The Cell

- The Cell Theory
  - All living things are made of cells
  - Cells come form other cells
  - Are the basic unit of all living things

- Unicellular: living organisms made up of only one cell
  - Bacteria, algae, protists

- Multicellular: living organisms made up of many cells
  - Water flea, mold, tree, dog, humans (75 trillion)

Two different types of Cells

- Prokaryotes – means “before nucleus”
  - Small simple cells that lack a membrane bound nucleus & organelles.
  - Have a cell membrane, cytoplasm, ribosomes & simple DNA.
  - Most ancient of life forms – fist appear in fossil record 3.5 bill year ago.
  - Bacteria are the only living examples, most numerous I total # of all living things

- Eukaryotes – means “true nucleus”
  - Larger, more complex cells that contain a membrane bound nucleus and organelles
  - Make up all other living things
  - First appeared in the fossil record about 1.5 billion years ago.

The Plasma Membrane

- The Plasma Membrane
  - Surrounds cell
  - Has a phospholipid bilayer imbedded with proteins
  - Responsible for molecules coming into and leaving the cell
  - Selectively permeable

- The Phospholipid Bilayer
  - Polar head
    - Hydrophilic
    - Face outwards and the tissue fluid on the other side
  - Non-polar tails
    - Hydrophobic
    - Face inwards towards each other, no water

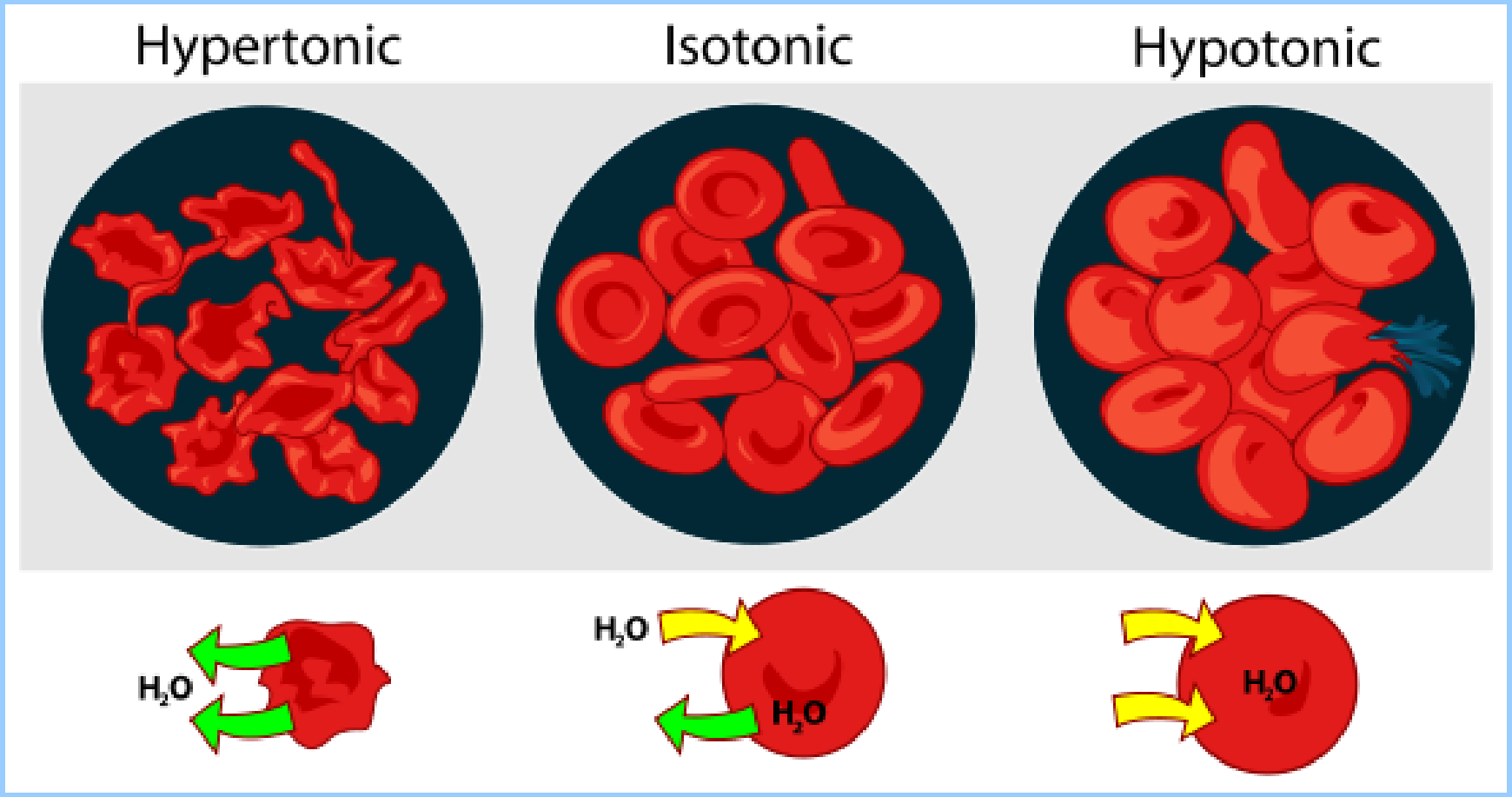
    Cholesterol lends support to the membrane

