SNS COLLEGE OF ALLIED HEALTH SCIENCE

Affiliated to The Tamil Nadu Dr MGR Medical University, Chennai

DEPARTMENT OF CARDIOPULMONARY PERFUSION CARE TECHNOLOGY

COURSE NAME: Physiology

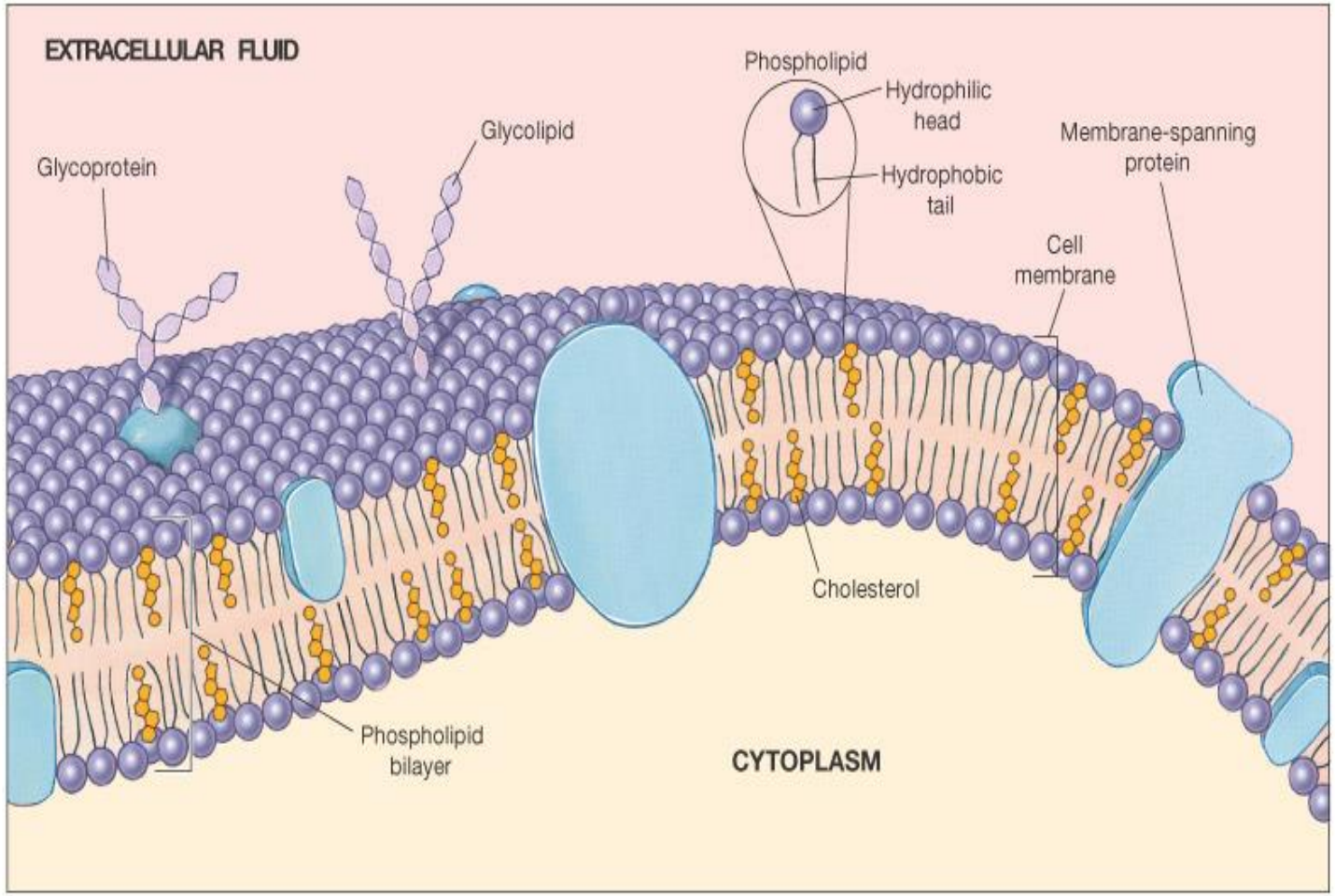
UNIT I – Cell

TOPIC: Cell Membrane and its Functions

FACULTY NAME: Mrs. Saranyaa Prasath

