

Transport Across a Membrane

- For cells and organelles to function properly, there must be a way to allow food, hormones, waste and other important materials to move back and forth across the membrane but prevent important cell parts from travelling that way
- Phospholipid membranes are semi-permeable, meaning that some substances can travel across them but others cannot
- The size and polarity of a molecule helps determine whether it can move across a membrane easily, with assistance or not at all

Passive Transport

- the movement of materials across a cell membrane without the cell using any energy
- there are 3 types of passive transport: simple diffusion, facilitated diffusion and osmosis

Simple Diffusion

- small molecules, like oxygen and water, can pass through the gaps in the cell membrane, following the laws of simple diffusion
- simple diffusion is the movement of particles from an area of high concentration to an area of low concentration (like air freshener)
- Diffusion is a natural process and it requires no energy because particles are always moving
- Diffusion ends when the particles are equally spread out in the area they occupy

Facilitated Diffusion

- Some particles are too large to move through the membrane so they use protein carrier molecules
- protein carriers also speed up the movement of molecules already moving across the cell membrane
- the carrier proteins must be specialized to aid the diffusion of glucose molecules, but not other sugars (it has a specific fit)

Osmosis

- is the diffusion of water molecules across a selectively permeable membrane
- when the other particles are too big to move through the membrane, water has to move across to balance things out
- the movement of water into and out of living cells is vital to life processes
- ideally, cells are bathed in isotonic solutions (where the solute concentration outside the cell is equal to that inside the cell)
- one of the major functions of blood in your body is to keep your internal environment in an isotonic balance (homeostasis)

Hypotonic Solution - water diffuses inward

- is when a cell is placed in a solution that has a lower concentration of solute and a higher concentration of water than inside the cell
- water molecules move into the cell
- the cell expands as water moves in

Hypertonic Solution - water diffuses outward

- is when a cell is placed in a solution that has a higher concentration of solute and a lower concentration of water than inside the cell
- water molecules move out of the cell
- the cell shrinks as water moves out

Active Transport

- when a cell uses its own energy to move materials from an area of low concentration to an area of higher concentration
- while you sleep, 30% - 40 % of your total energy budget is used for active transport

Endocytosis and Exocytosis

- cells take in smaller solutes by means of transport carrier molecules
- however some molecules will not pass through the pores of the cell membrane
- the cell must expend energy to transport larger substances
- endocytosis is the process by which cells ingest materials
- there are 2 types of endocytosis:
 - i) pinocytosis - cells take up dissolved molecules by engulfing small volumes of the external solution (cells engulf liquid and dissolved molecules)
 - ii) phagocytosis - cells engulf solid particles
- exocytosis is the process by which large molecules held within the cell are transported to the external environment