

CELL BIOLOGY: Transport through the plasma membrane

The plasma membrane is semipermeable, and its permeability depends on the size of the molecules that want to pass through and the lipid solubility.

The phospholipid bilayer is a good barrier around cells, especially to water soluble molecules. In order for the cell to survive, some materials need to go in and other ones need to go out.

There are different basic mechanisms:

1. **Diffusion and Facilitated diffusion** (passive transport): molecules go inside or outside travelling through its concentration gradient. It needs no energy.

2. **Active transport**: we need to transport molecules against its concentration gradient.

Hence, we need to hydrolyse ATP to have energy.

It is important to consider that calcium, used to give signals to the cells, has very low concentration into the cell but high outside the cell and, then, when it enters to the cell, it begins different activities.

Type of molecules involved in the transport:

1. **Channels**: group of proteins organized in alpha helices and constitute pores. They are usually closed but, once they are open, they allow the pass of polar residues, which are never going to be in contact of the lipids (hydrophobic) in the membrane. Channels do not undergo conformational changes.

2. **Transporters/carriers**: proteins embedded in the plasma membrane that undergo conformational changes to transport small molecules. They can act as passive or active transporters.

TYPES OF CHANNELS: (usually passive diffusion)

1. Voltage gates channels: controlled by membrane potential. When the plasma membrane changes its voltage, there is an electrical signal and the channel opens. This process is very important in neurons.

2. Ligand gates channels: controlled by binding a ligand. When a neurotransmitter is attached to the receptor, the molecule enters the cell. (passive diffusion, as we are not using energy).

3. Mechanically gated channels: sound waves cause the stereocilia to tilt and this causes the channels to open and transport signal to the brain.

TYPES OF TRANSPORTERS: (sometimes active, sometimes passive diffusion)

1. Uniport: if just one molecule is transported

2. Symport: you use one molecule to open one transporter and then other molecules pass through.