

BIOLOGICAL SIGNIFICANCE OF LIPID



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BIOLOGICAL SIGNIFICANCE



- Biological molecules that are insoluble in aqueous solutions and soluble in organic solvents are classified as *lipids*.
- lipid are made up a wide variety of molecules, but they all contain carbon, hydrogen and oxygen with a much higher percentage of carbon and hydrogen molecules than oxygen.

BIOLOGICAL SIGNIFICANCE



- The lipids of physiological importance for humans serve as structural components of biological membranes; provide energy reserves, predominantly in the form of triglycerides, serve as biologically active molecules exerting a wide range of regulatory functions, and the lipophilic bile acids aid in lipid emulsification during digestion of fats.

BIOLOGICAL SIGNIFICANCE



- The biologically relevant lipids consist of the fatty acids, triglycerides, phospholipids, sphingolipids, ceramides, cholesterol, bile acids, eicosanoids, omega fatty acid derivatives, and bioactive lipid derivatives, which also include the inflammation-modulating lipid derivatives.

BIOLOGICAL SIGNIFICANCE



- **Energy storage**
- Triglycerides, stored in adipose tissue, are a major form of energy storage both in animals and plants.
- They are a major source of energy because carbohydrates are fully reduced structures.

BIOLOGICAL SIGNIFICANCE



- **Energy storage**
- In comparison to glycogen which would contribute only half of the energy per its pure mass, triglyceride carbons are all bonded to hydrogens, unlike in carbohydrates.

BIOLOGICAL SIGNIFICANCE



- **Energy storage**
- The adipocyte, or fat cell, is designed for continuous synthesis and breakdown of triglycerides in animals, with breakdown controlled mainly by the activation of hormone-sensitive enzyme lipase.

BIOLOGICAL SIGNIFICANCE

Energy storage

- The complete oxidation of fatty acids provides high caloric content, about 38 kJ/g (9 kcal/g), compared with 17 kJ/g (4 kcal/g) for the breakdown of carbohydrates and proteins.
- Migratory birds that must fly long distances without eating use stored energy of triglycerides to fuel their flights.

BIOLOGICAL SIGNIFICANCE



- **Signaling**
- Evidence has emerged showing that lipid signaling is a vital part of the cell signaling.
- Lipid signaling may occur via activation of G protein-coupled or nuclear receptors, and members of several different lipid categories have been identified as signaling molecules and cellular messengers.

THANK

YOU