

# Module 5: Membranes

## Keys to Success & Study Guide

### Learning Objectives

By the end of this module, you should be able to: 1. **Diagram** the structure of the plasma membrane (Fluid Mosaic Model). 2. **Predict** the movement of water and solutes across a membrane in various osmotic conditions. 3. **Compare** and **contrast** passive and active transport mechanisms. 4. **Explain** how large molecules traverse the membrane via bulk transport.

### Key Terminology Checklist

*Define these terms in your own words to ensure mastery.* - [ ] **Amphipathic**: Having both hydrophilic and hydrophobic parts. - [ ] **Concentration Gradient**: The difference in concentration of a substance across a space. - [ ] **Aquaporin**: A channel protein specifically for rapid water transport. - [ ] **Turgor Pressure**: The pressure of water pushing the plasma membrane against the cell wall of a plant cell. - [ ] **Ligand**: A molecule that binds specifically to a receptor site.

### Concept Check

#### 1. The Gatekeeper

- **Question**: What are the three main components in a cell membrane?
- **Deep Dive**: Phospholipids (barrier), Proteins (doors/workers), and Cholesterol (stabilizer). How does Cholesterol prevent the membrane from freezing in the cold or melting in the heat?

#### 2. Just Passing Through

- **Question**: When would active transport be necessary?

- **Deep Dive:** Usually things flow "downhill" (high to low). If you need to pump water "uphill," you need a pump and electricity. In cells, if you need to gather specific nutrients *against* their gradient, you need a Protein Pump and ATP.

### 3. Water Wars

- **Question:** What is the meaning of isotonic, hypertonic and hypotonic solutions?
- **Deep Dive:** Remember, water chases the solute.
  - **Hyper** (High solute) -> Water leaves cell (Shrivel).
  - **Hypo** (Low solute) -> Water enters cell (Burst/Turgid).
  - **Iso** (Equal) -> Equilibrium.
  - *Tip:* Freshwater fish live in a Hypotonic environment. Why don't they explode? (Kidneys/Gills).

### 4. Big Gulp

- **Question:** How are very large substances brought into and pushed out of cells?
- **Deep Dive: Phagocytosis** ("Cell Eating"). White blood cells use this to devour bacteria. It involves the membrane wrapping around the target and pinching off a vesicle.

### Study Tips

- **Draw the Diagram:** Seriously, draw the Fluid Mosaic Model. Label the Heads, Tails, Integral Proteins, Peripheral Proteins, Carbohydrate chains.
- **Scenario Practice:** Don't just memorize "Hypertonic = Shrivel." Visualize a slug with salt on it. The salt is Hypertonic. The water leaves the slug's cells to dilute the salt. result: Slug shrivels.
- **Gradient Gravity:** Think of Concentration Gradients like Gravity.
  - Passive Transport = Rolling a ball down a hill (Easy, no energy).
  - Active Transport = Pushing a ball up a hill (Hard, requires energy/ATP).