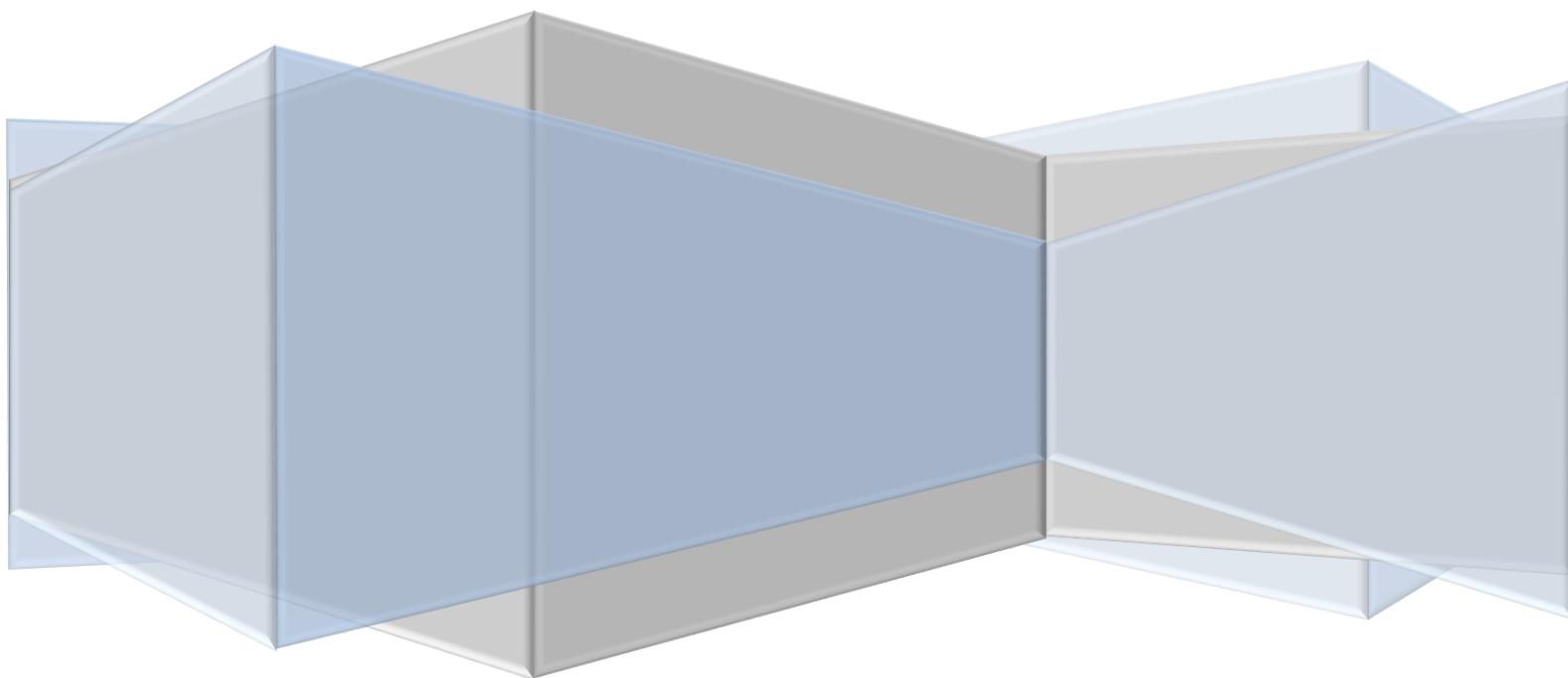


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Transport methods

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Transport methods

Cell membranes do not allow the molecules to pass through them. They are often described as semi-permeable but a better term is **selectively permeable**. This means that some small and large molecules can pass through the pores whilst other large and small molecules cannot. Cell membranes have very important job because they must prevent potential poisons from entering the cell but allow foods, water and oxygen to enter.

The methods of passing through cell membranes can be summarised as follows:-

- 1- Endocytosis 2- Exocytosis 3- Diffusion 4- Osmosis
5- Active transport 6- Facilitated transport

1- Endocytosis: Large molecules or other materials can enter the cell by this method. Liquid can be packaged into a vacuole or vesicle which is then taken into the cell. This cell drinking is called **pinocytosis**. Solids can also be taken up in this way. Cell eating is called **phagocytosis**. It is method used by white blood cells when they eat up harmful microbes that may invade our bodies.

