What is Cell Membrane Structure?

Worksheet

The cell membrane is a phospholipid bilayer studded with proteins, cholesterol, and glycoproteins, arranged so hydrophilic heads face water on both sides and hydrophobic tails face each other in the middle - a structure called the fluid mosaic model.

Questions

1. What are the two main components of the cell membrane's bilayer?

A) Proteins and DNA
B) Phospholipids and cholesterol
C) Carbohydrates and RNA
D) Ribosomes and lipids

2. Which part of a phospholipid faces the watery cytoplasm?

A) The hydrophobic tail
B) The hydrophilic head
C) The glycoprotein chain
D) The cholesterol ring

3. What best describes the fluid mosaic model?

A) A rigid, static wall of protein
B) A fluid lipid bilayer with mobile embedded proteins
C) A single layer of carbohydrate
D) A solid layer of cholesterol only

4. Where are glycoproteins typically located?

A) Deep inside the cytoplasm
B) On the outer surface of the membrane
C) Inside the nucleus
D) In the mitochondria only

5. Identify the two 'tails' of a phospholipid and explain why they point inward in the bilayer.

6. A glucose transport protein spans the entire membrane. What type of membrane protein is it, and what is its likely function?

7. Explain why cholesterol is described as a 'membrane stabilizer' across a range of temperatures.

8. Define: What is the fluid mosaic model?

9. Define: What are the two parts of a phospholipid?

10. Define: What is the role of cholesterol in the membrane?

Answer Key

1. B) Phospholipids and cholesterol - The bilayer is primarily made of phospholipids, with cholesterol embedded among them.

2. B) The hydrophilic head - The hydrophilic (water-loving) phosphate head faces outward toward water on both sides of the bilayer.

3. B) A fluid lipid bilayer with mobile embedded proteins - The model shows the membrane as fluid, with a mosaic pattern of proteins that can drift within the lipid bilayer.

4. B) On the outer surface of the membrane - Glycoproteins project from the outer membrane surface and are key to cell recognition.

5. Each phospholipid has a hydrophilic (water-loving) phosphate head and two hydrophobic (water-fearing) fatty acid tails. In water, the tails avoid contact with water molecules, so they cluster together in the middle of the bilayer. The heads face outward toward the watery cytoplasm and extracellular fluid on both sides.

6. Because it spans the whole bilayer, it is an integral (transmembrane) protein. Spanning proteins that move specific molecules across the membrane function as channels or carrier proteins. This one likely acts as a glucose transporter, moving glucose from outside to inside the cell.

7. Cholesterol molecules wedge between phospholipid tails. At high temperatures, cholesterol restrains excess movement, preventing the membrane from becoming too fluid. At low temperatures, cholesterol prevents tails from packing too tightly, stopping the membrane from becoming too rigid - so it keeps fluidity roughly constant.

8. The model describing the cell membrane as a fluid phospholipid bilayer with a 'mosaic' of embedded proteins that can move within it.

9. A hydrophilic (polar) phosphate head and two hydrophobic (nonpolar) fatty acid tails.

10. It regulates membrane fluidity, keeping the membrane neither too rigid nor too fluid across temperature changes.