

Homeostasis and Transport

Homeostasis

Homeostasis ("standing still"), is a process that maintains the stability of the human body's internal environment in response to changes in external conditions. Examples: regulation of temperature, pH, gas concentrations, and water concentrations.

Homeostatic Mechanism A regulatory mechanism that contributes to maintaining a state of equilibrium (e.g., thermoregulation, water regulation, and oxygen regulation).

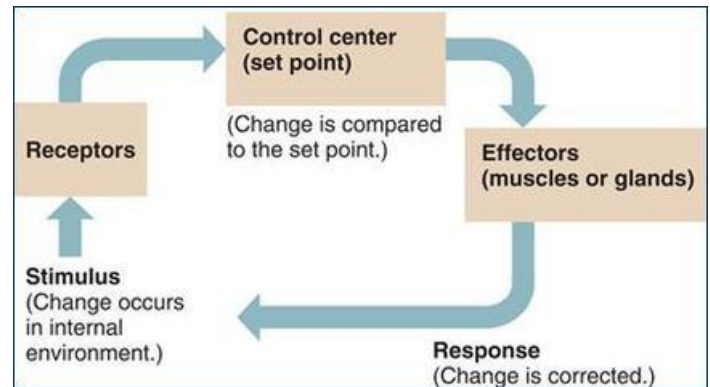
Temperature A measure of the average kinetic energy (energy of motion) of particles in a sample of matter.

pH The measure of acidity or basicity of an aqueous solution scaling from 1 (highly acidic) to 14 (highly alkaline) with a midpoint of 7 (neutral).

Concentration The measure of the amount or proportion of a given substance when combined with another substance.

Concentration Gradient The graduated difference in concentration of a solute per unit distance through a solution.

Solute + Solvent = Solution



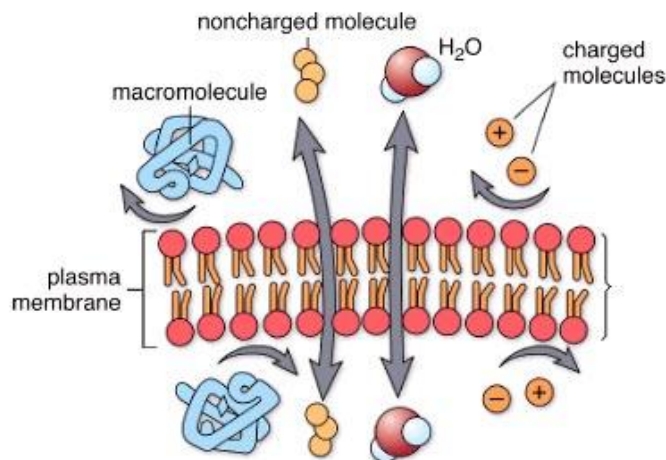
Membrane transport

Membrane transport refers to the collection of mechanisms that regulate the passage of solutes such as ions and small molecules through biological membranes, which are lipid bilayers that contain proteins embedded in them. The regulation of passage through the membrane is due to selective membrane permeability. Water and small, non-charged molecules have no difficulty crossing the lipid portion of the membrane. Ions and charged molecules cannot cross easily, nor can large molecules. It is important that many types of substances be able to enter or leave cells. There is a variety of mechanisms by which this occurs, some requiring energy and some utilizing carrier proteins.

Impermeable Not permitting passage of a substance or substances.

Permeable Permit passage of all substances

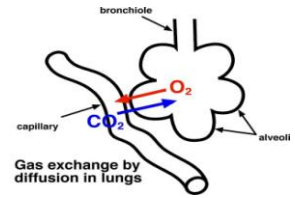
Selectively permeable permit passage of select substances



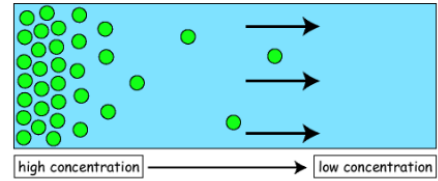
Carrier (Transport) Proteins- Proteins embedded in the plasma membrane involved in the movement of ions, small molecules, and macromolecules into and out of cells; also known as transport proteins.

Phospholipid Bilayer- The lipid bilayer is a thin polar membrane made of two layers of lipid molecules. These membranes are flat sheets that form a continuous barrier around all cells.

Passive Transport - The transportation of materials across a plasma membrane without using energy.

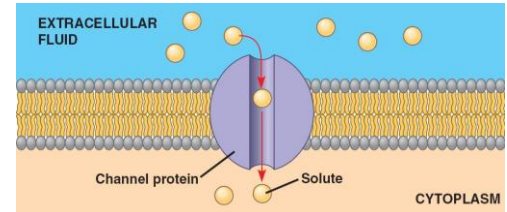


Diffusion The movement of particles from an area of high concentration to an area of low concentration; a natural result of kinetic molecular energy.



Facilitated Diffusion A process in which substances are transported across a plasma membrane with the concentration gradient with the aid of carrier (transport) proteins; does not require the use of energy.

● solute

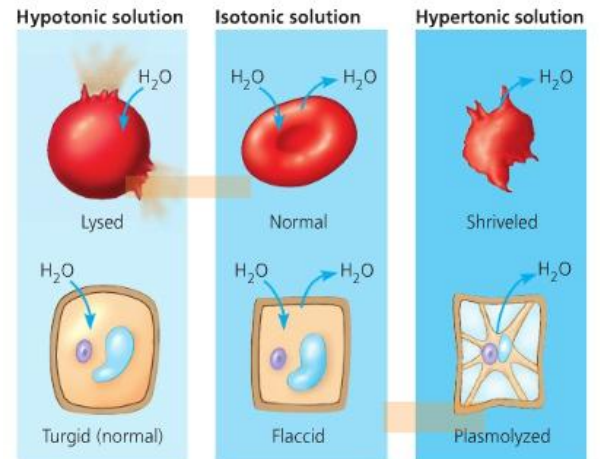


Osmosis The movement of water or another solvent through permeable membranes from an area of higher water concentration (dilute) to an area of lower water concentration (concentrated).

Hypertonic - Solution that has a higher concentration of solute and a lower concentration of water than the cell.

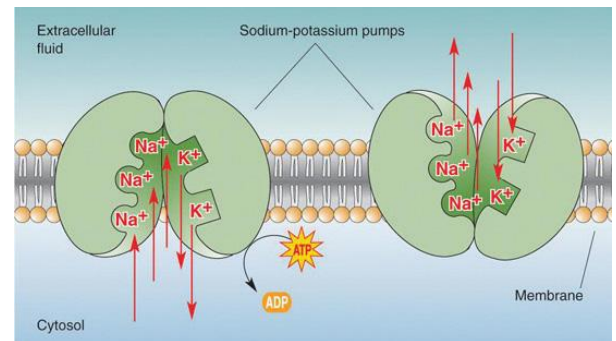
Hypotonic - Solution that has a lower concentration of solute and a higher concentration of water than the cell.

Isotonic- Solution that has equal concentrations of solute and water.



Active Transport - Transfer of a substance into or out of a cell requiring the expenditure of energy.

Pumps (Ion or Molecular) Any of several molecular mechanisms in which ions or molecules are transported across a cellular membrane requiring the use of an energy source (sodium [Na⁺], calcium [Ca⁺], and potassium [K⁺]).



Endocytosis A process in which a cell engulfs extracellular material through an inward folding of its plasma membrane.

Exocytosis A process in which a cell releases substances to the extracellular environment by fusing a vesicular membrane with the plasma membrane, separating the membrane at the point of fusion and allowing the substance to be released.