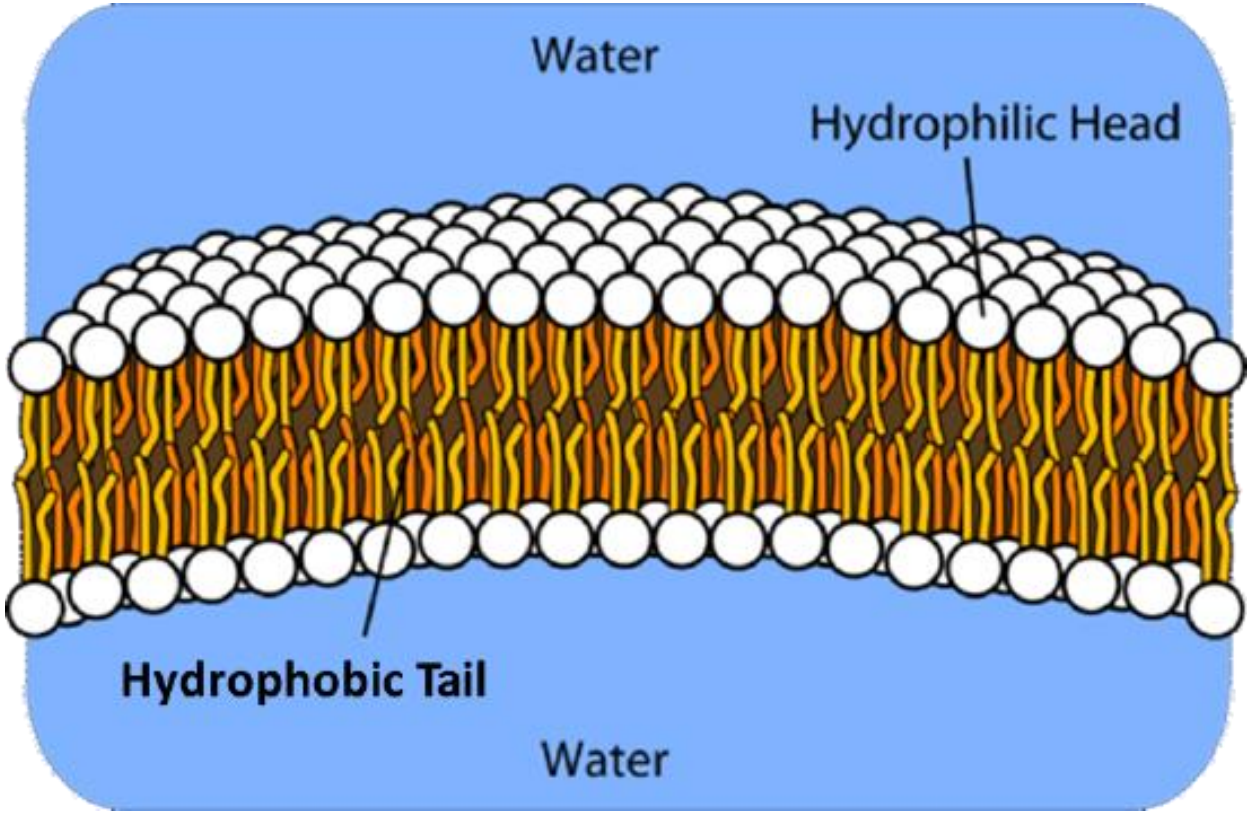
Empathize - Cell Membrane and Its Functions

- The cell membrane (plasma membrane) is a thin, semi-permeable biological membrane surrounding the cell.
- It separates intracellular contents from extracellular environment, maintaining homeostasis.
- Composed mainly of a lipid bilayer, proteins, and carbohydrates.



