

Passive membrane transport

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Passive Membrane Transport

Passive membrane transport is the movement of chemical substances across cell membranes WITHOUT THE NEED OF ENERGY. Passive membrane transport can also be described as the net overall movement of chemical substances from an area of high concentration to an area of low concentration across a membrane until an equilibrium is established. However, due to this transport being "passive" there is no need for chemical energy to be input at the start of the process.

"Uses of Passive Membrane Transport in the body and clinical Medicine"

Passive membrane transport is important in the body because there are many homeostatic functions which require passive transport in order to occur. For example water reabsorption which occurs in the kidneys specifically loop of Henle. The loop of Henle creates a very negative water potential around the medulla of the kidney by transporting salts from the ascending limb to the descending limb. Due to this difference in water potential the water molecules can be reabsorbed by osmosis. One type of therapy for Kidney failure is dependent on this process is Dialysis. This occurs when waste,excess fluids and salts are run through a dialysis membrane which contains dialysis fluid, due to the difference in concentration of certain substances the waste, excess fluids and salts are removed from the patients blood by diffusion, ensuring the composition of the patients blood plasma is correct before re-entering their body. The correct composition of the blood plasma upon re-entering is ensured because the dialysis fluid has the same concentration of substances as normal blood plasma does. Hemodialysis uses a machine to filter the blood whereas peritoneal dialysis uses the peritoneum lining in the body for filtration.

Oral medicines such as pills, when in the stomach usually diffuse out of the capsule and are then absorbed into the stomach lining and then into the bloodstream. For some medicines however, the capsule cannot provide enough long term dosage, or the medicine itself has a short lifespan due to its quick absorption. A solution to this problem is a transdermal patch. This consists of an adhesive layer that attaches to the skin. The medicine diffuses out of the reservoir and into the skin, and from there into the bloodstream. Since the patch reservoir is capable of holding a much larger quantity of medicine than the capsule of a pill, and since the time it takes for diffusion through the skin is much greater than through the stomach lining into the bloodstream, the patch provides an increased dosage for a prolonged period of time.

"Different Types of Passive membrane transport "

There are four different types of Passive membrane transport, these are: Diffusion, Osmosis, Facilitated diffusion and Filtration. Diffusion is the net overall movement of particles from an area of high concentration to an area of low concentration OF SOLUTE. Osmosis is the movement of water molecules from an area of high concentration to an area of low concentration OF WATER, however, unlike diffusion Osmosis can only occur across a semi-permeable membrane. Facilitated diffusion follows the same movement as diffusion, the process of spontaneous passive transport, however, this process requires specialised proteins to "carry" these particles through the semi-permeable membrane, for instance transmembrane integral proteins such as carrier or channel proteins to move substances across biological membranes. Finally, there is Filtration, which depends on a pressure gradient rather than a difference in concentration between substances. The pressure is that of hydrostatic nature influenced by the cardiovascular system. The particles will move from an area of high pressure to an area of low pressure, for instance, filtration of blood in the Bowman's Capsule into the glomerulus, the first step of urine production in the kidneys.

Sources:

http://en.wikipedia.org/wiki/Passive_transport http://en.wikipedia.org/wiki/Transdermal_patch

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