane proteins are responsible for most specific functions of the membrane.
- B. Peripheral proteins are loosely attached to the membrane surface.
- C. Integral proteins penetrate the lipid bilayer and may span across it.
- D. All membrane proteins are located only on the outer surface and never embedded in the bilayer.

12. Which of the following is INCORRECT regarding transport proteins?

- A. Transport proteins include channels and pumps that facilitate movement of substances.
- B. Channels allow passive movement of molecules across membranes.
- C. Pumps require energy to move substances against concentration gradients.
- D. Transport proteins function independently of membrane structure and are not embedded in the bilayer.

13. Which of the following is INCORRECT regarding membrane carbohydrates?

- A. Membrane carbohydrates play a role in cell-cell recognition.
- B. They are typically found on the external surface of the membrane.
- C. They are usually short branched oligosaccharides.
- D. They are uniformly distributed inside and outside the membrane equally.

14. Which of the following is INCORRECT regarding glycolipids?

- A. Glycolipids contain carbohydrate groups attached to lipids.
- B. They are located primarily in the outer leaflet of the cell membrane.
- C. Their sugar residues have variable patterns.
- D. They are found exclusively in the inner leaflet of the plasma membrane.

15. Which of the following BEST describes passive transport?

- A. Movement of molecules against concentration gradient using ATP.
- B. Movement of molecules from high to low concentration without energy input.
- C. Movement of molecules using vesicles and requiring ATP.
- D. Movement of molecules only through membrane pumps.

16. Which of the following is INCORRECT regarding facilitated diffusion?

- A. It involves transport of polar molecules through protein channels.
- B. It occurs along a concentration gradient.
- C. It requires ATP to function effectively.
- D. It allows hydrophilic molecules to cross the membrane.

17. Which of the following is INCORRECT regarding active transport?

- A. Active transport moves substances against their concentration gradient.
- B. It requires energy in the form of ATP.
- C. It uses protein pumps embedded in the membrane.
- D. It always occurs from high to low concentration gradient.

18. Which of the following BEST describes endocytosis?

- A. Movement of small molecules directly through membrane channels.
- B. Uptake of large molecules into the cell via vesicles.
- C. Passive diffusion of lipids across the bilayer.
- D. Transport of water molecules through aquaporins.

19. Which of the following is INCORRECT regarding osmosis?

- A. Osmosis is the movement of water from high to low water concentration.
- B. The direction of water movement depends on solute concentration differences.
- C. Hypertonic solutions have lower solute concentration than hypotonic solutions.
- D. Isotonic solutions have equal solute concentrations on both sides.

20. Which of the following is INCORRECT regarding large molecule transport?

- A. Endocytosis and exocytosis involve vesicles and vacuoles.
- B. Phagocytosis refers to cellular eating.
- C. Pinocytosis refers to cellular drinking.
- D. Exocytosis involves intake of substances into the cell.

Model Answers

1. C

2. C

3. B

4. D

5. B

6. C

7. D

8. C

9. D

10. C

11. D

12. D

13. D

14. D

15. B

16. C

17. D

18. B

19. C

20. D