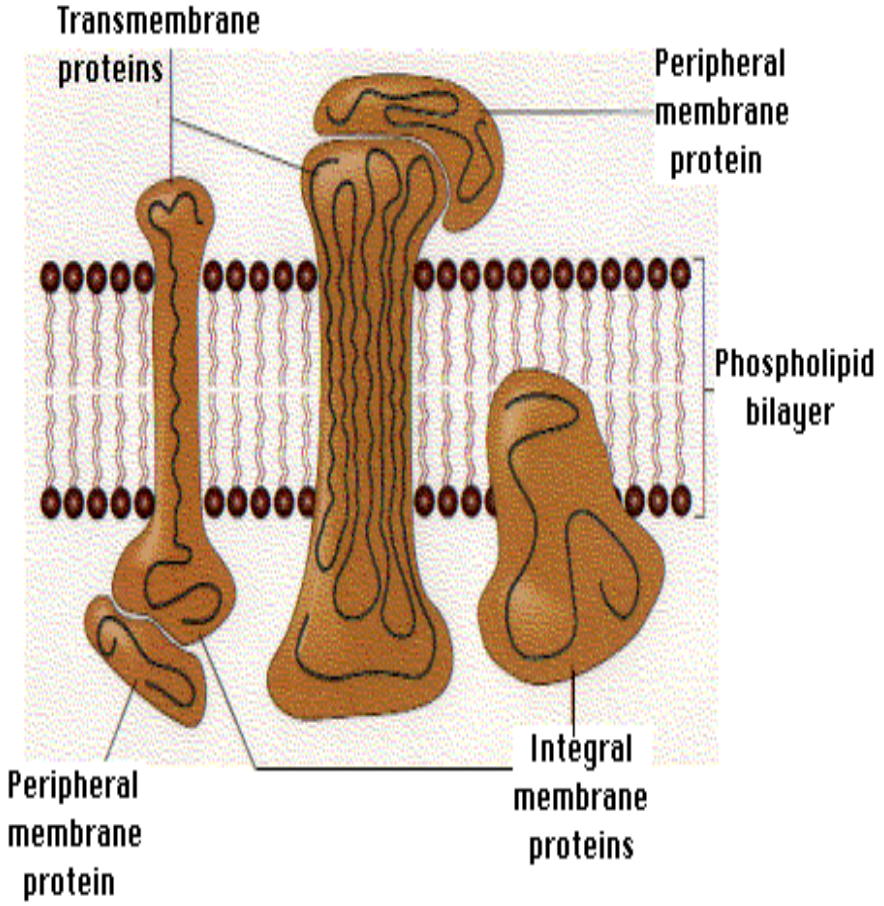
Define - Introduction to the Cell Membrane

- The membrane's primary role is to provide a selective barrier allowing regulated transport.
- **Structure:** Phospholipid bilayer with hydrophilic heads facing outward and hydrophobic tails inward.
- Embedded proteins and cholesterol stabilize and add functionality.



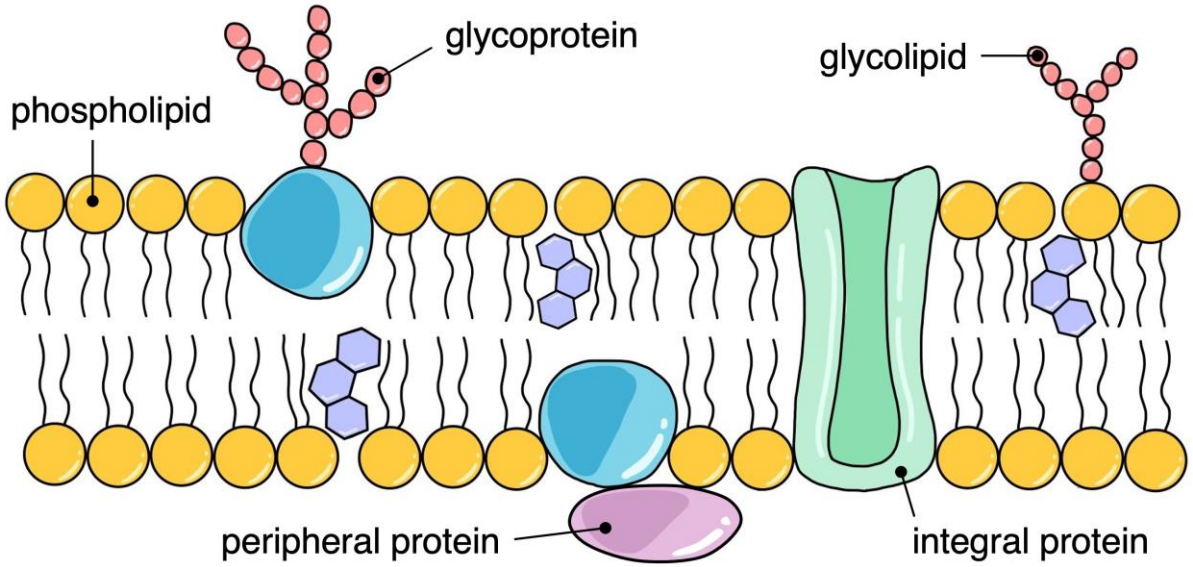
Ideate the Structure of the Cell Membrane

- **Lipid bilayer:** Amphipathic phospholipids form a fluid matrix.
- Integral proteins span the membrane, peripheral proteins associate loosely.
- Cholesterol molecules maintain membrane fluidity and integrity.
- Glycolipids and glycoproteins on the outer surface function in cell recognition.

