Fluid Mosaic Model:

- The plasma membrane is described by the fluid mosaic model, which means it is not static but rather a dynamic structure where lipids and proteins can move within the bilayer.

Transport Across the Membrane:

- Passive transport: Movement of substances across the membrane without the expenditure of energy (e.g., diffusion and osmosis).
- Active transport: Movement of substances against their concentration gradient, requiring energy (e.g., ion pumps like the sodium-potassium pump).

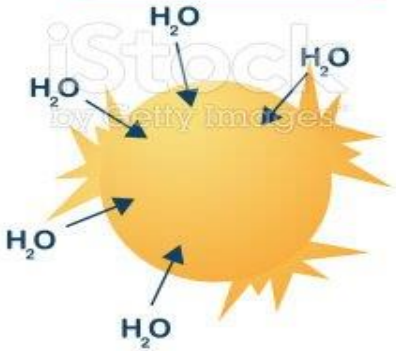
Cell Recognition and Adhesion: The plasma membrane plays a vital role in cell recognition and adhesion, allowing cells to adhere to each other or other structures in the body.

- **Isotonic Solution:**
  - In an isotonic solution, the solute concentration inside and outside the cell is equal. As a result, there is no net movement of water, and the cell maintains its shape.
- **Hypotonic Solution:**
  - In a hypotonic solution, the solute concentration outside the cell is lower than inside. Water moves into the cell, causing it to swell and potentially burst (lyse).
- **Hypertonic Solution:**
  - In a hypertonic solution, the solute concentration outside the cell is higher than inside. Water moves out of the cell, causing it to shrink and become dehydrated (crenation).

