

concentration gradients for each ion/molecule (ex: Channels let K⁺ leave cell, Pumps bring K⁺ back into the cell)

- Ion levels
 - SEE TABLE BELOW
 - **Hint:** excess Sodium (Na⁺) causes high blood pressure so TOO MUCH Na⁺ in blood and outside cell (so Low inside)... K⁺ is just the opposite of Na⁺
 - may seem stupid, but makes you never forget

ION NAME	Concentration Inside cell	Concentration Outside Cell (interstitial fluid)	Concentration in Plasma
Na ⁺	low	high	high
K ⁺	high	low	low
Cl ⁻	low	high	high
protein -	high	low	high

- **Aquaporins:** Channels that let alot of water in
- Plasma Membrane is not always constant in its number of Channels/carriers (depends on what's needed/ cell type)
 - **endocytosis:** used to take proteins back into the cell and OUT OF THE MEMBRANE
 - **Exocytosis:** is used to embed proteins INTO THE MEMBRANE
- **Membrane Potential**
 - All cells have an electrical potential across their membrane
 - Inside the cell the charge is negative
 - voltage is -5 to -100 mV
 - This means that the potential is negative, but what makes it negative
 - unequal distribution of ions (see chart)
 - many amino acids are negatively charged and the proteins made of them are large and stuck inside of the cell
 - The cell membrane's selective permeability helps maintain this
 - large negatively charged organic phosphates also get stuck inside (like the proteins)
 - These fixed anions attract cations that can pass through channels which accumulate at higher and higher concentrations outside of the cell
 - There is huge pressure for Na⁺ to go into the cell, but only few channels to let it through (negative charge inside attracts it AND Lower [Na⁺] inside)
 - Na⁺/K⁺ pump keeps the Na⁺ that does seep in balanced out to keep the cell from **depolarizing** (covered later) when it doesn't want to
 - called an electrogenic pump because it creates the electric gradient (pumps 3 Na⁺ out 2 K⁺ in resulting in a loss of + charge every cycle... keeping the inside of the cell negative)
- **Featured Disorder: Hyperkalemia**
 - an abnormal increase in [K⁺] in blood, increasing the amount of K⁺ outside of cells.
 - Raising [K⁺] outside cell makes it favorable for K⁺ to move into the cell and make the

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