

Lecture 4

Body Organization

- Fluid Compartments (3)
 - o Plasma ↔ Interstitial Fluid ↔ Intracellular Fluid
 - o Barrier between fluids
 - **Capillary wall** (between plasma and IF)
 - **Cell Membrane** (between IF and IF)
 - o These 2 barriers limit movement

Subcellular Composition

- **Ions**= have a charge (aka electrolytes)
 - o Net positive (cation) or negative (anion) charge
- **Free Radicals** = single electron in outer orbital
 - o The single electron is unstable and does not want to be alone
 - There is an odd number of electrons, lacks a pair of electrons
 - o Free Radicals remove electrons from another molecule
 - This is called oxidizing
 - o Our body makes free radicals when we are sick
 - They are effective at fighting pathogens but they also damage our good cells too
 - For that reason, they are said to be **indiscriminant**
 - We don't want free radicals when we are healthy though
 - o Need to be neutralized by donors (ex. *vitamin A and D*)
 - Can neutralize free radicals without turning into one
 - AKA **antioxidants** = neutralize free radicals by donating an electron
 - We don't want these when we are sick; only when we are healthy
 - o Examples. Know these
 - Super Oxide $O_2\cdot$
 - Nitric Oxide $NO\cdot$
 - Hydroxyl Radical $OH\cdot$
- Molecular Bonds
 - o Figure 2-5
 - o **Covalent**: sharing of electrons (very strong bond)
 - But not always sharing equally (ex. H_2O)
 - Creates partial charge
 - Terminology: based on water and oil (lipids/fat)

- Polar vs. Nonpolar
- Hydrophilic vs. Hydrophobic
- Lipophobic vs. Lipophilic
- Figure 2-8
 - Some compounds are **amphipathic**
 - Have polar and nonpolar part (ex. phospholipid)
 - Like dissolves like
 - **So they dissolve in...**
- Noncovalent bonds
 - **Ionic:** electrical attraction of opposite charges
 - Ex. salts (figure 2-4) $\text{Na}^+ + \text{Cl}^- \rightarrow \text{NaCl}$
 - Between metals and nonmetals
 - Strong without water; so weak in body
 - **Hydrogen Bonding:** interaction with H bound
 - Weak
 - **Hydrophobic Bonding:** avoiding polar
 - Weak

Plasma Membrane

- Functions
 - Regulates movement (in, out, within) → figure 3-8
 - Binds chemical messengers
 - Holds cell in extracellular matrix
 - Allows for cell's shape and motility
- Components: in fluid mosaic form
 - Things move relative to each other
 - Made up of more than just one component
 - 1. **Phospholipid:** main building block
 - Polar head and 2 nonpolar tails → amphipathic
 - Spontaneously form bilayer
 - 2. **Cholesterol**
 - Amphipathic (small polar head induces correct orientation)
 - Form vesicles → move things in and out of the cell
 - 3. **Proteins** → 2 categories:
 - **Integral**
 - Within the plasma membrane
 - Serve as channels, receptors, and anchors extracellular matrix
 - **Peripheral**

- On the side of the plasma membrane
- Impact shape and motility of the membrane