

Phospholipids



**ASSIGN
BUSTER**

Along with sterol, phospholipids make up 5% of lipids in diet. Best known phospholipid is lecithin. Has backbone of glycerol. 2 of its 3 attachments occupied by fatty acid like those of triglycerides. The third space occupied by a phospholipid group and a molecule of choline. Soluble in both fats and water. Fatty acids make phospholipids soluble in fat. Phosphate group allows phospholipids to dissolve in water and this allows the phospholipids used as an emulsifier to mix with water in products such as mayo and candy.

Phospholipids are found naturally in foods. The richest sources of lecithin are in: Eggs, Liver, Soybeans, Wheat germ, Peanuts.

ACTION OF PHOSPHOLIPIDS:

Lecithin's decrease, other phospholipids are important composition of cell membranes. Helps lipids move across cell membranes because soluble in both water and fats such as Vitamins, Hormones. Act as emulsifiers keeping fat suspended in the blood and body fluids. Do not need to take supplement of lecithin because the liver makes lecithin from scratch. Large doses of lecithin can cause GI distress, sweating and loss of appetite.

Phospholipids, including lecithin, have a unique chemical structure that allows them to be soluble in both water and fat. In the body, phospholipids are part of cell membranes; the food industry uses phospholipids as emulsifiers to mix fats with water. A cell membrane is made of phospholipids assemble into an orderly formation called a bilayer. The fatty acid tails orient themselves away from the watery fluid inside and outside of the cell. The glycerol and phosphate heads are attracted to the watery fluid.

STEROLS Most common sterol is cholesterol. Cholesterol is made in the body and comes from foods.

Derived from both plants and animal contain sterols, animals contain significant amounts of cholesterol. Cholesterol is in dietary foods and blood. The good and bad cholesterol is found in blood only. The chemical structure of good cholesterol and blood cholesterol have the same chemical structure but cholesterol that is made in the body is called ENDOGENOUS, whereas cholesterol from outside the body (from food) is called EXOGENOUS. Vitamin D, a fat-soluble vitamin, is synthesized from cholesterol. Sterols other than cholesterol is found in plants, are structurally similar to cholesterol but plant sterols interfere with cholesterol absorption this lowering cholesterol levels. Margarine is a functional food with plant sterols to help reduce blood cholesterol.

ROLES OF STEROLS Many important body compounds are sterols. Among them are: Bile acids Sex hormones, testosterone Adrenal hormones, cortisol Vitamin D Cholesterol itself Cholesterol in the body is the starting material for synthesis of: Bile acids Steroid hormones such as testosterone, androgens, estrogens, cortisol, progesterone, cortisone and aldosterone. Vitamin D Sterols have a multiple ring structure that differs from the structure of other lipids. In the body, sterols include cholesterol, bile, vitamin D, and some hormones. Animal derived foods contain cholesterol. To summarize, the members of the lipid family include: **SUMMARY OF LIPIDS:**

TRIGLYCERIDES: fats and oils and made up of * Glycerol: 1 per triglyceride * Fatty acids: 3 per triglyceride and fatty acids maybe: * Saturated, no double bonds * Monounsaturated, 1 double bond Polyunsaturated, more than 1 double bond and depending on location of the double bonds polyunsaturated fatty acids maybe: * Omega-3 where 1st double bond is 3 carbons away from

methyl group (CH₃)* Omega-6 where 1st double bond is 6 carbons away from the methyl end MAJOR SOURCES OF SATURATED FATS: * Whole milk, cream, butter, cheese * Fatty cuts of beef and pork * Coconut, palm, and palm kernel oils MAJOR SOURCES OF OF CHOLESTEROL * Eggs * Mild products * Meat * Poultry * shellfish PHOSPHOLIPIDS: major one is lecithin STEROLS: include cholesterol In the body, triglycerides: Provide and energy, reserve when stored in the body's fat tissue * Insulate against temperature extremes * Protect against shock * Help the body use carbohydrate and protein efficiently LINOLEIC ACID is an 18-carbon omega 6 fatty acid, LINOLENIC ACID is an 18-carbon omega 3 fatty acid, and both are essential nutrients. They serve as structural parts of cell membranes and as precursors to the longer fatty acids that can make eicosanoids, a powerful compound that participate in blood pressure regulation, blood clot formation, and the immune response to injury and infection, among other functions.

