What is the Cell Membrane?

Worksheet

The cell membrane is a phospholipid bilayer with embedded proteins that separates a cell's interior from its surroundings and selectively controls the movement of substances in and out.

Questions

1. What type of molecule forms the main structure of the cell membrane?

A) Phospholipids
B) Nucleic acids
C) Polysaccharides
D) Amino acids

2. Which transport process requires ATP?

A) Simple diffusion
B) Osmosis
C) Facilitated diffusion
D) Active transport

3. A cell placed in a hypertonic (high-solute) solution will...

A) Swell and burst
B) Shrink as water leaves
C) Stay exactly the same
D) Immediately divide

4. Which best describes facilitated diffusion?

A) Movement against gradient using ATP
B) Movement with gradient through a channel/carrier protein, no ATP
C) Random movement of only water
D) Active pumping of ions only

5. A red blood cell is placed in distilled (pure) water. Predict and explain what happens.

6. Oxygen must move from the lungs' air sacs into the blood. Which transport type is used and why?

7. A nerve cell must keep sodium ions low inside and potassium ions high inside, against their gradients. Which mechanism does this and what does it cost?

8. Define: What is the cell membrane made of?

9. Define: What does 'selectively permeable' mean?

10. Define: Diffusion vs active transport?

Answer Key

1. A) Phospholipids - The membrane's core is a phospholipid bilayer.

2. D) Active transport - Active transport moves substances against their gradient, which costs energy (ATP).

3. B) Shrink as water leaves - Water moves out toward the higher outside solute concentration, so the cell shrinks.

4. B) Movement with gradient through a channel/carrier protein, no ATP - Facilitated diffusion is passive but needs a protein channel/carrier to help polar or charged substances cross.

5. Distilled water has a much lower solute concentration than the cell's cytoplasm. Water moves into the cell by osmosis, from low solute (outside) to high solute (inside) concentration. The cell swells and may burst (lyse) because water keeps entering to equalize concentration.

6. Oxygen concentration is higher in the air sacs than in the blood. Oxygen moves down its concentration gradient, from high to low. No ATP is needed, so this is simple diffusion (passive transport).

7. Both ions must move against their natural concentration gradient. This requires a carrier protein and energy: the Na+/K+ pump. Each pump cycle uses one ATP molecule - this is active transport.

8. A phospholipid bilayer with embedded proteins, cholesterol, and carbohydrate markers.

9. The membrane lets some substances cross freely while blocking or regulating others.

10. Diffusion moves substances down their gradient without energy; active transport moves them against the gradient using ATP.