Transmembrane Transport

The cell membrane is **semipermeable** . Substances that pass through it can pass freely or with the help of **membrane carriers**. Substance transport can then be **active** or **passive**.

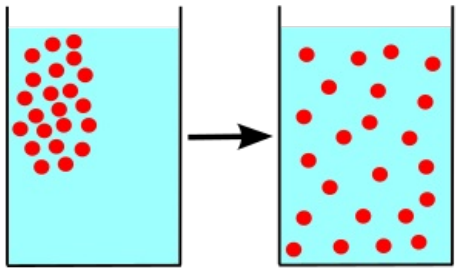
Passive transport

Passive transport is the transfer of substances across the cell membrane that occurs spontaneously through channels and]]carrier proteins]]. Unlike active transport, this process does not consume any chemical energy (ATP). Passive transport depends on the permeability of the cell membrane, which is composed of a double layer of phospholipids and interspersed proteins. The basic types of passive transport are simple diffusion, facilitated diffusion and osmosis.

🔎 *For more information see Passive Transport.*

Diffusion

Diffusion is a spontaneous process of penetration of particles of one substance into another with an effort to **spread evenly** throughout the entire volume. It occurs due to **disordered thermal movement of particles**. Substances tend to move from an environment with a **higher concentration** to an environment with a **lower concentration**. Diffusion is not an energy-intensive process. Diffusion enables the movement of substances inside cells and thereby, **metabolism**.

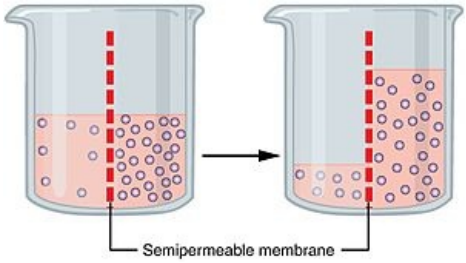


Diffusion

🔎 *For more information see Diffusion.*

Simple Diffusion

Simple diffusion enables **the transport of substances along a concentration gradient** (from places with a higher concentration to places with a lower concentration). It takes place with polar molecules of small dimensions or various types of gases.

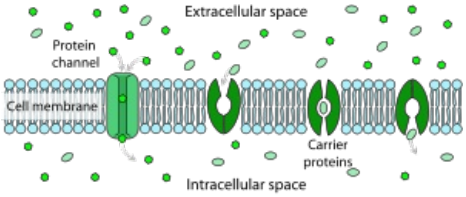


Osmotic Pressure

🔎 *For more information see Simple Diffusion.*

Facilitated diffusion

Facilitated diffusion is a type of passive transport in which substances cross the membrane **along their electrochemical gradient** using carriers embedded in the membrane.



Facilitated Proteins

🔎 *For more information see Facilitated diffusion.*

Osmosis

Osmosis is a type of passive transport in which a solvent (most often water) moves through a semi-permeable membrane from a space with a **less concentrated** solution to a space with a **more concentrated** solution.

🔎 *For more information see Osmosis.*

Permeation through ion channels

on channels, along with transporter proteins, are structures that participate in transport across the biological membrane. We can divide them according to the principle of their opening.

- *Ion channels still open.*
- *Voltage-gated ion channels.*
- *Chemically gated ion channels*
- *Both voltage- and chemically-gated ion channels.*
- *Mechanically controlled ion channels.*

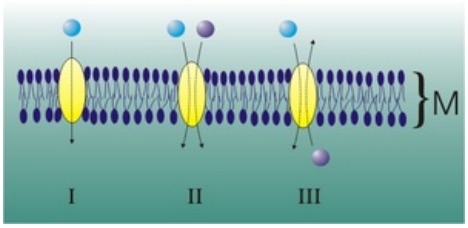
🔎 *For more information see Ion Channels.*

Active transport

Active transport is the transfer of substances across the cell membrane, which, unlike passive transport, is associated with energy consumption. Thanks to the supplied energy, which is most often produced by splitting ATP , it is possible to carry out this transport even **against the direction of the concentration gradient** (concentration gradient).