Because essential fatty acids are common in the diet and stored in the body, deficiencies are unlikely. REVIEW: The three classes of lipids found in the body and in foods are: Triglycerides Phospholipids Sterol The functions of triglycerides are: Carry fat-soluble vitamins Induce satiety Provide body with a continuous food supply Keep body warm Protect it from mechanical shock Serve as starting materials for hormonal regulations The functions of phospholipids and sterols: Con: tribute to cells structures The functions of cholesterol Serves as raw material for hormones, vitamin D, and bile The features that fats bring to food are: Fats enhance foods aroma and flavor Increase palatability Provide kcal and fat-soluble vitamins The features that distinguish fatty acids from each other are: Essentially and no essentiality

Size indicated by number of carbons Saturated versus unsaturated Location of double bonds in unsaturated fatty acids The term omega with respect to fatty acids is: In polyunsaturated fatty acids, omega refers to the relative place in which the first double bond is located from the methyl end of the chain. The roles of the omega fatty acids in disease prevention is: The structures are important to health as they are essential nutrients used to make hormone like substances that play regulatory roles in the body. Omega 3 fatty acids may lower risk of some cancers and heart disease.

Phospholipids differ from triglycerides is that: Phospholipids have a choline or other phosphorus containing acid in place of one of the fatty acids, enabling them to function as emulsifiers in the body. Phospholipids allows the fatty acids to dissolve in water Phospholipids differ from cholesterol: Cholesterol is a sterol, and its C, H, and O atoms are arranged in rings. Cholesterol in the body can serve as starting material for many important body compounds The roles of phospholipids in the body are: Phospholipids are important parts of cell membranes They help lipids move back and forth across the cell membranes into the watery fluids on both sides Enable fat-soluble vitamins and hormones to pass easily in and out of cells The roles of cholesterol are: Provides energy Serves as part of cell membranes, bile acids, sex hormones, adrenal hormones and vitamin D The steps of fat digestion, absorption, and transport are: Bile emulsifies fats, allowing the enzymes to gain access to the fat for digestion Products of lipid digestion are packaged with protein for transport The route cholesterol takes in the body is: Cholesterol shuttles back and forth between the liver and the body cells in lipoproteins, and it visits the intestinal tract in the form of bile.

Structure and functions of lipoproteins: Composed of triglycerides, cholesterol, phospholipids, and proteins, lipoproteins transport lipids in the body. The differences among the chylomicrons: Are the largest of the lipoproteins, Formed in the intestinal wall following fat absorption. They contain mostly triglycerides. Describe VLDL, LDL, HDL: VLDL are made in the liver and contain mostly triglycerides. LDL contains few triglycerides but are about half cholesterol, bad cholesterol. HDL is about half protein and transport cholesterol back to the liver. Which of the fatty acids are essential and they are found where: Linolenic acid, Linoleic acid. Both are found in vegetable oils and meats, grains, seeds, nuts, leafy vegetables, fish.

Excessive fat intake influences health: Excessive fat intake can contribute to elevated blood cholesterol and other blood lipids, therefore heart disease, obesity, and cancer can occur. Some saturated fats raise total cholesterol and LDL, trans-fatty acids raise LDL and lower HDL. Monounsaturated fats lower LDL without lowering HDL. The dietary recommendations regarding fat and cholesterol intake and ways to reduce intake: To consume a diet that is low in saturated fat, trans fat and cholesterol, limit total fat intake to 20 to 36% of daily energy from fat, consume 5 to 10% of daily energy from linoleic acid and 0.6 to 1.0 percent from linolenic acid. To reduce fat intake select lean meats and nonfat milk, eat plenty of vegetables, fruits, and grains, use fats and oils sparingly, look for invisible fat, and read food labels. The lipids include: Triglycerides, phospholipids, sterols. The roles of body fat are: Maintain cell structure, Protect organs, Provide energy, Protect lean tissue from depletion. The roles of food fat are: Provide palatability, Provide satiety, Deliver fat soluble vitamins, Provide kcalories. Triglycerides are made of: Glycerol, 3 fatty acids. The lipoproteins are: Chylomicron, VLDL, LDL, HDL.