Unit 5 - Nutrition

Key Concepts:

- Identify foods that are rich sources of the 4 main classes of organic macromolecules as well as vitamins and minerals
- Identify differences between "good" and "bad" fat
- Calculate caloric contributions by carbohydrates, proteins and lipids from the nutritional information on a food label
- Explain how bad health choices can lead to problems like obesity, factors that influence obesity and ways to treat obesity
- Explain the role of body mass index (BMI) as a measure of health status of an individual
- Explain the role of oxygen in cellular respiration
- Understand implications of a block in the energy conversion machinery of the cell

4/11 - Obesity

Class Notes:

- Mouth = >500
- Digestive Tract = >1000

- Functional contributions of gut microbiota:
  - Break down complex carbohydrates
  - Synthesize vitamins
  - Regulator of drug bioavailability
  - 55

    -18.5-24.9 = normal

    -25-29.9 = overweight

    -30 and above = obese
  - **Measures of body fat**: BMI, waist circumference, waist to hip ratio, BOD PODS, DEXA scans, calipers, BIA, blood levels of lipids.
  - **Problems associated with obesity**: hypertension, type II diabetes, hyperlipidemia, cardiovascular disease, depression
  - **Treatment of obesity:** weight loss pills, surgery (gastric banding, gastric bypass), weight loss programs.

Types of Carbohydrates

- **Monosaccharide**: glucose, fructose, galactose
- **Disaccharide:** lactose, sucrose, maltose
- **Polysaccharide:** glycogen, starch, cellulose
- **Organic Macromolecules**: carbohydrates, lipids, proteins and nucleic acids

-organic molecules must contain carbon

- Amino acids:
  - Some like water, some don't.
  - Our bodies produce some, but won't produce others.
  - Building blocks of proteins.
  - Come in different shapes and sizes
- Fatty Acids:
  - Building blocks for fats.
  - Saturated: have no double bonds in its chain. Solid at room temperature.
  - Unsaturated: have one or more double bonds in its chain. Liquid at room temperature, because the bends in the chain prevent them from being closely packed together.
  - Triglyceride: the fatty acid chain may be saturated or unsaturated. (Main storage = form of lipid).

- **Carbohydrates** attached to proteins on the cell surface connect two cells through the extracellular matrix.
- **Proteins** form channels for the passage of molecules, signals from the outside of the cell to the inside.
- **Phospholipids:** reside in the membrane and serve as a barrier to external environment.
- **Cholesterol** makes the cell membrane fluid and flexible.

- **Nutrition Facts Label:**
  - Select foods low in sodium;
  - A food is low in fat if the calories from fat multiplied by 3 are less than the calories per serving; (fat calories should not make up more than a third of total calories)
  - Look for high fiber;
  - A food high in protein has 7 grams or more per serving;
  - Consume less than 300mg of cholesterol per day.

Reading Notes:

5.6 - The Chemical Building Blocks of Life

- There are 4 major classes of molecules: carbohydrates, nucleic acids, proteins, and lipids
- Organic molecules are biomolecules that include at least 1 carbon-hydrogen bond. Ex: Sugars and amino acids

- Macromolecules- larger assemblies of atoms created by small organic molecules linked up Ex: starch and proteins
- Monomers - small repeating units of macromolecule
- Polymers - what macromolecules are called when contain monomers(A polymer may be a natural or synthetic macromolecule comprised of repeating units of a smaller molecule (monomers)
- Functional group - clusters of covalently bonded atoms that have the same distinctive chemical properties no matter what molecule they are in

5.7 - Carbohydrates

- Carbohydrates are sugars and their polymers
  - In a carbohydrate, for each Carbon, there are 2 Hydrogen and one oxygen
- Monosaccharides - simplest sugar molecules. Often referred to by the # of carbons (between 3 and 7).
  - Ex: Glucose ($C_6H_{12}O_6$)
- Disaccharide - two covalently joined monosaccharides.
  - Ex: table sugar, sucrose
- Polysaccharide - large polymers built by many linked monosaccharide. Ex: cellulose

5.8 - Proteins

- Major functions of protein: storage, structure (bone, cartilage, hair), transport (hemoglobin), catalysts (enzymes)
- Built from amino acids
- Polypeptide- linear chains of amino acids covalently linked
  - their sequence of amino acids = primary structure; how it folds = secondary structure; last fold = tertiary structure
- Denaturation - destruction of a protein's 3-D structure

5.9 - Lipids

- Lipids- hydrophobic molecules made by living cells
  - most from fatty acids
- Fatty acid in which all the Carbon atoms in the hydrogen chain are linked by single covalent bonds are saturated