

Lecture 6

Lipids - introduction, importance and classification

Occurrence and importance

- The word lipids is derived from the Greek word '**lipos**' meaning fat.
- Lipids are chemically heterogeneous group of compounds that are **insoluble in water but soluble in non-polar solvents such as chloroform**.
- Lipids occur in plants and animals as **storage and structural components**
- Structural lipids present in animals and plants are in the form of meat and vegetables respectively.
- Storage fats occur in milk and adipose tissue of farm animals and in seed oils
- Fats supply over **twice as much energy per unit weight** as proteins or carbohydrates.
- Lipids are anhydrous due to non-polar nature and represent more energy than carbohydrates which are heavily hydrated due to polar nature.
- The presence of lipids in diet contributes considerably to palatability.
- Lipids contribute palatability in two ways. They induce olfactory responses, namely, taste in the mouth and aroma through nose.
- Secondly, they contribute to the texture of food and is responsible for the mouth-feel.
- Lipids also supply the **essential fatty acids** which are not synthesised in human beings but are essential for growth.
- Lipids are **essential for the effective absorption of fat-soluble vitamins A, D, E and K from intestine**.
- Many **enzymes require lipid molecules for maximal activity**. Examples are microsomal enzyme, glucose 6-phosphatase and mitochondrial enzyme, \square hydroxybutyrate dehydrogenase.
- **Adrenal corticosteroids, sex hormones and vitamin D3 (Cholecalciferol)** are synthesized from lipid derivative- cholesterol.
- Much of the lipid of mammals is located subcutaneously and **acts as insulation** against excessive heat loss to the environment.
- The subcutaneous lipid deposits also insulate the important organs against mechanical trauma.

Classification

Lipids are broadly classified into **simple, compound and derived lipids**

Classification of Lipids

Lipids		
Simple Lipids	Compound Lipids	Derived Lipids
Esters of fatty acids with glycerol and monohydric alcohols.	Esters Containing chemical groups in addition to alcohol and fatty acids.	Substances derived from simple and compound lipids by hydrolysis. Alcohols, fatty acids, aldehydes, ketones, sterols and hydrocarbons.
Depending upon the constituent alcohols they are further subdivided into fats or oils and waxes.	Depending upon the chemical groups they are further subdivided into phospholipids, glycolipids, sulpholipids and lipoproteins.	
Fats, also termed as triacylglycerols are esters of fatty acids with glycerol e.g. Plants-vegetable oils; Animals-ghee and butter	Phospholipids contain phosphate group. Phospholipids are further grouped as glycerophospholipids e.g., Lecithin if the constituting alcohol is glycerol or as sphingophospholipids if the alcohol is sphingosine e.g., sphingomyelin.	
Waxes are esters of fatty acids and alcohols other than glycerol e.g., Plant wax-carnauba wax;	Glycolipids contain hexose units preferably galactose alongwith fatty acids and alcohol e.g. Cerebrosides.	
Insect wax-beeswax;	Plant sulpholipids contain sulfated hexose with fatty acids and alcohol	

Animal wax – lanolin	Lipoproteins contain protein subunits along with lipids. Depending upon density and lipid compound they are further classified as VLDL, LDL and HDL.	
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