

# LIPIDS



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# DEFINITION

□ ***“Lipids may be regarded as organic substances relatively insoluble in water ,soluble in organic solvents actually or potentially related to fatty acids and utilized by living cells”.***

# CLASSIFICATION:-

- Lipids are broadly classified into 5 types which are the following:-
  - I. Simple lipids
  - II. Complex lipids
  - III. Derived lipids
  - IV. Neutral lipids and
  - V. Miscellaneous lipids

**I. SIMPLE LIPIDS:-** Esters of fatty acids with alcohols. These are mainly of two types:

**a. FATS AND OILS(Triacylglycerols):**

These are the esters of fatty acid with glycerol.

The difference between fat and oil is only physical.

**b. WAXES:**

Esters of fatty acids with alcohols other than glycerol.

These alcohols may be aliphatic or acyclic.

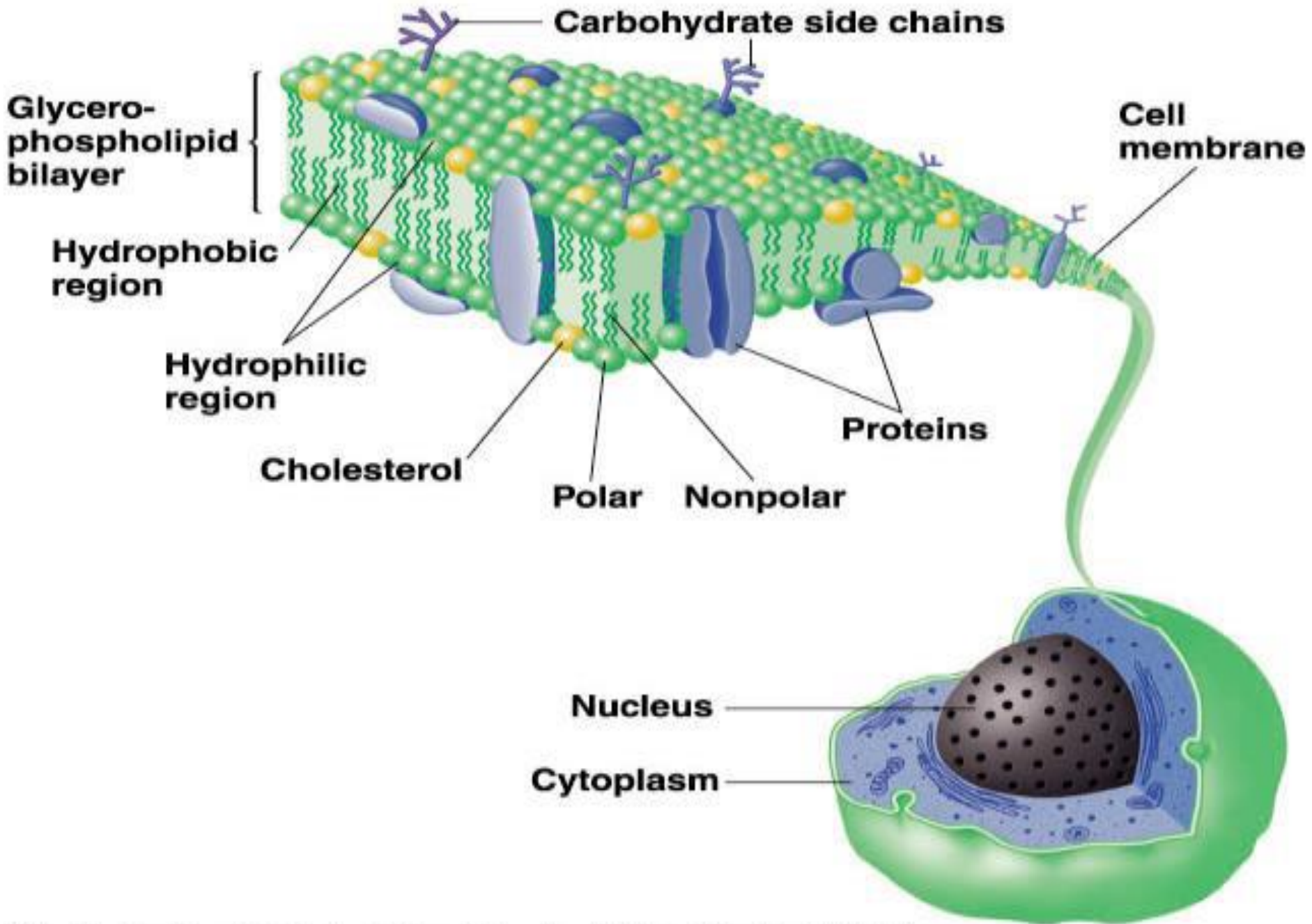
2. **COMPLEX (COMPOUND) LIPIDS**: Esters of fatty acid with alcohols containing additional groups such as phosphate, nitrogenous base, carbohydrate, protein.