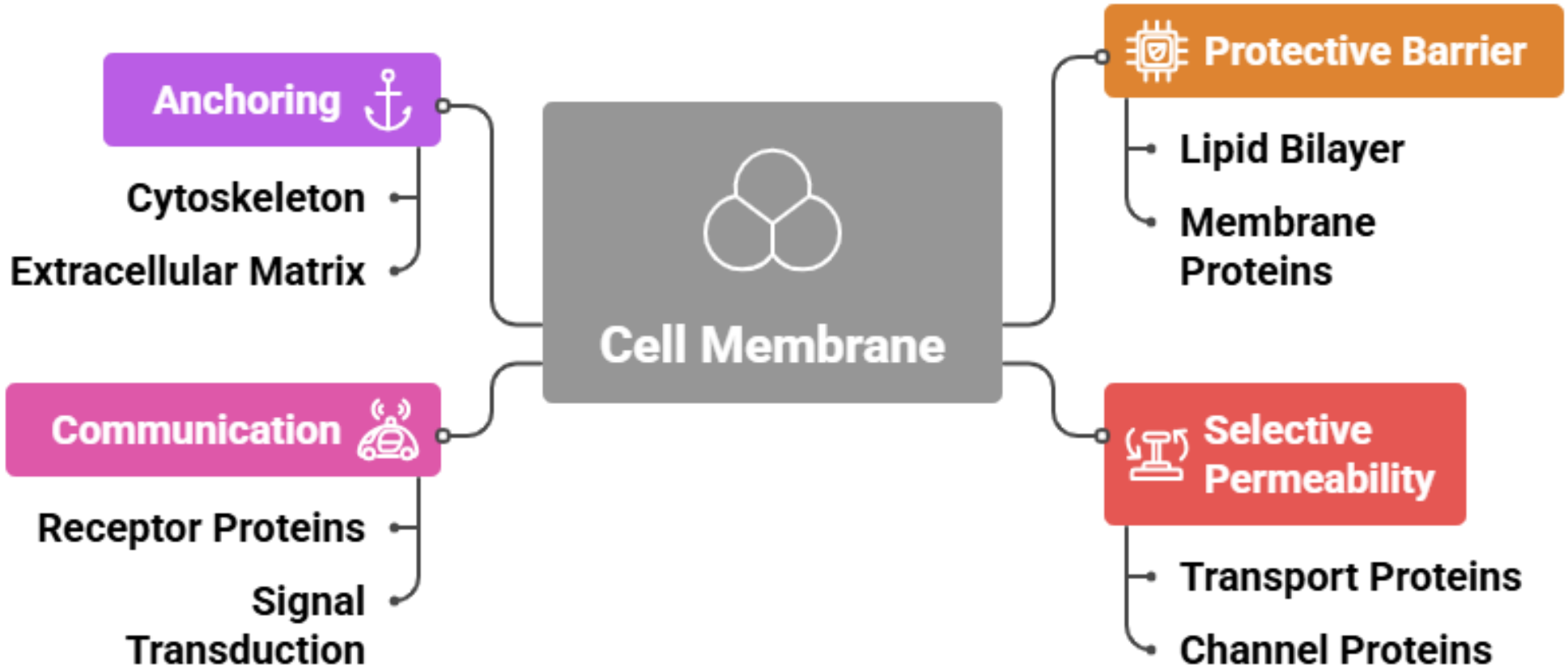


Prototype - Physical and Chemical Properties

- **Fluid Mosaic Model:** Dynamic and flexible membrane structure with proteins floating in or on the bilayer.
- Selective permeability due to lipid bilayer and protein channels/transporters.
- Amphipathic nature balances interaction with aqueous environments inside and outside the cell.