Biology

Water balance of cell

Hypotonic solution

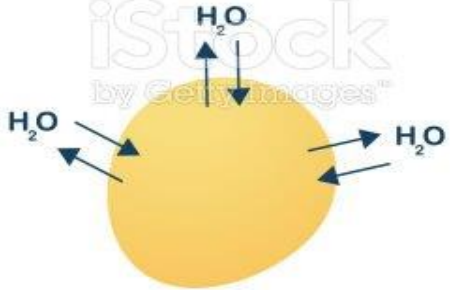


Outside < Inside

LOWER concentration

Water move into the cell
Cell expand and lyse

Isotonic solution

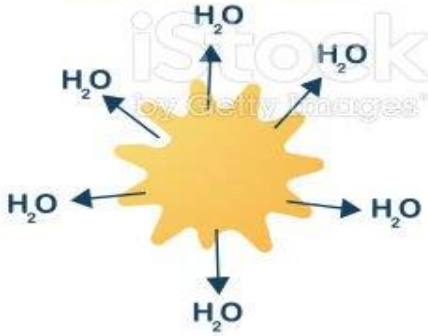


Outside = Inside

EQUAL concentration

Overall concentration are equal
Cell remain constant

Hypertonic solution



Outside > Inside

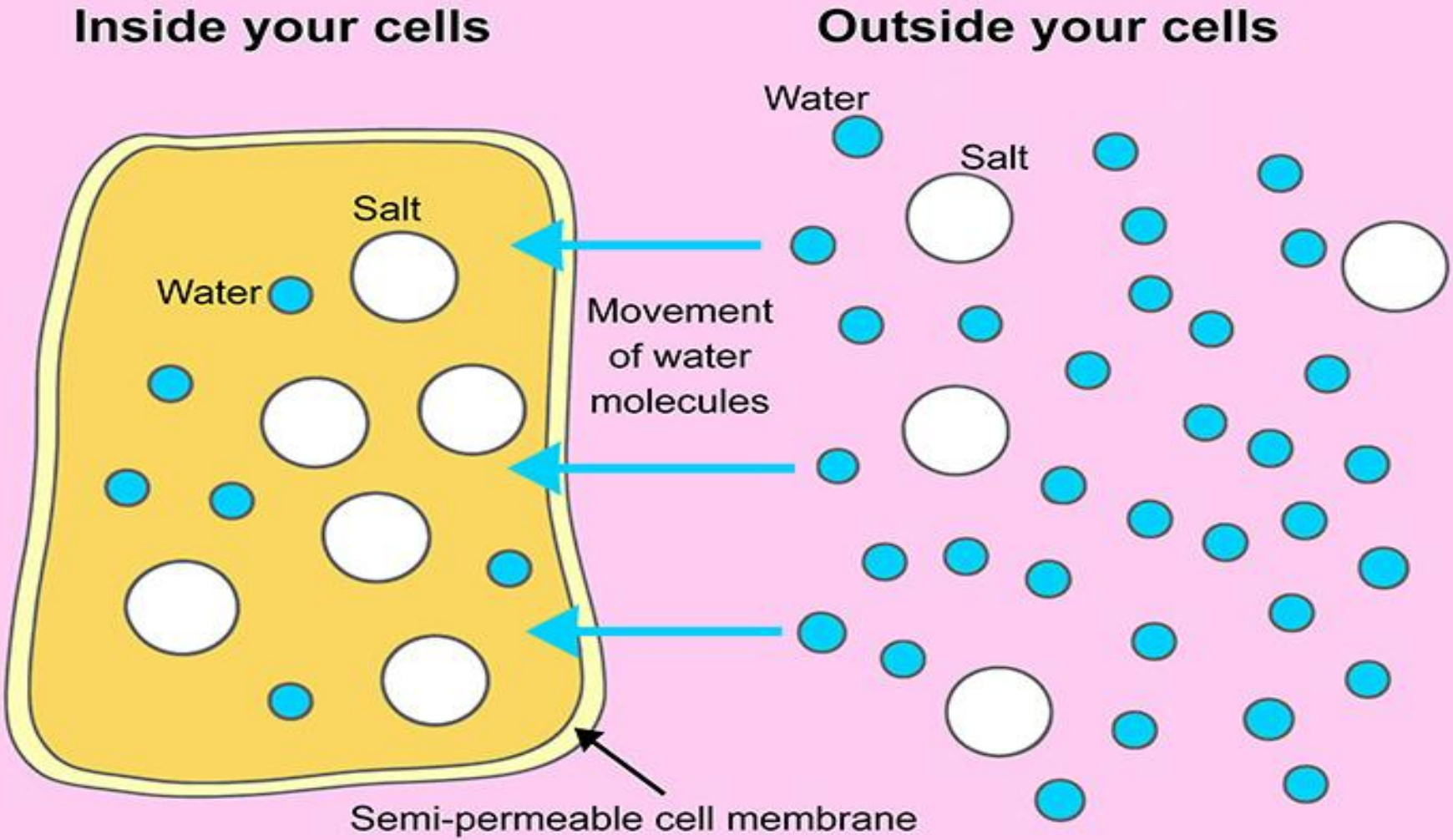
HIGHER concentration

Water move out from cell
Causing crenation

Osmosis

- **Definition of Osmosis:** Osmosis is the passive movement of water molecules through a selectively permeable membrane from an area of lower solute concentration to an area of higher solute concentration. It occurs to equalize the solute concentration on both sides of the membrane.
- **Selectively Permeable Membrane:** Osmosis occurs across a selectively permeable or semi-permeable membrane, which allows the passage of water molecules but restricts the movement of solute particles (e.g., ions, sugars, salts).
- **Concentration Gradient:**
  - Osmosis relies on a concentration gradient, which is the difference in solute concentration between two regions separated by the membrane.
  - Water moves from the region with lower solute concentration (hypotonic) to the region with higher solute concentration (hypertonic)

- **Selective Permeability:**
  - The plasma membrane is selectively permeable, meaning it allows some substances to pass through while blocking others. This property is essential for maintaining cell homeostasis.
- **Membrane Fluidity:**
  - Membrane fluidity is influenced by temperature and lipid composition. It affects the movement of molecules within the membrane.
- **Membrane Proteins and Signaling:**
  - Proteins in the plasma membrane can act as receptors for hormones, neurotransmitters, and other signaling molecules, transmitting signals into the cell.
- **Membrane Disorders:**
  - Certain diseases and conditions, such as lipid metabolism disorders or autoimmune diseases, can affect the structure and function of the plasma membrane.


Inside your cells
Outside your cells
Water
Salt
Salt
Water
Movement of water molecules
Semi-permeable cell membrane

- **Turgor Pressure:** Osmosis plays a vital role in plant cells by creating turgor pressure. In a hypotonic solution, water enters plant cells, causing them to become turgid and maintain their structural integrity.
- **Osmoregulation:** The process by which organisms control the balance of water and solutes in their cells to maintain cell function and prevent damage due to osmotic imbalances.
- **Reverse Osmosis:** Reverse osmosis is a technology that uses a semi-permeable membrane to filter out impurities and contaminants from water. It is commonly used in water purification systems.