2- Exocytosis: There are many substances that must exit from a cell. For example, the secretions produced by Golgi apparatus need to leave the cell if they are going to do their job. Exocytosis is the reverse of Endocytosis. The secretions or enzymes are packaged into vacuoles and then moved towards the cell membrane where they are discharged.

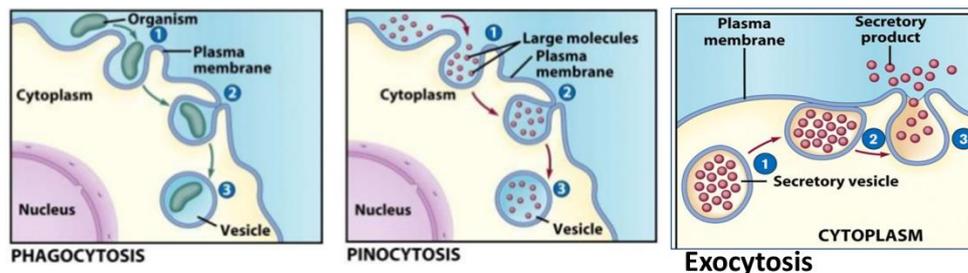


Figure 4: Endocytosis and Exocytosis

3- Diffusion: The molecules are move from an area of high concentration to an area of low concentration. This movement from high concentration to low concentration is called movement down a diffusion gradient or a concentration gradient.

4- Osmosis: This is the diffusion of water across a selectively permeable membrane from an area of high concentration of water to an area of low concentration. Only the water molecules are able to cross the membrane and any large molecules being held back.

The effects of osmosis depend upon the difference in the concentration between solutions on other side of the membrane. Solutions have an osmotic effect on our tissues that is dependent upon the strength of the solution compared with that of the body fluids:

Isotonic solutions: are those equal strength to our body fluids. They therefore cause neither shrinking nor swelling of cells and tissue.

Hypotonic solutions: contain less dissolved material and more water than the body fluids. This water passes into the cells by osmosis and causes them to swell up and eventually burst.

Hypertonic solutions: contain more dissolved materials and less water than the body fluids. Water therefore leaves the cell by osmosis and causes them to shrink.

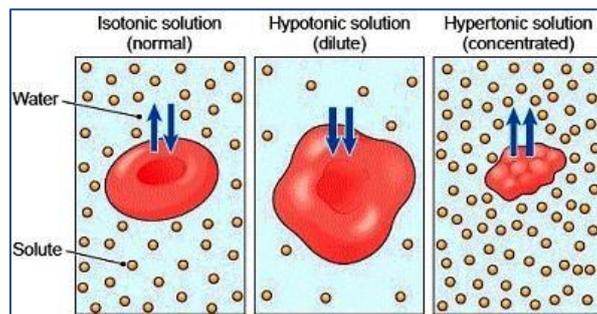


Figure 5: Isotonic, Hypotonic and Hypertonic solutions

Active transport: use energy to pump materials into the cell against the concentration gradient. For example, the thyroid gland cells collect iodine from the blood.

Facilitated transport: this is a sort of faster diffusion. It takes place along special protein pathways in the cell membrane across which chemicals can pass more quickly. These protein carriers take glucose and amino acids into cell quicker than would be expected for normal diffusion processes.

