

Transport over Cell Membranes

For more information on the cell membrane itself try the [Cell Structure](#) page.

Diffusion

Diffusion is the transport of molecules from a region of high concentration to a region of lower concentration. The rate of diffusion depends upon:

- Concentration Gradient - the higher the concentration gradient between the two regions the faster the rate of movement.
- Distance - if the distance between the two regions is smaller a faster rate of movement will occur.
- Surface Area - the more surface area available the faster the rate will occur.
- Temperature - means more molecular energy is present making the rate of transfer faster.

Facilitated Diffusion

Certain types of molecules, such as charged particles, large molecules like glucose and ions, don't pass through the membrane naturally because they don't dissolve in lipid. Transmembrane and channel proteins are here to help! They span from one side of the membrane to another helping these molecules diffuse in or out of the cell in question.

- Carrier Proteins - [ATP](#) is not needed, these carrier proteins bind to the molecule at hand and change shape as a result. Because of this the molecules are then released on the other side of the membrane.
- Channel Proteins - These are water filled channels and because they are hydrophilic it means that any molecules which are soluble in water can dissolve and then pass through this membrane.

Osmosis

Remember the Definition for Osmosis (below). You never know when you might need it!

Definition: Osmosis is the movement of water from a region of high concentration to a region where it is lower, through a partially permeable membrane.

Water potential or WP is used to measure the tendency of water to move from high concentrations to low concentration. It uses the Greek letter Ψ (Psi) as a unit of measurement.

The greater the water potential the more likely it is to leave the area.

$$\Psi = \Psi_s + \Psi_p$$

$$\text{Water Potential} = \text{Solute Potential} + \text{Pressure Potential}$$

The Water potential of pure H₂O is zero. It's the highest WP allowed and so all other WP's are given negative values.

Pinocytosis & Phagocytosis

Pinocytosis is the movement of liquid through the membrane of a cell whereas phagocytosis is the movement of solids.

A way that my friend remembers the difference between the two is the start of pinocytosis sounds like pina which is then linked with a drink called a pina colada, a liquid.

Endocytosis & Exocytosis

Endocytosis is the movement into the cell via the cell membrane of any substance. Exocytosis on the other hand is the movement of anything out of the cell via the cell membrane.

A way to remember this is that the start of endocytosis could sound like into, endo - into? But also the start of exocytosis can sound like exit, exo - exit? Tell me what you think?

Active Transport

Active transport works against the concentration gradient and requires energy when moving ions or molecules over the membrane. This means that substances can move over the cell membrane even if there is a higher concentration already within the cell but it does require ATP.

Also note that active transport won't take place if there is a respiratory inhibitor such as cyanide present.

Other Important Terms

Try not to get confused between hypertonic and hypotonic!

- If the Water Potential of an external solution is lower compared to the solution within an animal cell, water will flow out of the cell. This is known as hypertonic.
- Equally if the WP of the external solution is higher than the WP of the internal solution of an animal cell, water will flow into the cell. This is known as hypotonic.
- If the external solution and the internal solution over an animal cell have the same WP then it is known as isotonic.
- For plant cells the three words, plasmolysis, flaccid and turgid are relevant.
- Plasmolysis is the process by which the plant cell cytoplasm draws away from the cell wall because of the lack of water. Once this has happened the cell can be called flaccid.
- On the other hand if a plant cell takes up so much water that it can't take up any more then it is known as turgid.