Passive Transport

Recall that the cell membrane is semipermeable. It does not allow everything to pass through. Some molecules can pass easily through your cell membranes, while others have more difficulty. Sometimes molecules need the help of special transport proteins to move across the cell membrane. Some molecules even need an input of energy to help get them across the cell membrane. The movement of molecules across a membrane without the input of energy is known as **passive transport**. When energy (ATP) is needed, the movement is known as **active transport**. Active transport moves molecules against their concentration gradient, from an area of low concentration to an area of high concentration.

Simple Diffusion

One example of passive transport is **diffusion**, when molecules move from an area of high concentration (large amount) to an area of low concentration (low amount). Molecules are said to naturally flow down their concentration gradient. This type of diffusion proceeds without an input of energy. In **simple diffusion**, molecules that are small and uncharged can freely diffuse across a cell membrane. They simply flow through the cell membrane. Simple diffusion does not require energy or need the assistance of a transport protein. Other larger or charged molecules that diffuse across a membrane may need assistance from a protein.

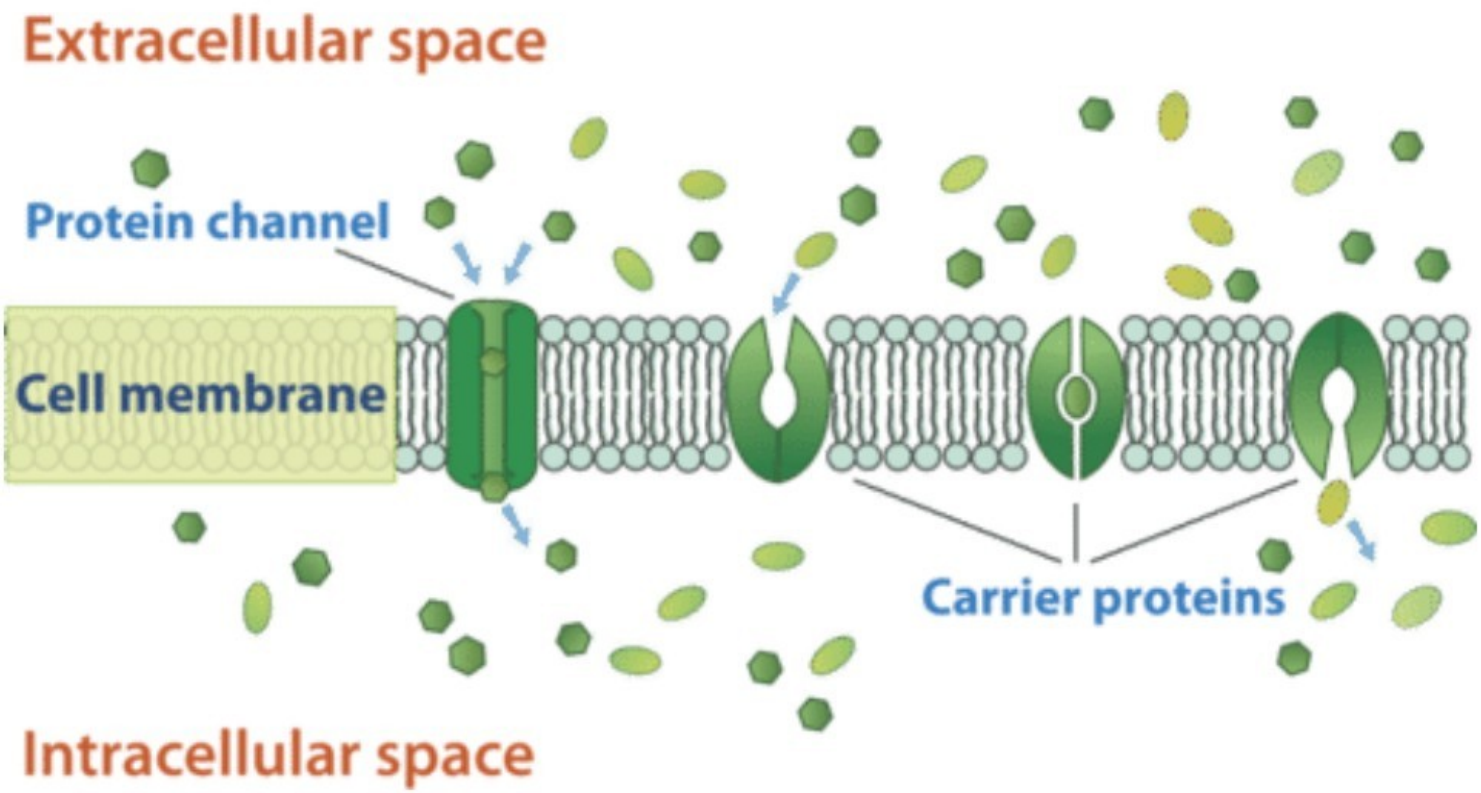
Oxygen is a molecule that can freely diffuse across a cell membrane. For example, oxygen diffuses out of the air sacs in your lungs into your bloodstream because oxygen is more concentrated in your lungs than in your blood. Oxygen moves from the high concentration of oxygen in your lungs to the low concentration of oxygen in your bloodstream. Carbon dioxide, which is exhaled, moves in the opposite direction - from a high concentration in your bloodstream to a low concentration in your lungs.

Passive Transport using Membrane Proteins

Sometimes, molecules cannot move through the cell membrane on their own. These molecules need special transport proteins to help them move across the membrane, a process known as **facilitative diffusion**. These special proteins are called **channel proteins** or **carrier proteins** (**Figure** below), and they are attached to the cell membrane. In fact, they go through the cell membrane, from the inside of the cell to the outside.

Channel proteins provide an open channel or passageway through the cell membrane for molecules to move across. Many channel proteins allow the diffusion of **ions.** Ions are charged atoms. The charge makes it difficult to cross the cell membrane without assistance. Channel proteins are specific for the molecule they transport. For example a sodium **ion** crosses the membrane through a **channel protein** specific for sodium ions.

Carrier proteins bind and carry the molecules across the cell membrane. These proteins bind a molecule on one side of the membrane, change shape as they carry the molecule across the membrane, and deposit the molecule on the other side of the membrane. Even though a protein is involved in both these methods of transport, neither method requires energy. Therefore these are still types of passive transport.



Protein channels and carrier proteins are involved in passive transport. [Figure2]

Summary

- Passive transport does not require energy input.
- An example of passive transport is diffusion, the movement of molecules from an area of high concentration to an area of low concentration.
- Carrier proteins and channel proteins are involved in facilitated diffusion.