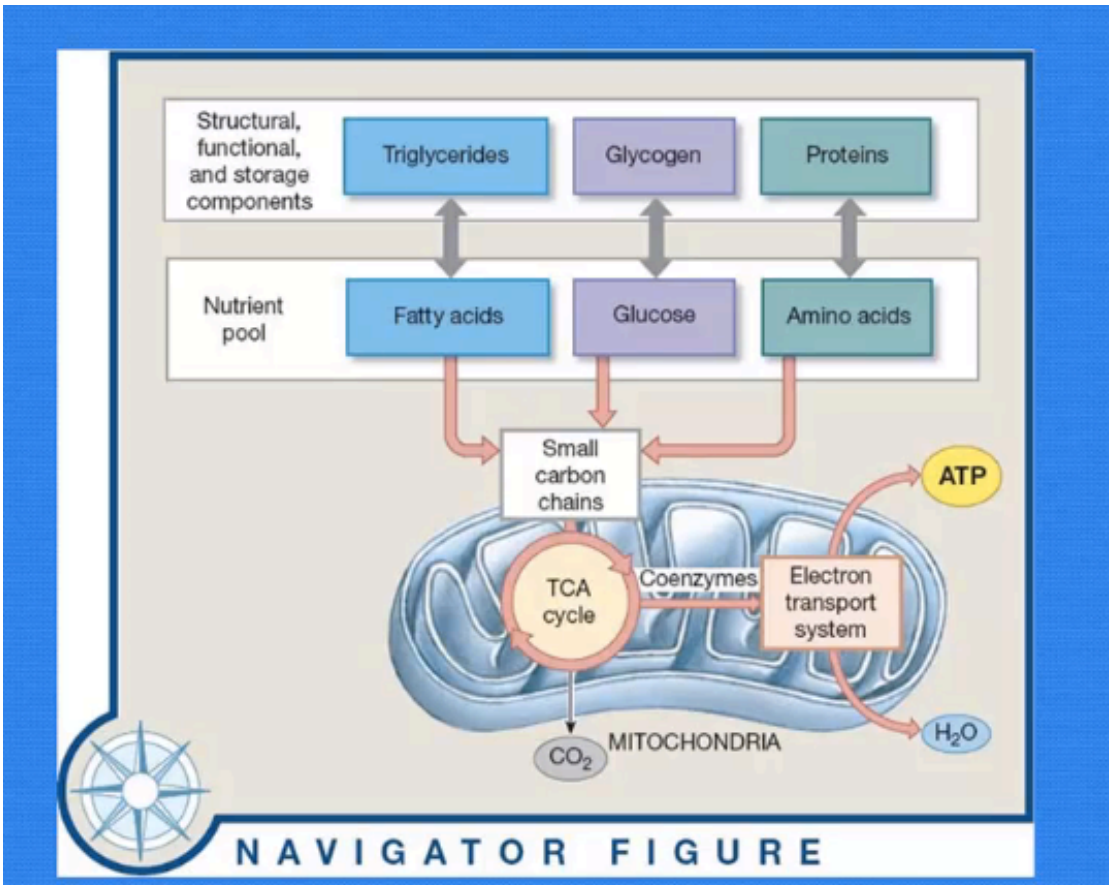
Cellular Respiration (Week 3)

- How macromolecules make energy
- Cellular respiration occurs in the mitochondria
- When we eat we have triglycerides, larger carbs and proteins which come into our digestive system which forms fatty acids, glucose and amino acids
- We use carbon chains in mitochondria to make energy



- Kreb's cycle:
- Carbs are the easiest to use
- For cellular respiration:
    - Organic molecules in
    - Broken down to a simple form
    - Catabolism results in energy release
    - 60% lost as heat
    - 40% ATP for cell activities
- ATP powers our whole body
- Energy doesn't disappear it changes form
- Catabolic reactions when food is broken down produces energy for body

- Main purpose of CR is to generate ATP
- **Stage 1:** Digestion in GI tract lumen (we eat something)
- **Stage 2:** Anabolism and formation of catabolic intermediates within tissue cells (Nutrients used in glycolysis)
- **Stage 3:** Oxidative breakdown in mitochondria of tissue cells (produce energy that we use)
- Metabolism – all the chemical reactions that occur in an organism
- Cellular metabolism – all the chemical reactions within a cell
    - Provide energy needed to maintain homeostasis and to perform essential functions
- Decomposition reactions
    - Breaks large complex molecules into smaller fragments that can be absorbed
- Hydrolysis
    - Decomposition reaction involving water
    - Components of the water molecule join the new fragments
- Decomposition reactions are known as catabolism
- When a covalent bond is broken it releases energy that can be used for work
- High energy bonds
    - Most chemical reactions that release energy occur in the mitochondria but most activities requiring energy occur in the cytoplasm
    - Needs to be in a form that can be moved around
    - High energy bonds (made by enzymes)
    - Most high energy compounds are derived from nucleotides e.g. ADP, ATP
    - High energy bonds connect a phosphate group to an organic molecule
- Formation of high energy bonds
    - Nitrogenous base i.e. adenine added to a ribose makes adenosine
- High energy bonds stores energy through anabolism
- Requires ATPase to synthase
- Without ribose life wouldn't be possible (energy use)
- What is an enzyme?
    - Most things that happen in the body are possible because specific enzymes make it possible (catalyse)
    - They're a protein
    - Specifity, saturation limits, regulation
    - Cofactors: functional