Test - Major Functions of the Cell Membrane



Define - Passive Transport Mechanisms

Simple diffusion

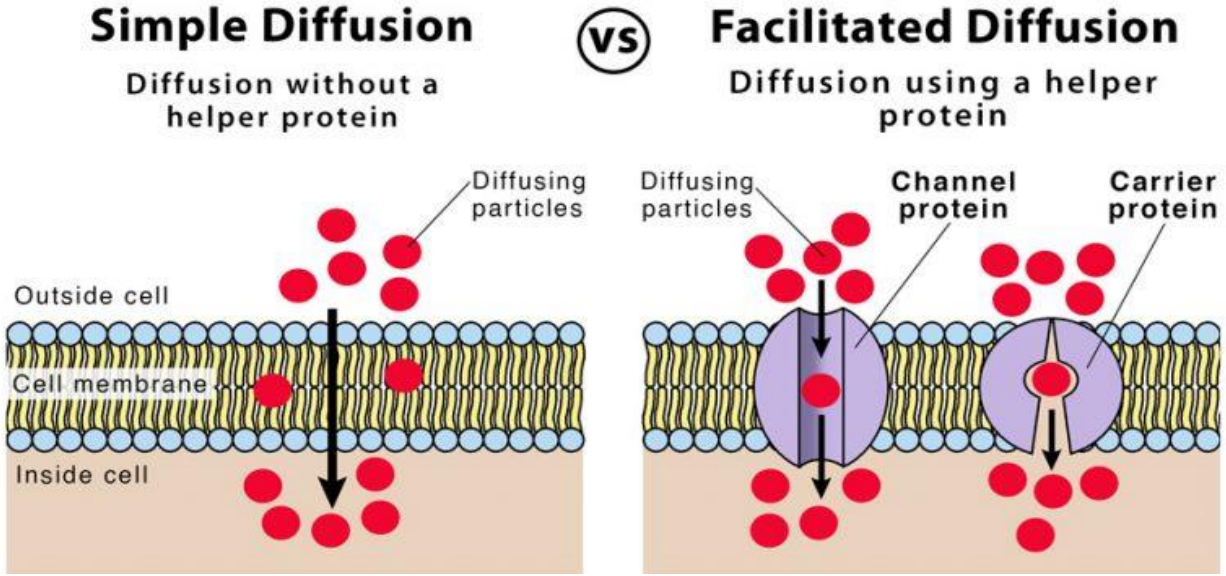
Movement of nonpolar molecules like O2 and CO2 down concentration gradients.

Facilitated diffusion

Transport of polar molecules through protein channels or carriers without energy.

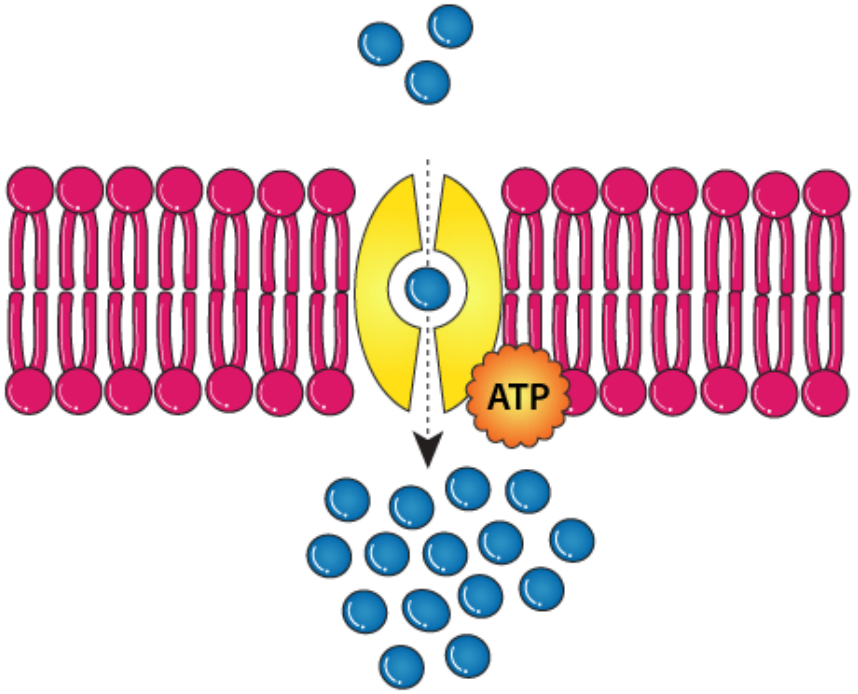
Osmosis

Water movement across the membrane via aquaporins to balance solute concentrations.