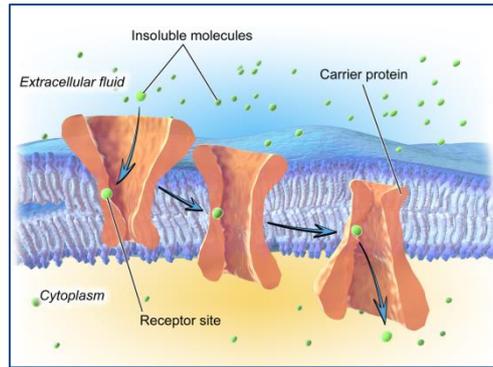
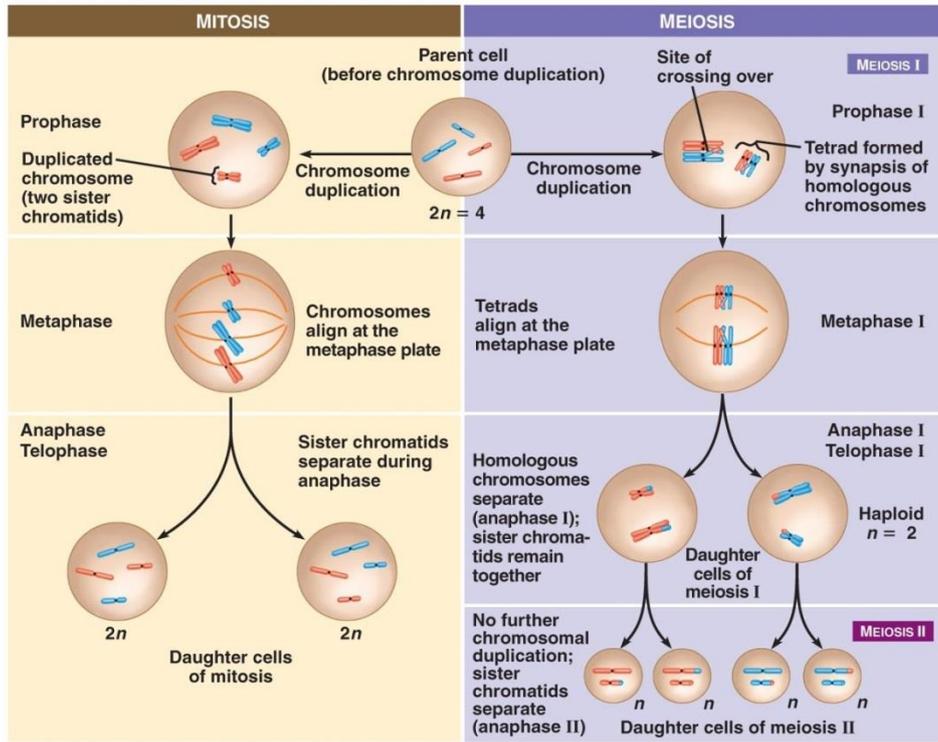


Figure 6: The Facilitated transport

Cell division

In cell division, the cell that is dividing is called the **"parent" cell**. The parent cell divides into two or more **"daughter" cells**. The process then repeats in what is called the **cell cycle**.

Depending on the type of cell, there are two ways cells divide-**mitosis** and **meiosis**. Each of these methods of cell division has special characteristics. One of the key differences in mitosis is a single cell divides into two cells that are replicas of each other and have the same number of chromosomes. This type of cell division is good for basic growth, repair, and maintenance. In meiosis a cell divides into two cells that have half the number of chromosomes. Reducing the number of chromosomes by half is important for sexual reproduction and provides for genetic diversity. For convenience, the events can be separated into phases (**interphase, prophase, metaphase, anaphase and telophase**). In real life it is really one continuous process taken about 45-90 minutes.



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Figure 6: The Cell division

The characteristics of living organisms

Plants and animals show characteristics that suggest they are alive. There are seven major characteristics of living organisms as shown in the table below:

Features	Animals	Plants
Movement	Very obvious	Not very obvious
Irritability (sensitivity)	Obviously able to respond to such stimuli as light, temperature, changes, vibration and touch	Little obvious response to stimulation over a short period of time
Respiration	Obvious organs associated with breathing	No obvious breathing action nor any organ associated with respiration
Nutrition	Heterotrophic method	Autotrophic method
Growth	Cell number increase more rapidly in some areas of the body than the other. The skin for example is in a state of continuous repair or growth	The increase number of cells is called growth. Cells divide by mitosis.
Excretion	There are obvious excretory organ (kidney, skin, lung) and obvious excretory products (urine, faces, water and carbon dioxide)	There are no obvious organ of excretion or obvious excretory products except for water and carbon dioxide.
Reproduction	The ovary and testis are the reproductive organs of mammals. Egg and sperm are produced by meiosis	The flowers are the reproduction organs of the plant. The sex cells are produced by meiosis