Pharmacokinetics

Pharmacokinetics is derived from two words: ***Pharmacon*** meaning drug and *kinesis* meaning movement. In short, it is 'what the body does to the drug'. It includes absorption (A), distribution (D), metabolism (M) and excretion (E) of a drug. All these processes involve the movement of the drug molecule through various biological membranes.

All biological membranes are made up of lipid bilayers. Drugs cross various biological membranes by the following mechanisms:

1. **Passive diffusion**: It is a bidirectional process. The drug molecules move from a region of higher concentration to lower concentration until equilibrium is attained. The rate of diffusion is directly proportional to the concentration gradient across the membrane. Lipid-soluble drugs are transported across the membrane by passive diffusion. It does not require energy.

2. **Filtration:** Filtration depends on the molecular size and weight of the drug. If the drug molecules are smaller than the pores, they are filtered easily through the membrane.

3. **Specialized transport**:

a. ***Active transport:*** The drug molecules move from a region of lower to higher concentration against the concentration gradient. It requires energy, e.g. transport of sympathomimetic amines into neural tissue, transport of choline into cholinergic neurons, and absorption of levodopa from the intestine.

b. ***Facilitated diffusion:*** This is a type of carrier-mediated transport and does not require energy. The drug attaches to a carrier in the membrane, which facilitates its diffusion across the membrane. The transport of molecules is from the region of higher to lower concentration, e.g. transport of glucose across the muscle cell membrane by a transporter GLUT4.