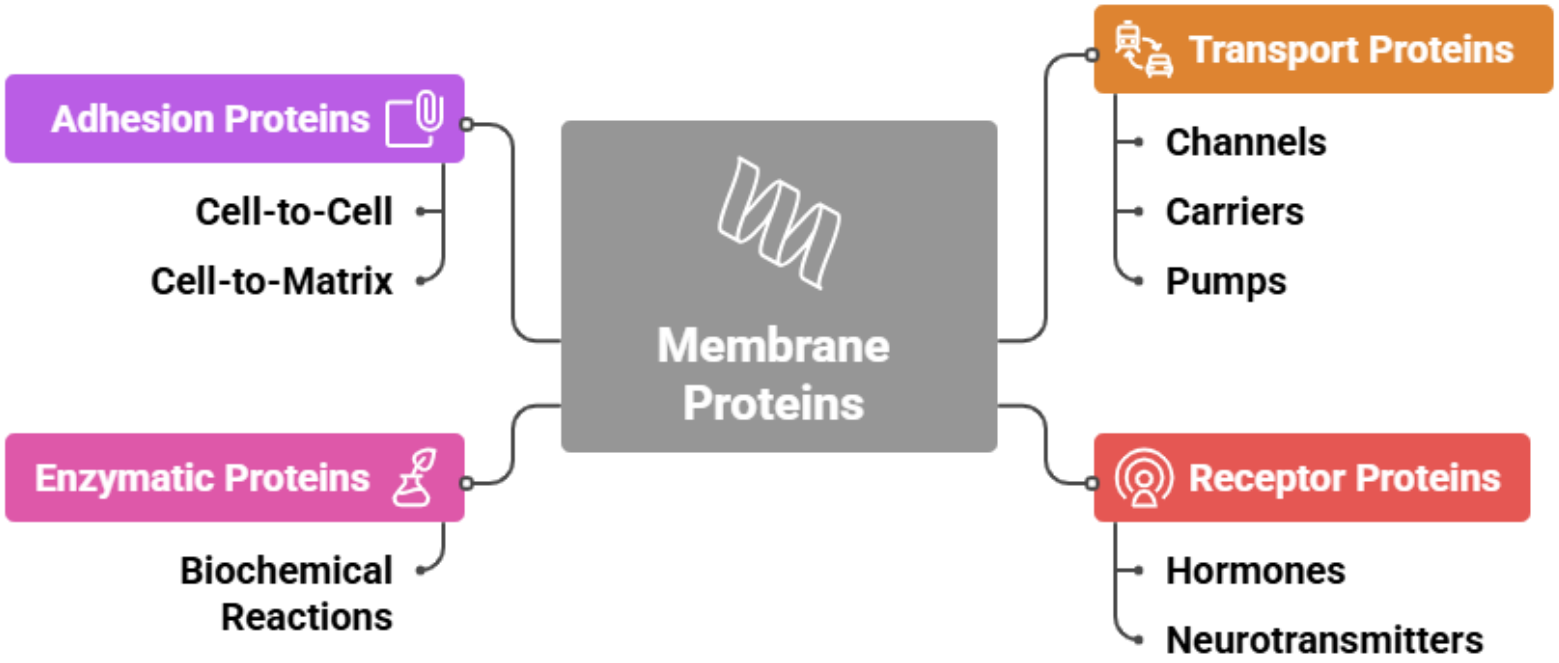


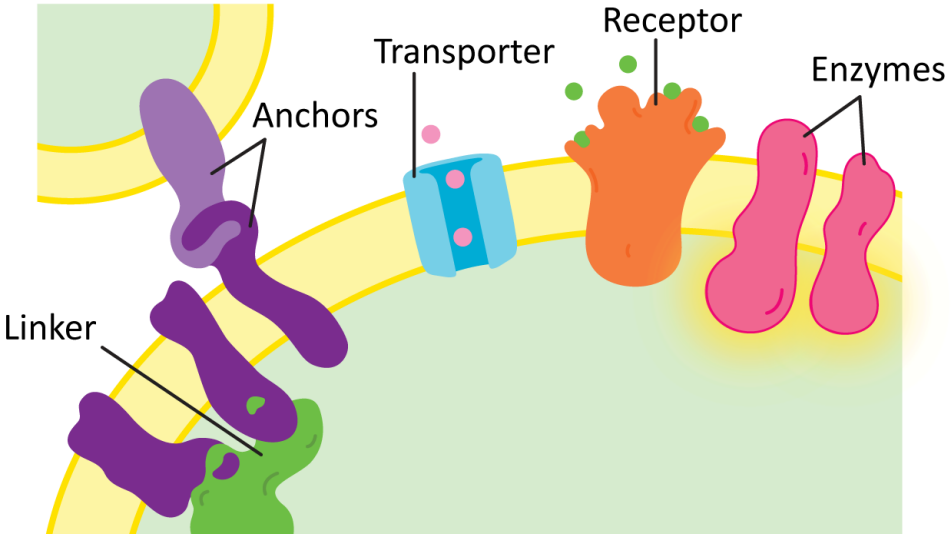
Define - Active Transport Mechanisms

Producing Energy	Pump / Channel	Endo & Exocytosis
Requires energy (ATP) to move molecules against concentration gradients.	Sodium-potassium pump (Na+/K+ ATPase) maintains ionic gradients.	Endocytosis and exocytosis transport large molecules or particles into and out of the cell.



