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With the aid of relevant examples, describe drug transport by membrane proteins.

Membrane proteins are the nanomachines that enable membranes to send and receive messages and to transport molecules in and out of cells and compartments. Without membrane proteins, the phospholipid membrane would present an impenetrable barrier and cells would be unable to communicate with their neighbors, transport nutrients into the cell or waste products out of it, or respond to external stimuli. The membrane proteins that are present in a particular membrane determine the substances to which it will be permeable and what signal molecules it can recognize.

There are two main types of membrane protein which includes: Integral membrane proteins that are permanently anchored or part of the membrane and Peripheral (extrinsic) membrane proteinsthatareonlytemporarilyattachedtothelipidbilayerorotherintegralproteins.

Integral proteins are of two basic categories: Transmembrane proteins that cross the membrane and act as pathways for ions and molecules and Monotopic proteins that are permanently bounded to the membrane but only from one side. Many of these proteins are enzymes. Examples include cyclooxygenase and carnitine O-palmitoyltransferase. Anti-inflammatory drugs, such as aspirin and ibuprofen, work to relieve symptoms of inflammation and pain by inhibiting this enzyme. The latter is a mitochondria transferase enzyme that participates in the metabolism of palmitoylcarnitine into palmitoyl-CoA. Passive transport molecules are allowed to flow down their concentration gradient. In most cases, this does not require a special protein. However, in facilitated diffusion, molecules that are insoluble in the lipid bilayer or too large to passthroughareassistedincrossingthecellmembranethroughspecialtransportproteins.

The other types of passive transport which do not require proteins because the molecules diffuse directly through the cell membrane are osmosis, diffusion, and filtration. Uniporters are the proteins that move molecules in passive transport. They can either be channel proteins or carrier proteins. Channel proteins open in response to a stimulus and let molecules flow freely through. Carrier proteins bind to a molecule, making it hydrophobic enough to cross the membrane.

Active transport energy is expended to transport a molecule up its concentration gradient. There are two types of active transport: primary and secondary. Both are involve in going against a concentration gradient using ATP, but they differ in how the ATP issued by the protein.