

Lipids II

Triacylglycerols

- Esterification of glycerol takes place at each of the alcohol moieties
- This is the major form of fatty acid storage. Found in adipose tissue in specialized cells. These fat cells are filled with TAGs and can grow in size.
- Release (hydrolysis) of fatty acids occurs under the control of hormone sensitive lipase
- Fatty acids released into the bloodstream are carried via albumin.
- The acylated acyl chains are typically different at each position of glycerol.
- Each of the three carbons on glycerol are different. The 1 and 3 carbons are stereochemically different and recognized as such by enzymes. The carbons are labeled sn1, sn2, sn3
- TAGs DAG and MAG. The sn3 carbon is typically removed first.
- Saponification - hydrolysis by bases (KOH - potash) cleaves the fatty acids from glycerol. Using KOH from wood ashes and animal fat creates old-fashioned soaps. (divalent cations in hard water cause the ppt of soaps)
- There is a large amount of energy available in the storage of TAGs. These are highly reduced molecules with low amounts of water associated. The result is a molecule that can undergo repeated oxidation steps transferring the energy to form ATP. The low water content increases the gram per gram energy available vs. carbohydrates
- Polar bears can go for up to 8 months without eating. Most of energy and water comes from the fats produced by the bear and the fat ingested from seals.

Phospholipids

- Phospholipids are the largest constituent of the membrane
- Phospholipids serve two important purposes (different than TAGs) structural and signaling. Although DAG is an important signaling molecule as well
 - You should know the different signaling lipids and their functions
- There are two general classes of phospholipids
 - Glycerophospholipids, phospholipids or phosphate esters (same thing) and the sphingolipids.
- The sn 1 and sn2 positions on glycerol are esterified. The sn2 carbon is typically unsaturated. Differences occur between tissues and organism
- The sn3 position is phosphorylated
- The phosphoryl group can be modified with several different alcohols.
- Phosphatidic acid is the base glycerophospholipid but is not found in high concentrations
 - Common head groups (the alcohol derivatives) are serine, choline, ethanolamine, glycerol and inositol.
This divides glycerophospholipids into basic neutral and acidic lipids.
- The nomenclature is 1-acyl-2-acyl-3-phosphatidyl "head group".