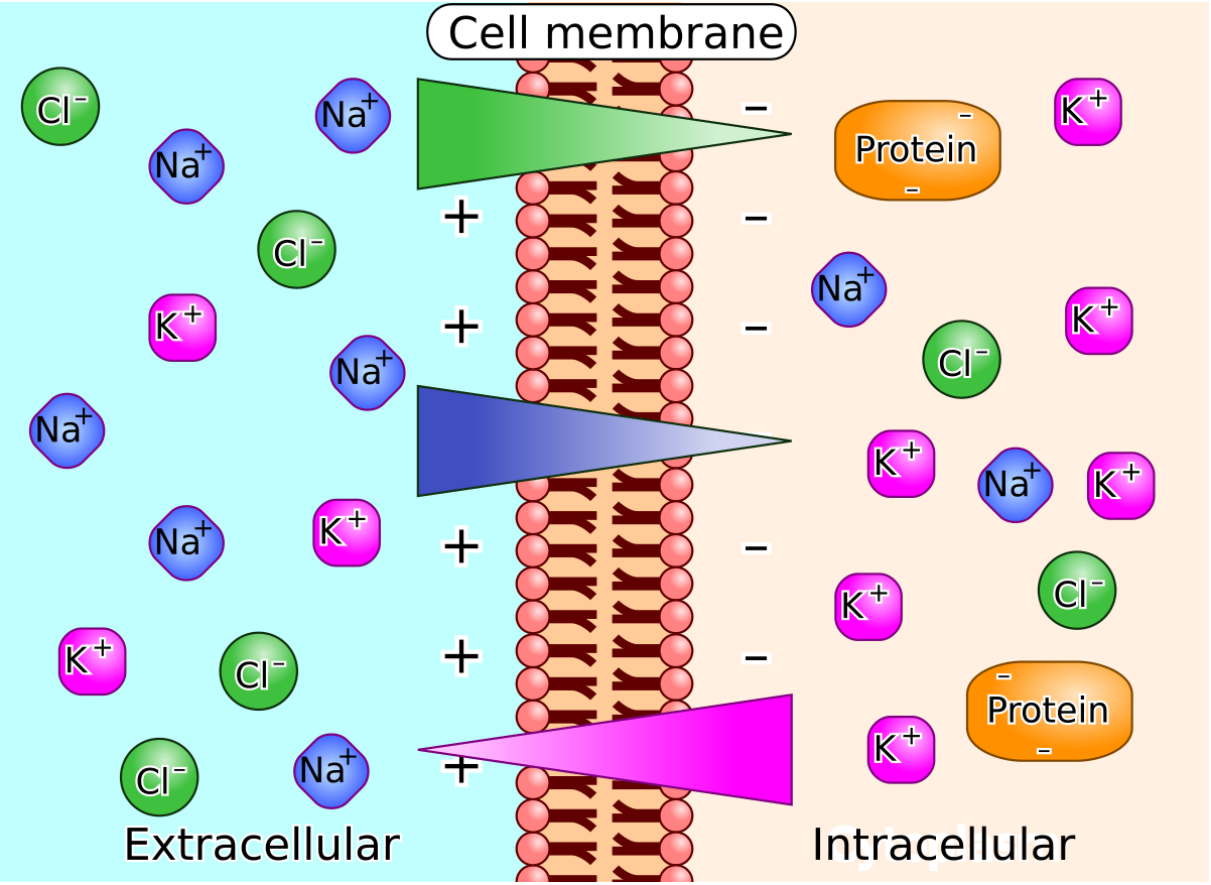
Ideate - Membrane Proteins and Their Roles



