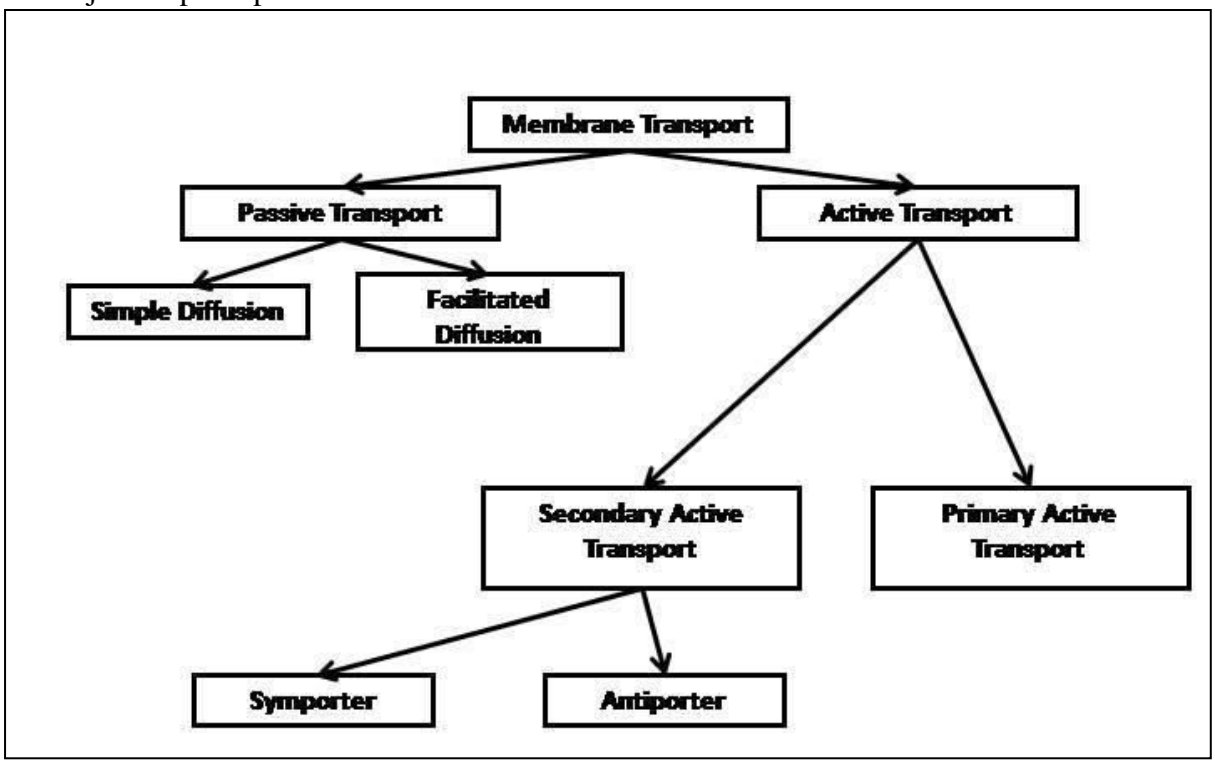
BIOLOGICAL MEMBRANE TRANSPORT

The movement of molecules across the biological membrane depends on its chemical property. For instance, the nonpolar molecules move across the membranes unhindered while the polar molecules require some assistance. As the major part of biological membrane is nonpolar thus the nonpolar compounds easily get dissolved in the membrane and can pass through while in case of polar compounds they require assistance as they cannot interact with the major nonpolar part of membrane.



There are basically two types of transport in membrane viz. Passive and Active transport. The passive transport does not require energy. In this kind of transport, the molecules move from higher concentration to lower concentration (down the concentration gradient). In case of active transport, the movement of molecules require energy, and molecules are moved against the concentration gradient i.e. from lower to higher concentration.

Passive Transport: the passive transport can be divided into Simple diffusion and facilitated diffusion.

Simple diffusion: the non-polar compound move across the biological membrane unhindered from higher concentration to lower concentration. They do not require help of any transporter for moving across the membrane as they can interact with the nonpolar part of the membrane.

Facilitated diffusion: the polar compounds and ions need the help of some transporters for moving across the biological membrane as they cannot interact with the nonpolar part of membrane that constitute the major part of biological membrane. These transporter that aid in facilitated diffusion are the integral proteins that are made of mostly nonpolar amino acids.

