

Facilitated diffusion

Article to be checked

Check of this article is requested.

Suggested reviewer: Carmeljcaruana

This article was checked by pedagogue



This article was checked by pedagogue, but later was changed.

Facilitated diffusion

Facilitated diffusion occurs in the cell body. Due to the hydrophobic nature of the fatty acid tails of the phospholipids that make up the lipid bilayer, polar molecules and large ions dissolved in water cannot diffuse freely across the cell membrane. (https://en.wikipedia.org/wiki/Cell_membrane)

Facilitated diffusion is movement of ions and small, polar molecules along their concentration gradient. This passive movement of molecules or ions from regions of high concentration to low, does not require the use of cellular energy (ATP). Their transport must therefore be "facilitated" by transport proteins across a selectively permeable membrane by a transport protein.

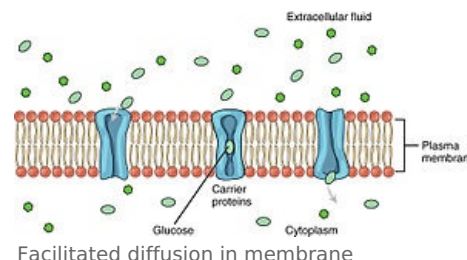
Channel - Carrier mediated

The uptake of some substances will be mediated by receptors located at the cell surface. After binding to the receptor, the substance is carried inside the cell or from intracellular to extracellular environment.

- **Carrier - mediated:** Transport of some molecules are helped across the membrane by a membrane component. For example: glucose is transported by a glucose carrier.
- **Channel - mediated:** Movement of small, polar molecules along its concentration gradient by a carrier protein. For example: sodium ions Na^+ moves through a Na^+ channel into cell.

Transmembrane channels

All polar molecules (https://en.wikipedia.org/wiki/Chemical_polarity) are transported by proteins in the form of transmembrane channels. These channels open and close (gated), therefore they regulate the flow of ions or small polar molecules across membranes. Transmembrane carrier proteins transport larger molecules, such as permease. They change their conformation as the molecules are carried across (e.g. glucose or amino acids (https://en.wikipedia.org/wiki/Amino_acid)). Because no energy is required for facilitated diffusion, the metabolites are not altered. Only permease changes its shape in order to transport metabolites.



Diseases

When the channel for the chloride ion is missing or will not open there is a ion channel malfunction. The cells can no longer regulate salt and water concentrations resulting in the symptoms typical of the disease, e.g. w:cystic fibrosis. Additional disorders resulting from malfunctions in ion channels include forms of epilepsy, cardiac arrhythmia, certain types of periodic paralysis and ataxia.^[1]

Illustration of "Facilitated diffusion" from Indiana University: How facilitated diffusion works. (http://highered.mheducation.com/sites/0072495855/student_view0/chapter2/animation__how_facilitated_diffusion_works.html)

Sources

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References

1. Celesia, G. G. (2001) Disorders of Membrane Channels or Channelopathies. *Clinical Neurophysiology* Jan, 112 (1), 2 - 18.[1] (<http://www.ncbi.nlm.nih.gov/pubmed/11137655>)