i. **PHOSPHOLIPIDS**: Fatty acid + alcohol + phosphoric acid + nitrogenous base

- Based on the type of alcohol present they are again divided into:
- **GLYCEROPHOSPHOLIPID**: Contain glycerol as alcohol.  
ex: lecithin and cephalin
- **\_SPHINGOPHOSPHOLIPID**: Contain sphingosine as alcohol.  
ex: sphingomyelin

## **FUNCTIONS OF PHOSPHOLIPIDS:-**

- Structural components
- Electron transport chain
- Absorption of fat
- Synthesis of lipoproteins and transport of fat
- Prevents fatty liver
- EICOSANOID production
- Surfactant
- Reverse cholesterol transport



## ii. GLYCOLIPIDS:-

- Fatty acids+alcohol+carbohydrate as nitrogenous base.
- They contain sphingosine as alcohol and hence also known as **GLYCOSPHINGOLIPIDS**.
- **Eg:** Cerebrosides and Gangliosides.

## iii. LIPOPROTEINS:-

- Macromolecular complexes of lipids with proteins.
- Eg:LDL,VLDL,Chylomicrons,HDL,etc



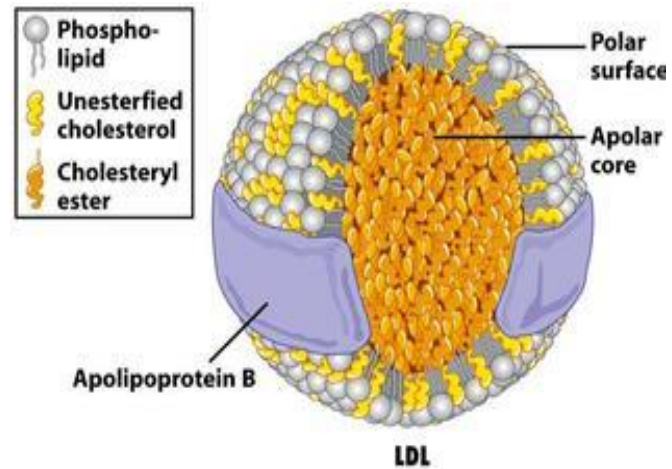
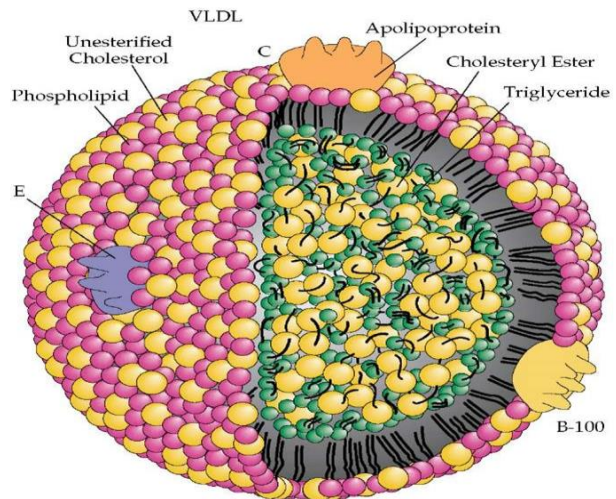
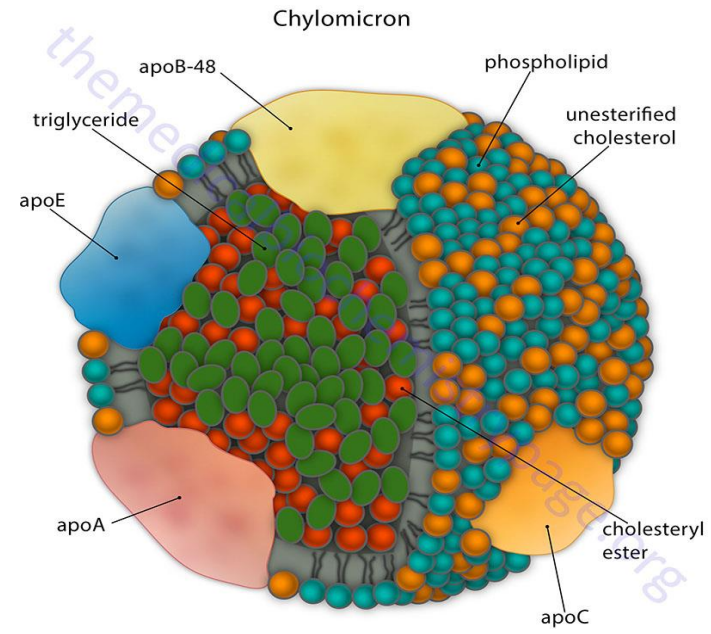
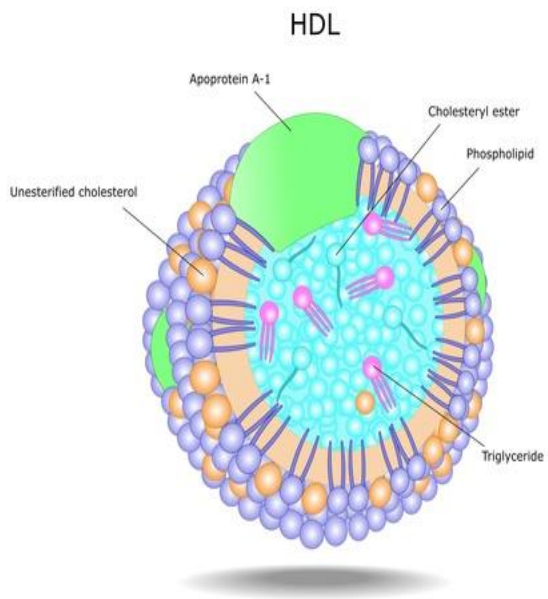
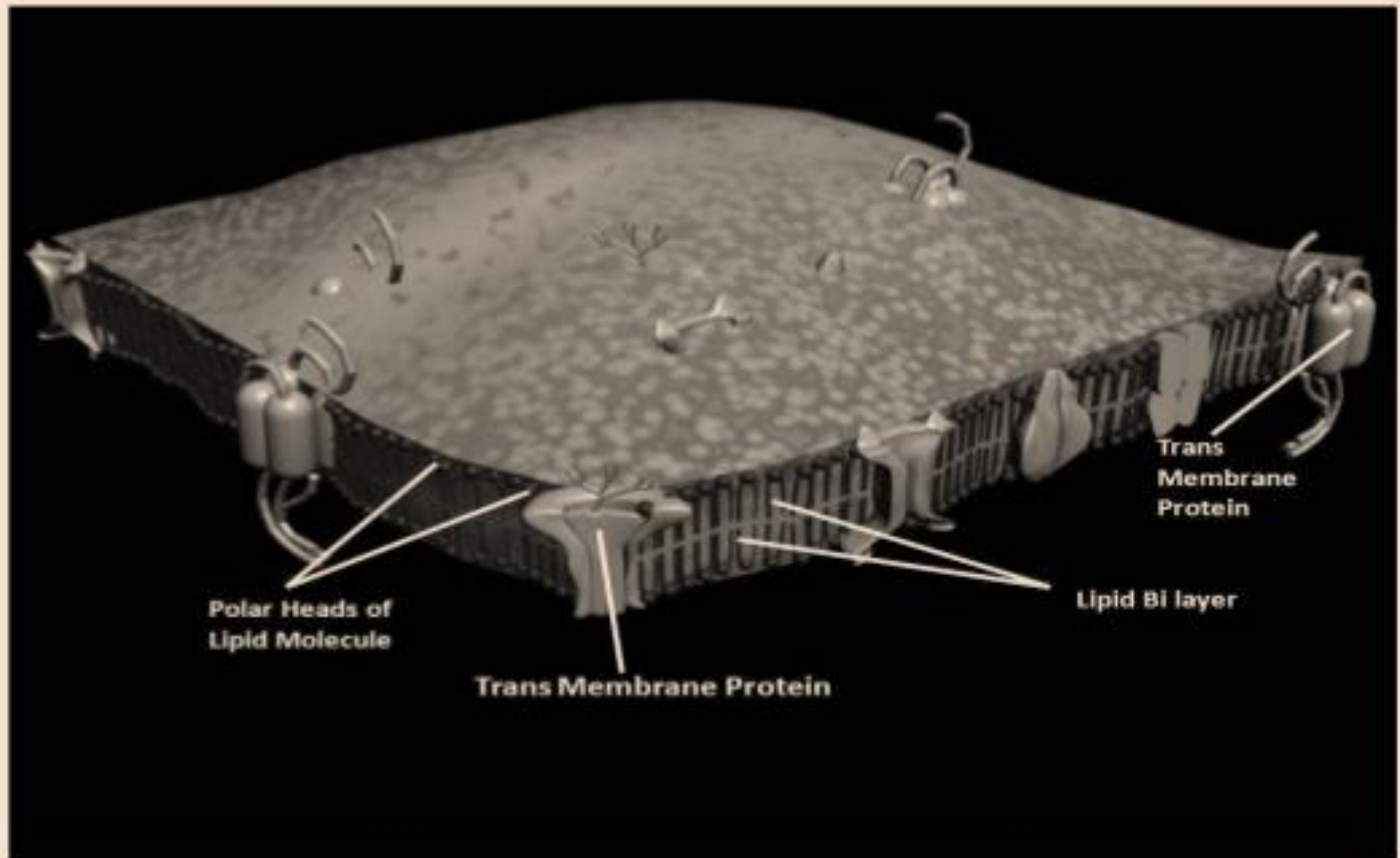