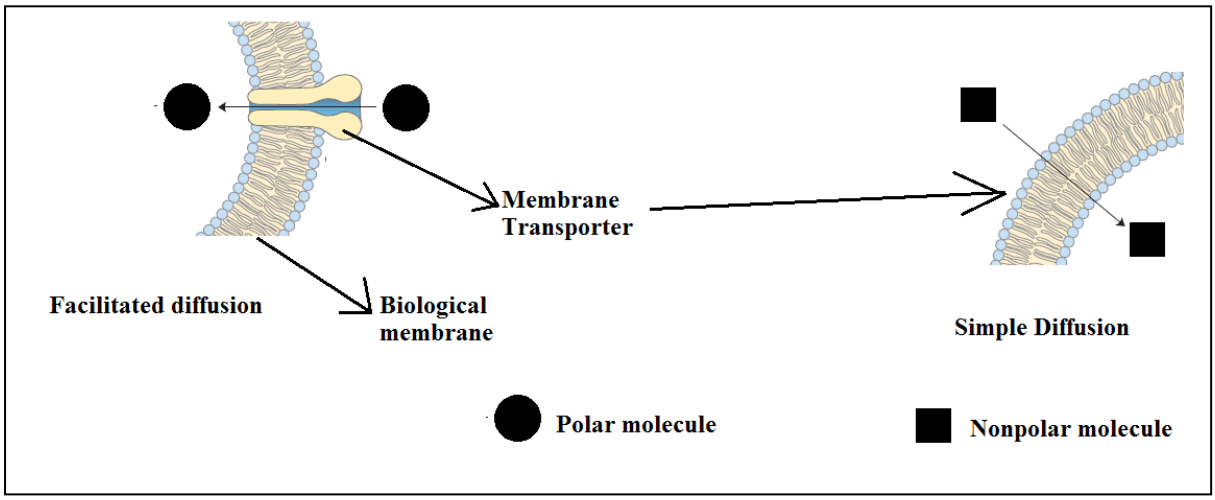


Fig. Passive transport.

Active transport: In the active transport, the movement of molecules require energy, and molecules are moved against the concentration gradient i.e. from lower to higher concentration. The active transport can be divided into primary and secondary active transport.

Primary active transport: in this kind of transport, the energy (chemical energy) for the active transport is obtained from break down of ATP.

ATP→ ADP + P_i + Energy.

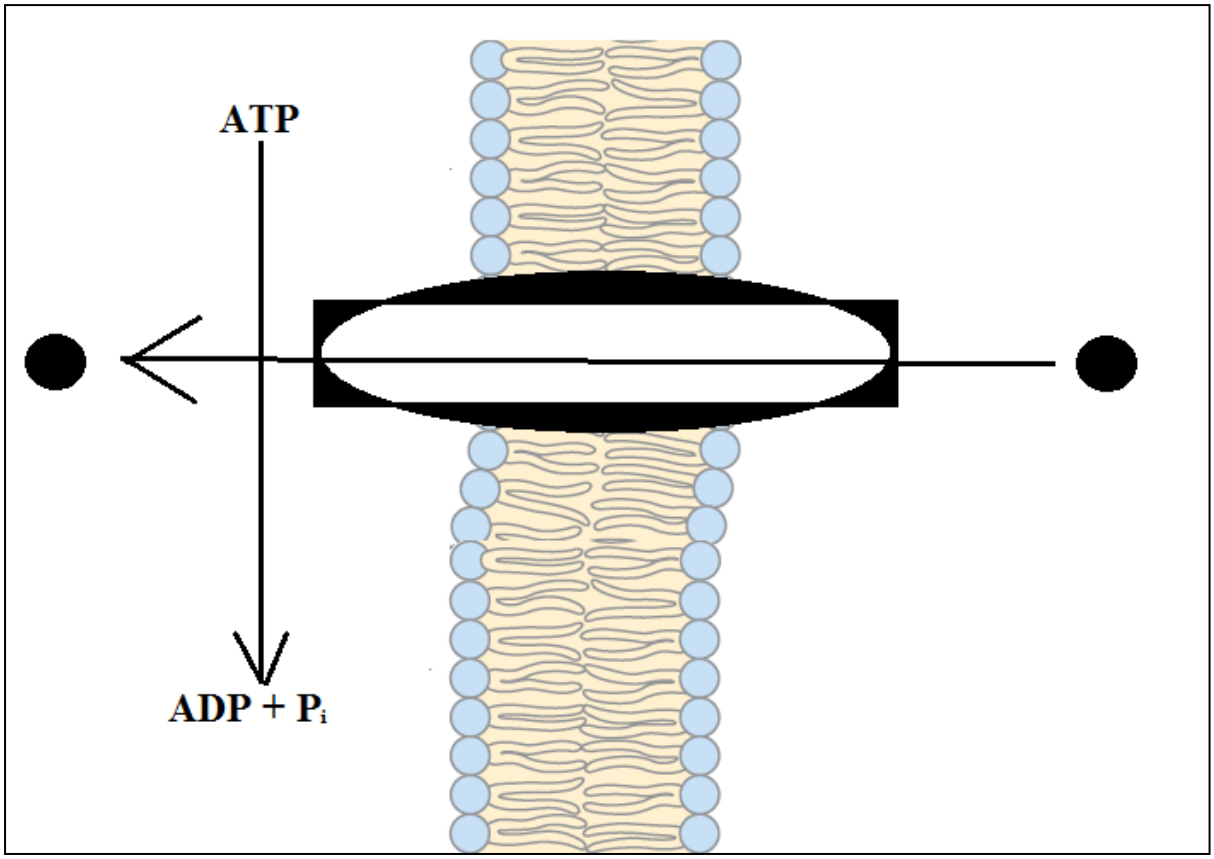


Fig. Primary active transport.

