Transmembrane Transport of Molecules

Water content of the body

- Intracellular fluid (ICF) & extracellular fluid (ECF: interstitial fluid + plasma)
- Many substances can be transported between ICF & ECF

Plasma membrane

- Membrane proteins (integral, peripheral, anchored)
- Membrane permeability

I. Passive membrane transport

A. Diffusion
- Simple diffusion
  - Diffuse directly through the lipid bilayer
    - e.g. non-polar **gases** (O_2, CO_2), ethanol, fatty acids, glycerol, **steroids**
- Facilitated diffusion
  - Diffuse through channel proteins
    - e.g. **ions**
  - Combine with carrier proteins (i.e. protein-mediated transport)
    - Large, polar molecules, e.g. simple sugars (**glucose**)

B. Osmosis
- Occurs when the solvent concentration is different on opposite sides of a membrane
- e.g. **water** diffusion across a semi-permeable membrane

C. Filtration
- The passage of water & solutes through a membrane by hydrostatic pressure
- Pressure gradient pushes **solute-containing fluid** from a higher-pressure area to a lower-pressure area

II. Active transport

- Uses ATP to move solutes across a membrane
- Requires carrier proteins
- e.g. Na^+-K^+ ATPase (in neurons): pumps Na^+ out & K^+ in
  (to maintain/ restore resting membrane potential)
- Symport vs. Antiport
- Primary vs. Secondary

III. Vesicular transport

- Transport of large particles & macromolecules across plasma membranes
- Exocytosis, endocytosis, receptor-mediated transport

Transport of substances in body systems

- Examples: across the walls of capillaries, intestine, renal tubule & alveoli