- Functions
  - Selectively permeable – O_2 and CO_2 are lipid soluble and small, can pass through freely
  - H_2O can also pass freely
  - Large molecules need assistance

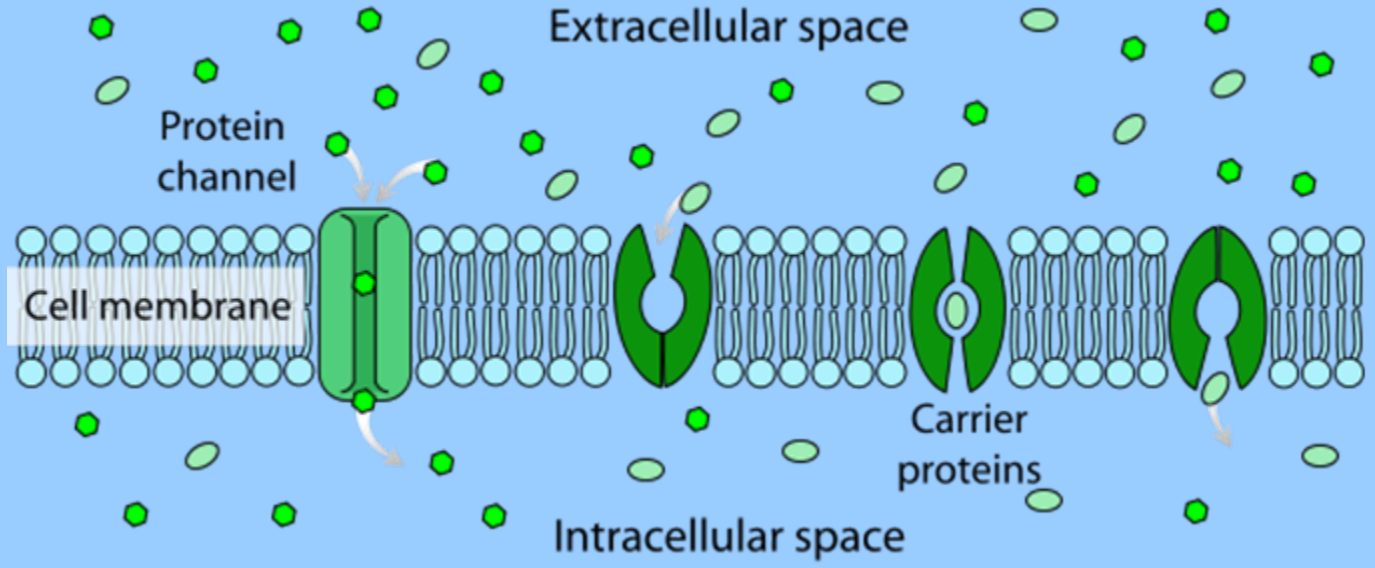
Passive Transport

- ***Diffusion*** – random movement of molecule from the area of high concentration to low concentration
  - **Passive**, needs no cellular energy
  - Moves small molecule that can move freely in and out
  - Equilibrium – as many molecules leaving the cell as entering

- ***Osmosis*** – diffusion of **water** across a plasma membrane.
  - **Passive**
  - Tonicity – concentration of a solute in a solution vs. the concentration of the water.
  - Water will move to the area with the highest concentration of solute.
  - Isotonic – equal solute concentration
  - Hyportonic - lower solute concentration
  - Hypertonic – higher solute concentration
  - Osmotic pressure – force exerted on a SPM because H2O has moved form a higher to lower concentration.