Secondary active transport: the secondary active transport is a coupled transport system where the energy released from passive transport of one solute molecule is utilized to actively transport another molecule against the concentration gradient. When both passive and active transport occur in the same direction, it is called symporter system and when in opposite direction it is called antiporter system.

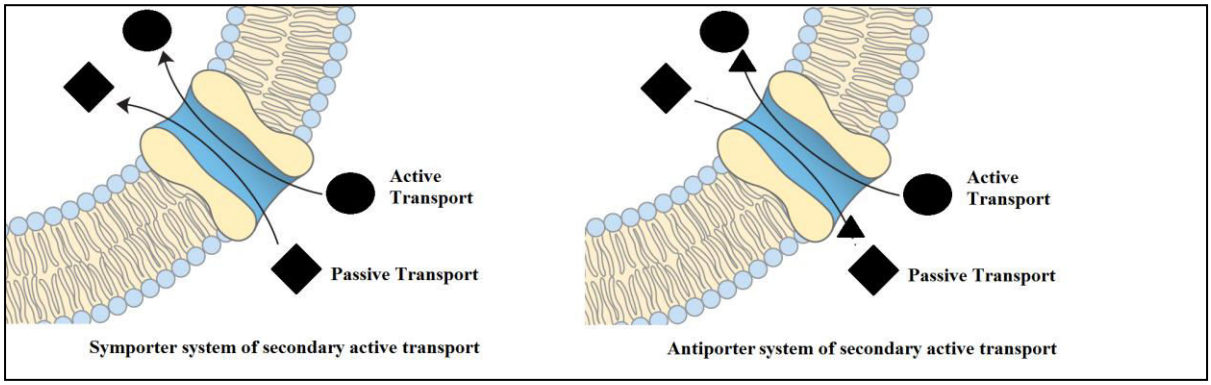


Fig. Secondary active transport.

DONNAN MEMBRANE EQUILIBRIUM

Also called The Gibbs–Donnan effect, the Donnan's effect, Donnan law, Donnan equilibrium, or Gibbs–Donnan equilibrium.

It refers to the behaviour of charged particles near a semi-permeable membrane that sometimes fail to distribute evenly across the two sides of the membrane. In donnan effect, the anions distribute uniformly across the membrane but not the cations in the blood. This is due to the fact that the blood proteins are negatively charged at pH 7.0. As a result, they hold back the cations and hinder in equal distribution of cations across the biological membranes.

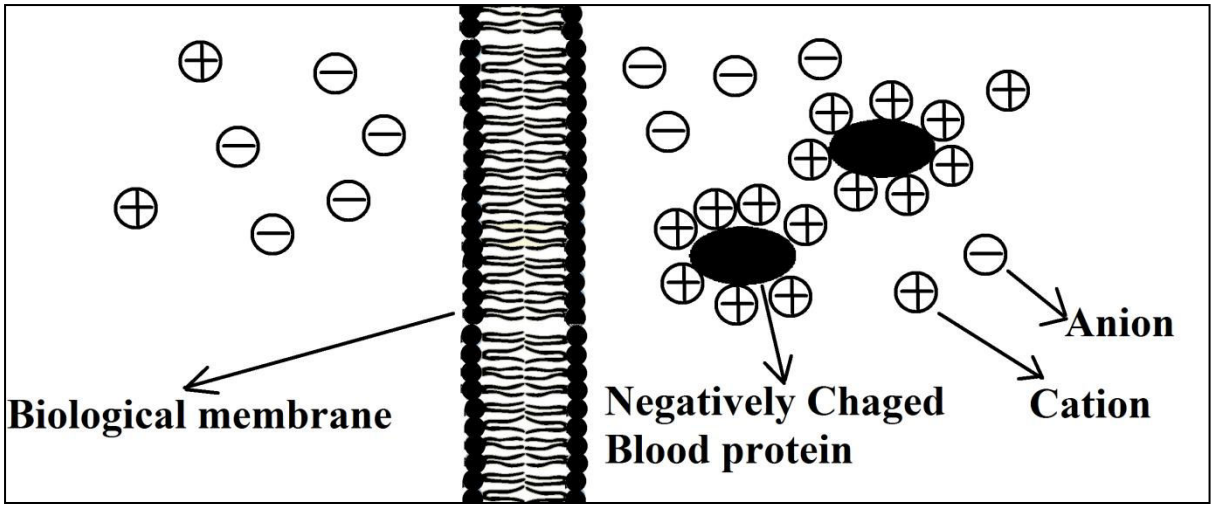


Fig. Donnan Membrane Equilibrium.