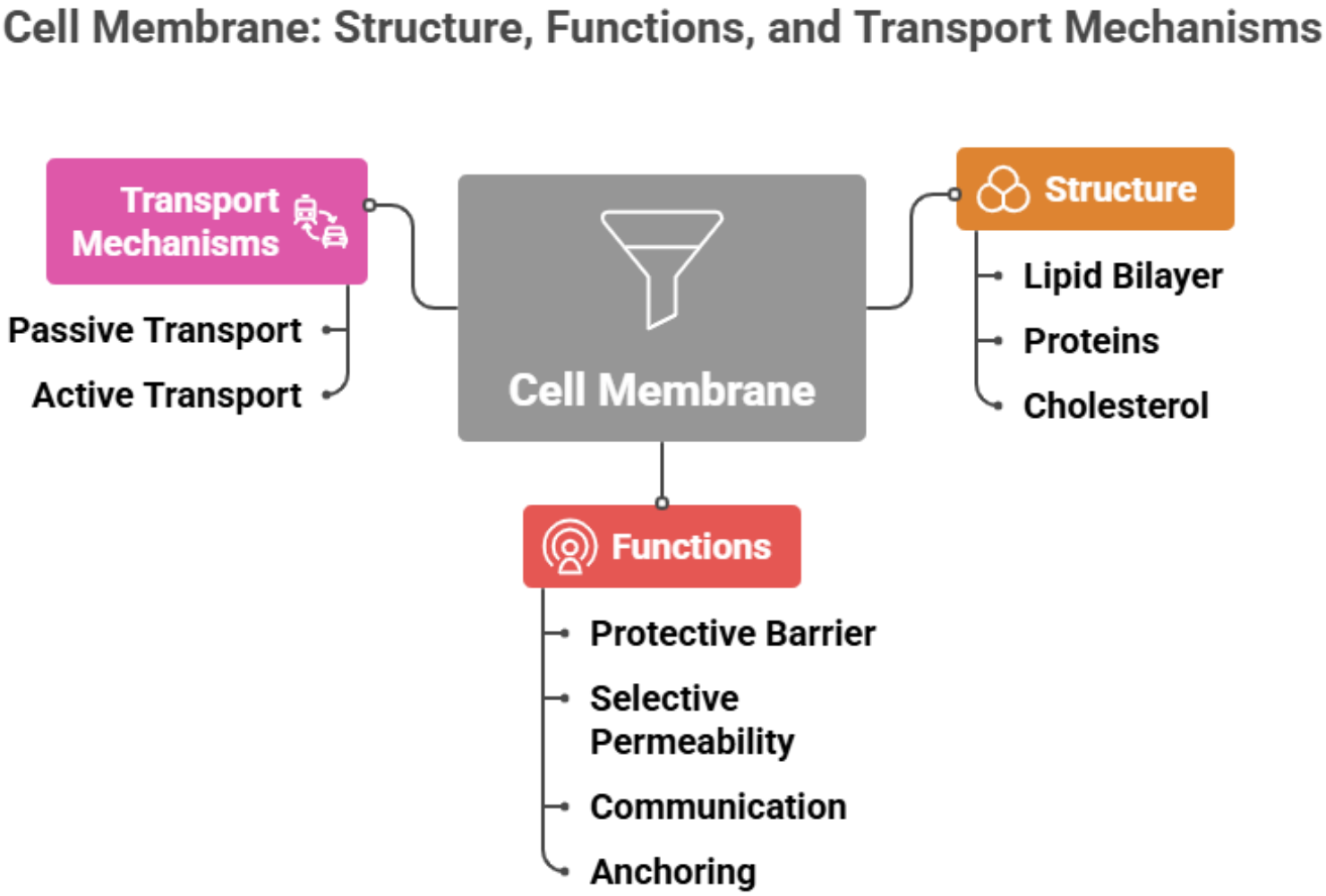


Additional Functions

- Maintenance of membrane potential and electrochemical gradients essential for excitability.
- Cell recognition and immune response via glycoproteins and glycolipids.
- Interaction with cytoskeletal elements provides cell shape and motility.



Summary


Cell Membrane: Structure, Functions, and Transport Mechanisms
Transport Mechanisms
Passive Transport
Active Transport
Cell Membrane
Structure
Lipid Bilayer
Proteins
Cholesterol
Functions
Protective Barrier
Selective Permeability
Communication
Anchoring

References

- https://www.britannica.com/science/cell-membrane
- https://www.ncbi.nlm.nih.gov/books/NBK538211/
- https://teachmephysiology.com/histology/cell-structures/cell-membrane/
- https://www.genome.gov/genetics-glossary/Cell-Membrane-Plasma-Membrane
- https://byjus.com/biology/transport-across-cell-membrane/

THANK YOU