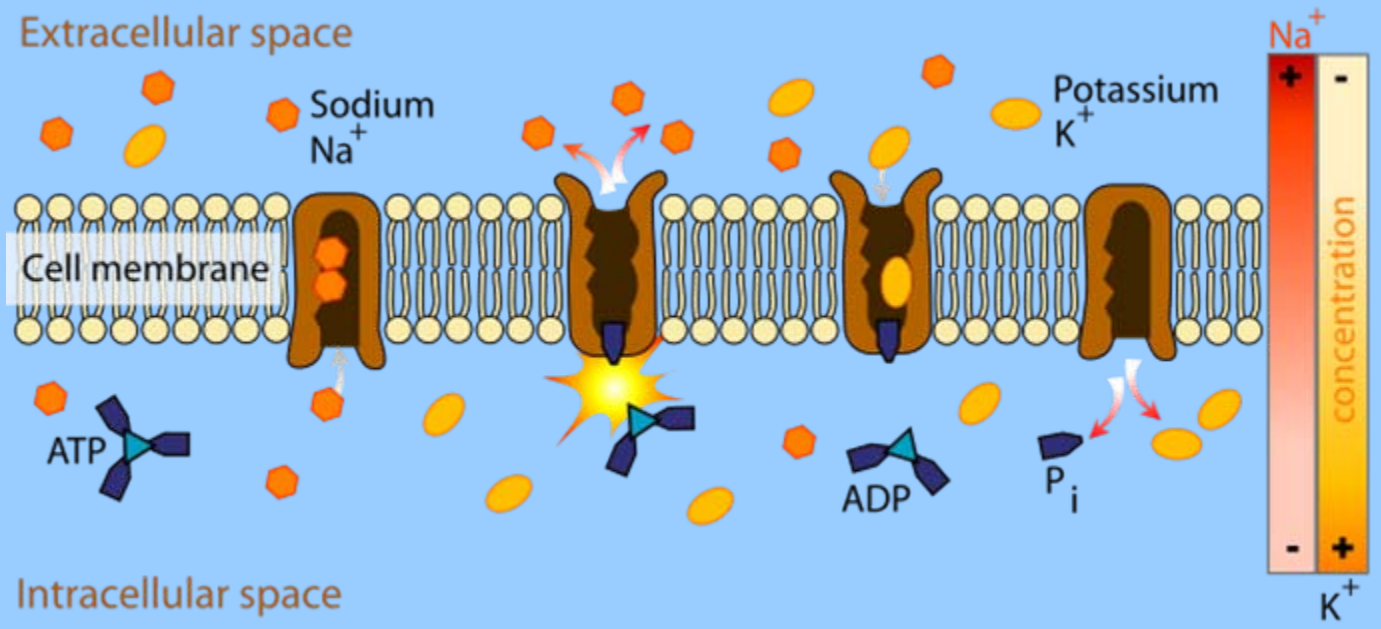

Hypertonic
Isotonic
Hypotonic
H2O
H2O
H2O
H2O

- Facilitated Transport - molecules are transported at a higher rate (faster) from high to low concentration.
  - Uses protein carriers
  - Binds to only a particular molecule
  - Transports sugars and amino acids

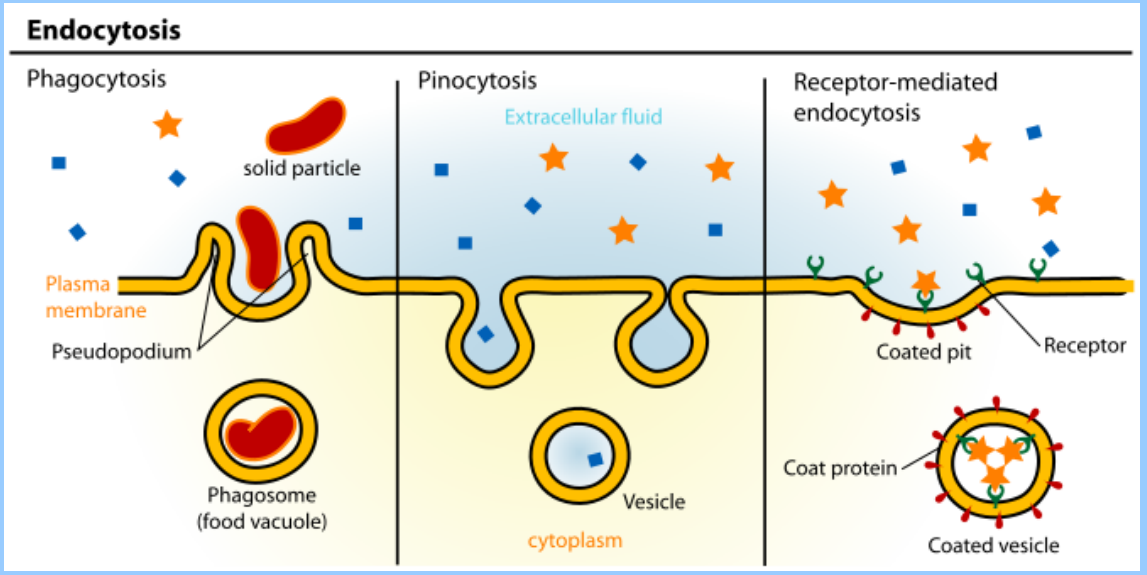


Active Transport

- Active Transport – Moves molecules from low concentration to high concentration.
  - Requires a protein carrier
  - Uses cellular energy (the break down of ATP)
  - Protein carriers are often called pumps
  - e.g. sodium/potassium pump



- Endocytosis – the plasma membrane forms a pouch around a substance and pulls it in to the cell.
  - Creates a vesicle in side the cell
  - Some white blood cells take in pathogens this is called phagocytosis
  - Pinocytosis – cell usually take up molecules and fluids



- Exocytosis – a vesicle fuses with the PM as secretion occurs.
  - e. g. insulin- secreting cell