Active transport is enabled by specialized **integral membrane proteins** embedded in the cell membrane:

- *Ion pumps* – ion channels equipped with the enzyme ATPase..
- *Carrier proteins equipped with an ATPase enzyme* ..



I - uniport II- Symport III - antiport

🔎 *For more information see Active Transport.*

Ion Pumps

Ion pumps penetrate integral proteins in the cell membrane that transport substances **against a concentration gradient**. During the transfer of substances, **ATP is consumed**.

🔎 *For more information see Ion Pumps, Sodium-Potassium Pump.*

Endocytosis

Endocytosis is an **energy- and material demanding *process characteristic of animal cells. During endocytosis,*** *particles from the external environment are absorbed'*. Cells are separated from the external environment by a cytoplasmic membrane. Some hormones, lipoprotein particles, viruses, and antibodies, but also damaged cells or bacteria, get into them through endocytosis.

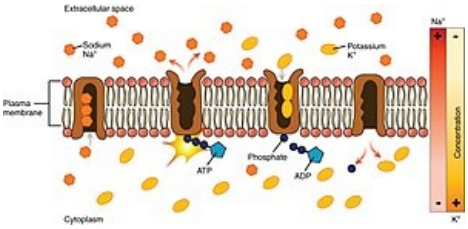
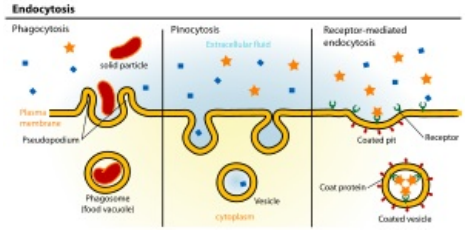


Diagram of the function of the sodium-potassium pump

🔎 *For more information see endocytosis.*

Phagocytosis

Phagocytosis is the ability of cells to absorb foreign particles, microbes or damaged cells. [1] Cells capable of phagocytosis participate in the **non-specific immunity of the organism** – antigen presenting cells, monocytes, from which individual types of macrophages (Kupffer Cells, histiocytes , microglia and others), develop, and white blood cells (neutrophil leukocytes, eosinophil leukocytes).



Types of Endocytosis

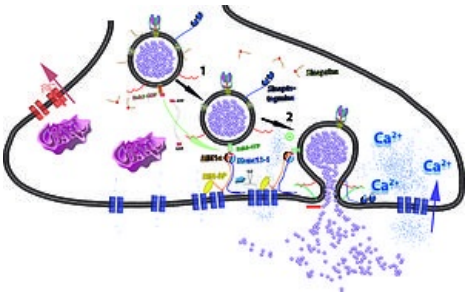
🔎 *For more information see phagocytosis.*

Pinocytosis

Pinocytosis is one subtype of endocytosis. During pinocytosis, the cell receives extracellular fluid (extracellular fluids = ECF) and very small particles.

Exocytosis

Exocytosis is a continuous process in which the cell secretes larger particles (e.g. macromolecules) directly **into the extracellular matrix through the cell membrane** (plasmalemma) . The membrane vesicle (vesicle) containing the secretion travels to the membrane, fuses with it and subsequently releases the internal contents into its surroundings.



