

Chapter 5

Nutrition



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Chapter 5 Nutrition 101 Week 4 Assignment Study questions 1. What features distinguish fatty acids from each other? Fatty acids are distinguished by the length of their carbon chains, degree of unsaturation and their location of double bonds. Most are triglycerides with glycerol backbones and three fatty acids attached. 2. What are the differences between saturated, unsaturated, monounsaturated, and polyunsaturated fatty acids? Describe the structure of a triglyceride. Saturated fats are fully saturated with hydrogen atoms and do not contain any double bonds with carbon atoms, they are solid at room temperature and are not considered to be heart healthy, they are commonly found in foods like butter and chicken fat. Unsaturated fats have no hydrogen atoms and have at least one double bond between carbons, they are liquid at room temperature and are known for being a heart healthy fat. Unsaturated fats are commonly found in olive oil and canola oil. Both Polyunsaturated fats and monounsaturated fats are types of unsaturated fats, the differences between the two are in their length of carbon chains. Polyunsaturated fats have two or more double bonds as appose to the monounsaturated fats that have one double bond.

Triglycerides are composed of a molecule glycerol and three fatty acids attached, it is the main form of fat in the body. 3. What does hydrogenation do to fats? What are trans-fatty acids, and how do they influence heart disease? Hydrogenation process makes fats more saturated (solid) and protects them from oxidation giving them a prolonged shelf life. Trans-fatty acids have their hydrogens on the opposite side of the double bond, this is rarely found in natural foods. Commercially created trans-fats are typically found in partially hydrogenated foods like margarines and shortening. Trans-fats have effects in the body similar to those of saturated fats, increasing

blood cholesterol and the risk of heart disease. 4. How do phospholipids differ from triglycerides in structure? How does cholesterol differ? How do these differences in structure affect function? Phospholipids are similar to triglycerides but differ in structure because phospholipids are bonded to glycerol with 2 fatty acids not 3 like triglycerides, they also have phosphate which is water soluble. Cholesterol differs significantly from other lipids, its structure has a four-ring carbon with a carbon side chain. 5. What roles do phospholipids perform in the body? What roles does cholesterol play in the body? Phospholipids enable the transport of lipids across cell membranes in the body, they are also an emulsifier, commonly found in foods like eggs, liver, soybeans, wheat germ and peanuts. Cholesterol is a major component of cell membrane especially in nerve and brain tissue. Cholesterol is also a starting material for Vitamin D, testosterone, cortisol, and very important in the synthesis of bile acids. 6. Trace the steps in fat digestion, absorption, and transport. Describe the routes cholesterol takes in the body. Fat digestion starts in the Mouth, where salivary glands release lingual lipase. very little digestion happens in the mouth. Once in the Stomach, muscular actions mix fat with chime, lipase is still active at this point. In the Small Intestine, fat signals the release of the CCK hormone which stimulates the gallbladder to release bile. Pancreatic and intestinal enzymes hydrolyse lipids to monoglycerides and fatty acids, phospholipids are also hydrolysed and sterols are absorbed are they are. Most of the lipid absorption is done in the duodenum or jejunum, small lipid molecules are digested into enterocytes and large molecules merge into micelles. Micelles are then turned into triglycerides and with protein they transport chylomicrons. Chylomicrons enter the lymphatic system bypassing the liver and continue to the rest of

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the body. Cholesterol is transported through the lipoprotein VLDL, as it loses triglycerides it shrinks and cholesterol becomes the predominant lipid turning it into a LDL. The LDL circulates through the cells of tissues and muscles.

7. What do lipoproteins do? What are the differences among the chylomicrons, VLDL, LDL and HDL? Lipoproteins serve as transport vehicles for lipids in the lymph and blood essentially protecting the fat, the four types of lipoproteins are chylomicrons, VLDL's, LDL's, and HDL's. Lipoproteins differ in sizes and what they transport, chylomicrons mostly transport triglycerides and are the largest of the lipoproteins. VLDL's are smaller and carry half triglycerides, HDL's are mostly protein and LDL's are more than half cholesterol making them the "bad cholesterol."

8. Which of the fatty acids are essential? Name their chief dietary sources. The essential fatty acids in our diets are the Omega-3 and Omega-6 fatty acids. Our bodies cannot synthesis these fatty acids so we must consume them from foods. Omega-3 is found in foods like soy oil, canola oil, walnuts, and fatty fish like salmon and mackerel. You can get the necessary Omega-6 from foods like nuts and seeds and common vegetable oils, corn, safflower, and sunflower.

9. What are the dietary recommendations regarding fat and cholesterol intake? List ways to reduce intake. Dietary Guidelines recommend choosing a diet low in saturated fat, trans fat and cholesterol that provides 20-35% of energy intake from fat. To reduce fat and cholesterol intake you must limit your fatty meats, whole milk products and hydrogenated foods like imitation cheeses, snack foods (chips), and fried foods.