Cell Membrane and Cell Transport

Plasma membrane, also known as the cell membrane, is made up of two layers of phospholipids. It is known as a phospholipid bilayer.

A phospholipid has a hydrophilic head and hydrophobic tails. The tails of the two layers are oriented towards each other and the heads are points towards the fluid filled inside of the cell or the outside of the cell.

The plasma membrane is also known as a fluid mosaic model because it is made up of more than just the phospholipids. In addition to the lipids, the membrane also has proteins which allow for cell-to-cell communication and transport of materials, and cholesterol molecules which increase the flexibility of the membrane.

Materials must be able to move into and out of the cell through the cell membrane. Small or non-polar molecules can pass through easily. Large molecules and polar molecules need different types of assistance.

Cell Transport – the movement of materials into and out of the cell. Remember, the plasma membrane is what controls what enters and leaves the cell.

Materials often move into or out of a cell based on their concentrations. If there is a high concentration in one area and a low concentration in another – then there is a concentration gradient (a difference in concentrations).

Passive transport occurs when materials move "down" or "with" the concentration gradient – from high concentration to low concentration. This does NOT require energy.

- Diffusion
- Facilitated diffusion – still diffusion but molecules might be too large or polar so they need a passageway
- Osmosis – diffusion of water only

Active transport occurs when materials move "up" or "against" the concentration gradient – from low concentration to high concentration. This DOES require energy.

- Pumps
- Bulk transport (endocytosis and exocytosis)

Solution Concentrations

When talking about osmosis, we look at different solution concentrations. A solution is a mixture of a substance (or more than one substance) dissolved in water. The following terms compare the concentrations between a cell and the solution that the cell is in.

Hypertonic solution – the solution has a higher concentration of substances (therefore, a lower concentration of water) than the cell. Water will leave the cell and the cell will shrink.

Hypotonic solution – the solution has a lower concentration of substances (therefore, a higher concentration of water) than the cell. Water will move into the cell and the cell will swell and/or burst.

Isotonic solution – the solution has a relatively equal concentration of substances as the cell. Water will move into and out of the cell at the same rate, but there will be no overall change → dynamic equilibrium.