Membrane Structure, Dynamics, and Transport Mechanisms

Biochemistry · Answer Key · 11 Questions

1. Which organelles utilize specialized, non-vesicular membrane biogenesis mechanisms instead of the conventional ER-to-Golgi vesicular transport pathway?

A) Lysosomes and Endosomes
B) Mitochondria and Chloroplasts
C) Golgi apparatus and Peroxisomes
D) Plasma membrane and Endoplasmic Reticulum

2. Which transport enzyme moves specific phospholipids from the outer (exoplasmic) leaflet to the inner (cytosolic) leaflet using ATP?

A) Scramblase
B) Floppase
C) Flippase
D) Lipase

3. What is the primary direction of movement catalyzed by floppases across the lipid bilayer?

A) From outer leaflet to inner leaflet
B) From inner (cytosolic) leaflet to outer (exoplasmic) leaflet
C) Bidirectional movement between both leaflets
D) Lateral movement within the same leaflet

4. How does scramblase differ from flippases and floppases regarding energy requirements?

A) It requires double the amount of ATP
B) It utilizes GTP instead of ATP
C) It generally functions independently of ATP hydrolysis
D) It relies exclusively on a sodium gradient

5. During co-translational insertion, which particle recognizes the hydrophobic signal sequence on a nascent polypeptide chain?

A) Signal Recognition Particle (SRP)
B) Sec61 complex
C) Golgi transport vesicle
D) Ubiquitin ligase

6. Through which protein-conducting channel does the polypeptide pass to enter or insert into the ER membrane?

A) ATP synthase
B) Sec61 complex
C) Nuclear pore complex
D) Aquaporin channel

7. Non-vesicular lipid transport from the ER to mitochondria occurs at specialized structural junctions known as what?

A) Tight junctions
B) Membrane Contact Sites (MCS)
C) Desmosomes
D) Gap junctions

8. Which specialized proteins extract lipids like phosphatidylserine from the ER to transport them to the mitochondrial outer membrane?

A) Lipid Transfer Proteins (LTPs)
B) G-protein coupled receptors
C) Floppases
D) Scramblases

9. Which unique lipid is synthesized by mitochondria following the import of phosphatidylserine?

A) Sphingomyelin
B) Phosphatidylcholine
C) Cardiolipin
D) Cholesterol

10. Which type of covalent bond connects fatty acid chains to the glycerol backbone in phospholipids?

A) Disulfide bond
B) Glycosidic bond
C) Ester bond
D) Peptide bond

11. Which covalent bonds stabilize the three-dimensional folding of membrane proteins in the extracellular environment?

A) Disulfide bonds
B) Ester bonds
C) Phosphodiester bonds
D) Ionic bonds

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