Nutrition and Sports Fall 2013 Exam 1 Study Guide

1. Know basic structural composition of CHO, Lipid and Protein. How is each type of macronutrient classified?

- Carbohydrates contain a carbon, hydrogen, and oxygen group; these molecules are in a 1:2:1 ratio
- Lipids contain a carbon, hydrogen, and oxygen group just like CHO, but they are in a methyl chain
- Proteins contain a carbon, hydrogen, oxygen, nitrogen, prosperous, and sulfur group.
  - Carbohydrates are classified as glucose, fructose, or galactose; and these are the monosaccharides.
    - Sucrose, Maltose, and lactose are the disaccharides and are formed from a mixture of the monosaccharide's
    - The oligosaccharides contain 3-9 of those monosaccharide's and these are usually in veggie
    - Maltodextrines contain 10-20 monosaccharide's o The polysaccharides are the main storage form for CHO, and these can contain up to thousands of monosaccharide's

➢ These are broken down to starch (plant storage, and as amylose or amylopectin), glycogen (storage in animals) and fiber (cellulose, beta-glucans, soluble, non-soluble)

➢ The proteins are classified as amino acids. These are individual blocks that from in chains to make the different proteins (need at least 100 amino acids).

➢ Lipids are classified based on the triglycerides, phospholipids, lipoproteins, steroids, and FA's in the body.

2. What are the functions, storage, and location of each of the macronutrients?

- CHO is an important fuel used for exercise and it is stored in the liver as glycogen (similar to amylopectin [branched] and 80-100g) and also in the muscles (300-900g). CHO is the main fule for the brain
- Lipids fuel most of the cells and is our dominate fuel at rest. It is stored in adipose tissue. The functions of lipids are numerous and essential: they serve as insulation, shock absorber, and vitamin carries, hunger suppressors, protect organs.
- Protein is mostly in skeletal muscle and serves as enzymes, tissue remodeling, in parts of the membrane, and as buffers.

3. What is the difference between the glycemic index and the glycemic load? And what affect does the glycemic load have?
    - Glycemic load is defined as the rate that the carbohydrate is absorbed, or that it enters the blood. With a high GL, the food would enter the blood stream shortly after ingestion, and this would spike the blood glucose level, which would cause an acute increase in insulin in order to absorb that glucose. The insulin stimulates fat synthesis and increase inflammation. So foods high in GL are considered worse usually (unless you need energy fast)
    - Glycemic index is a comparison of the blood sugar response between 50g CHO for the food and 50g of pure CHO. Once you get this number, you can multiply it by the g of CHO/100 to get the GL.
        - So GL=GI x g CHO/100

4. What determines the biological value of protein? What types of food are considered as examples?
    - When looking at the value of the protein in the food, the food is classified as a complete or an incomplete source
        - A complete source of protein contains all the essential amino acids (there's 9) in decent proportions. The classic example being egg, whey, or soy
            - An incomplete source of protein is missing some essential amino acids, and eventually can make a person deficient in that AA. Examples being rice, soybeans, and peanuts.

5. What are the distributions and functions of water?
    - These are explained and reviewed on ever guide and were on every test, so hopefully you know it by now! 60% of the male body is water, with 2/3 of this water being intracellular and 1/3 being extracellular (then these breaks down to 80% interstitial and 20% in the plasma).
    - Water has many essential functions, such as thermal heat capacity, many reactions, lubrication, transport, and an ionization medium for electrolytes. Basically any question involving the function of water is "all of the above".
    - If you want to look at the content is the tissues, the skin, organs, blood, and muscle (the most content) all are 75% or more water. Adipose is only 10% water, unless the person is really really really fat

6. What roles do vitamins and minerals play in the body? How are they classified? What affects mineral bioavailability.

- **A vitamin** is an organic compound that is considered essential. You take these out of the diet, and your body will deteriorate. You add them back in, and then those problems will be reversed; thus, they are essential.

- Understand that vitamins do NOT yield energy; they regulate many reactions, but they do not break down to energy like carbohydrates, proteins, and fats.

- Vitamins are classified as water or fat soluble, and this classification determines how the vitamin is absorbed (fat soluble vitamins need fat and are absorbed with fat) and how they are stored in the body (water soluble are stored in water, which you urinate out, so water soluble are not stored in the body). Because of these, it is very hard to overdose on water soluble vitamins, yet the fat soluble vitamins are stored in the body, so overdose is much easier.
  - Some vitamins are cofactors, meaning they assist in metabolic reactions. Some are coenzymes, so they are loosely attached to certain enzymes and determine reactions. If they are tightly bound to an enzyme, they are known as prosthetic groups.
- **A mineral** is an inorganic compound that the body requires in a very small amount. Minerals cannot be made by us humans, thus we need to consume them in food. Unlike vitamins, they are not destroyed by any means; cooking or light.
- Minerals come in two flavors, like vitamins do. The macro minerals and the micro minerals
  - The macro minerals are needed by the body in larger quantities, and consist of calcium and potassium for example.
  - The micro minerals are needed in smaller quantities, but are as important. Such as copper and zinc.
- Every mineral is different, but the general roles are all the same. Most of them are for structure, some are catalytic, and others are for signal transduction. Ones that we didn't go over in detail are Na, K, and Cl and these are involved in osmotic pressure and membrane potential. The exact role varies with minerals, but the general roles are the same.
- **Bioavailability** is the amount of the mineral in the food that the body could actually absorb, and differs among the minerals. Certain factors can decrease the bioavailability and some can increase it
  - The ones that decrease it are if chelation is present, if there is competition with other nutrients, or if the mineral has other antagonists and they are present
  - The ones that increase it are other food constitutes, synergism, or intestinal environment. It will be different for every mineral.