Figure 14.27  
Molecular Cell Biology, Sixth Edition  
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- iv. **Other complex lipids:-**

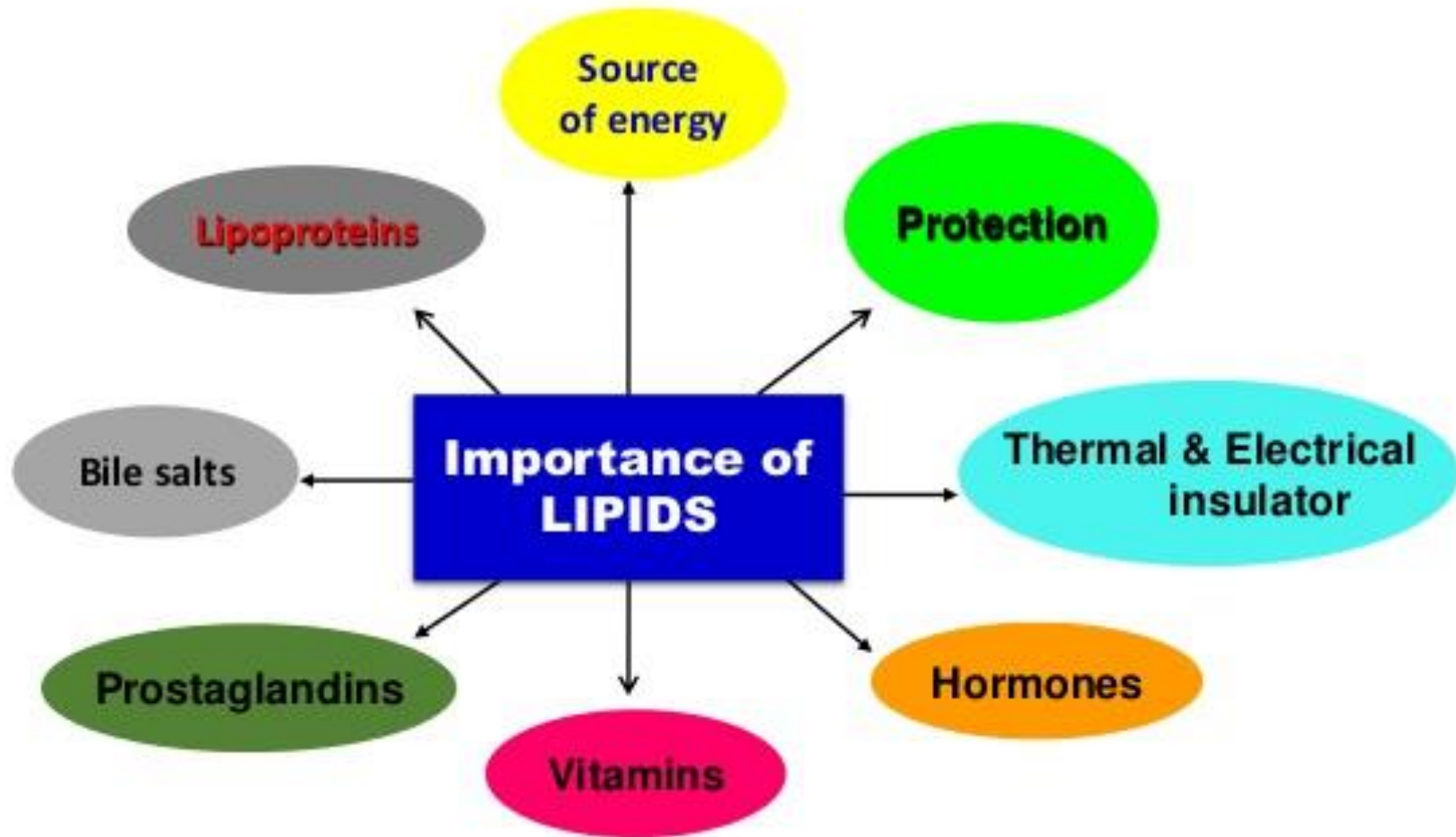
- Sulfolipids, Aminolipids and other Lipopolysaccharides come under this.



# DERIVED LIPIDS:-

- These are the derivatives of hydrolysis of simple and complex lipids which possess the characteristics of lipids.
- These include:
  - Lipid soluble vitamins
  - Steroid hormones
  - Hydrocarbons
  - Ketone bodies
  - Mono and diacylglycerol ,etc

# Biomedical Importance of Lipids



# LIPID RELATED DISORDERS

## Inborn Errors of Lipid Metabolism: Lysosomal (or Lipid) Storage Diseases.

Disease	Enzyme Defect	Accumulated Lipid	Tissues Involved
Tay–Sachs disease <sup>1</sup>	Hexosaminidase A	G <sub>M2</sub> ganglioside	Brain, retina
Gaucher's disease <sup>1</sup>	–Glucosidase (glucocerebrosidase)	Glucocerebroside	Liver, spleen, bone marrow, brain
Neimann–Pick disease <sup>1</sup>	Sphingomyelinase	Sphingomyelin	Brain, liver, spleen
Metachromatic leukodystrophy	Arylsulfatase A	Sulfatide	Brain, kidney, liver, peripheral nerves
Fabry's disease	–Galactosidase	Ceramide trihexoside	Skin, kidney
Krabbe's disease	Galactosylceramidase	Galactocerebroside	Brain

A large, stylized red smiley face is centered on the page. The face has two solid black oval eyes and a wide, black, upward-curving mouth. The text "THANK YOU!" is written across the middle of the face in a bold, white, sans-serif font. The background is a solid, vibrant red color.

**THANK YOU!**