Exocytosis

🔎 *For more information see exocytosis.*

Links

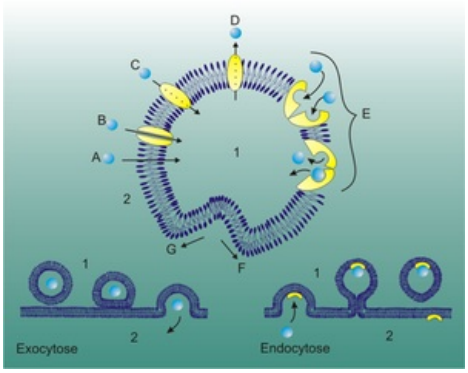
Related Articles

- Active transport
- Antiport
- Diffusion
- Endocytosis
- Phagocytosis
- Ion Channels
- Pinocytosis

Reference

sources

- ŠVÍGLEROVA, Jitka. *Passive transport* [online]. Last revision 2/18/2009, [cit. 11/12/2010]. < https://web.archive.org/web/20160306065550/http://wiki.lfp-studium.cz/index.php/Passivní_transport >.
- ŠVÍGLEROVA, Jitka. *Facilitated diffusion* [online]. Last revision 2009-02-18, [cit. 2010-11-12]. < https://web.archive.org/web/20160306065550/http://wiki.lfp-studium.cz/index.php/Facilitovaná_difuze >.
- ŠVÍGLEROVA, Jitka. *Osmosis* [online]. Last revision 2/18/2009, [cit. 11/12/2010]. < https://web.archive.org/web/20160306065550/http://wiki.lfp-studium.cz/index.php/Osmóza >.
- KODÍČEK, M. and V. KARPENKO. *Biophysical chemistry.* 1st edition. Prague: Academia, 2000. ISBN 80-200-0791-1 .
- VAJNER, Luděk, Jiří UHLÍK and Václava KONRÁDOVÁ. *Medical Histology I.* 1st ed. Prague: Nakladatelství Karolinum, 2012. ISBN 978-80-246-1860-9 .
- LEOŠ NAVRÁTIL, ROSINA JOZEF AND COLLECTIVE, *Medical Biophysics [online]. [feeling. 2014-16-11].* < [https://www.grada.cz/medicinska-biofyzika-
- LANGMEIER, Miloš, et al. *Basics of medical physiology.* 1st edition. Prague: Grada Publishing, as, 2009. 320 pp. ISBN 978-80-247-2526-0 .



Membrane transport

- KONRÁDOVÁ, Václava, et al. *Functional histology.* 2nd edition. H + H, 2000. 291 pp. ISBN 978-80-86022-80-2 .
- HALL, JE and AC GUYTON. *Textbook of Medical Physiology.* 12th edition. Philadelphia: Saunders Elsevier, 2011. ISBN 978-1-4160-4574-8 .
- BALOUNOVÁ, Z. *Physiology of plants* [online]. [feeling. 2010-11-16]. < http://kbd2.zf.jcu.cz/text/lidi/balounova/fros/FYZR0712.ppt >.
- ALBERTS, B, et al. *Molecular Biology of the Cell* [online] . 4th edition. New York : Garland Science, 2002. Also available from < https://www.ncbi.nlm.nih.gov/books/NBK26896/ >. ISBN 0-8153-3218-1 .
- MESCHER, Anthony L. Junqueira's basic histology: text and atlas. Thirteenth edition. New York [etc.]: McGraw-Hill Medical, 2013. ISBN 978-0-07-178033-9.
- HOŘEJŠÍ, Václav and Jiřina BARTŮŇKOVÁ. *Basics of immunology.* 3rd edition. Prague: Triton, 2008. 280 pp. ISBN 80-7254-686-4 .
- BROOKER, Robert. *Biology.* 2nd edition. New York: McGraw-Hill Science/Engineering/Math, 2011. ISBN 9780073532240 .
- ALBERTS, Bruce, Dennis BRAY, and Alexander JOHNSON. *Basics of cell biology.* 2nd edition. Ústí nad Labem: Espero Publishing, 1998. ISBN 80-902906-2-0 .
- TRKANJEC, Z. and V. DEMARIN. *Presynaptic vesicles, exocytosis, membrane fusion and basic physical forces* [online]. [feeling. 2014-11-26]. < http://www.sciencedirect.com/science/article/pii/S030698770091260X >.