**Course Title: General pharmacology (LAB)**

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**What are the different mechanisms through which drug cross the cell membrane, discuss in detail**

The most common method for drugs to cross the cell membrane is by

**Passive** **Diffusion**. Drug molecules will diffuse down its concentration gradient without expenditure of energy by the cell. However, the membranes are selectively permeable, so it has different effects on the rate of diffusion on different drug molecules.

**Background**:

Many drugs need to pass through one or more cell membranes to reach their site of action. A common feature of all cell membranes is a phospholipid bilayer, about 10 nm thick. Spanning this bilayer or attached to the outer or inner leaﬂets are glycoproteins, which may act as ion channels, receptors, intermediate messengers (G-proteins) or enzymes. Cells obtain molecules and ions from the extracellular fluid, creating a constant in and out flow. The interesting thing about cell membranes is that relative concentrations and phospholipid bilayers prevent essential ions from entering the cell. Therefore in order for drugs to move across the membrane these problems must be addressed. In general, this is completed by facilitated diffusion or active transport. In facilitated diffusion, relative concentrations are used to transport in and out. Active transports uses energy (ATP) to transfer molecules and ions in and out of the cell.

**Passive** **Transport**:

The most common method for drugs to cross the cell membrane is by Passive Diffusion. Drug molecules will diffuse down its concentration gradient without expenditure of energy by the cell. However, the membranes are selectively permeable, so it has different effects on the rate of diffusion on different drug molecules. The rate of diffusion also can be enhancing by transport proteins in the membrane by Facilitated Diffusion. There are two types of transport proteins that carry out the facilitated diffusion, Channel protein and Carrier Protein.

**Active** **transport:**

Active transport is an energy-requiring process. The drug molecule, transport against the a concentration gradient, and most of the protein used are carrier proteins, rather than channel proteins. There are also two type of active transport

**Primary** **active** **transport** which directly uses energy to transport molecules across a membrane. Sometime the carrier protein can be an electrogenic pump.

In **secondary** **active** **transport** or **Co**-**transport** also uses energy to transport molecules across a membrane. However, It differs from primary transport is that there is no direct coupling of Adenosine triphosphate instead, the electrochemical potential electrochemical potential difference created by pumping ions out of the cell i