



Glycolipids, Sulfolipids and Lipoprotein

Libyan International Medical University
Faculty of pharmacy
2019-2020

By first year students: Eman Benhalim (2439), Arwa Ahmed (2688) , Ayoob Mohamed (2657)

Glycolipids

Glycolipids

A carbohydrate, usually an oligosaccharide or monosaccharides, that is covalently linked to a lipid molecule, such as those found in the cell membrane by a glycosidic (covalent) bond.

Like the phospholipid sphingomyelin, glycolipids are derivatives of ceramides in which a long-chain fatty acid is attached to the amino alcohol sphingosine.

Glycolipid plays important role in the following:

Cell-cell interaction, Structure of cell membrane, Immune Responses, Blood types, Surface receptors, Part of nervous tissue, Part of Muscle tissue, Cell Growth, Diseases related to Glycolipid.

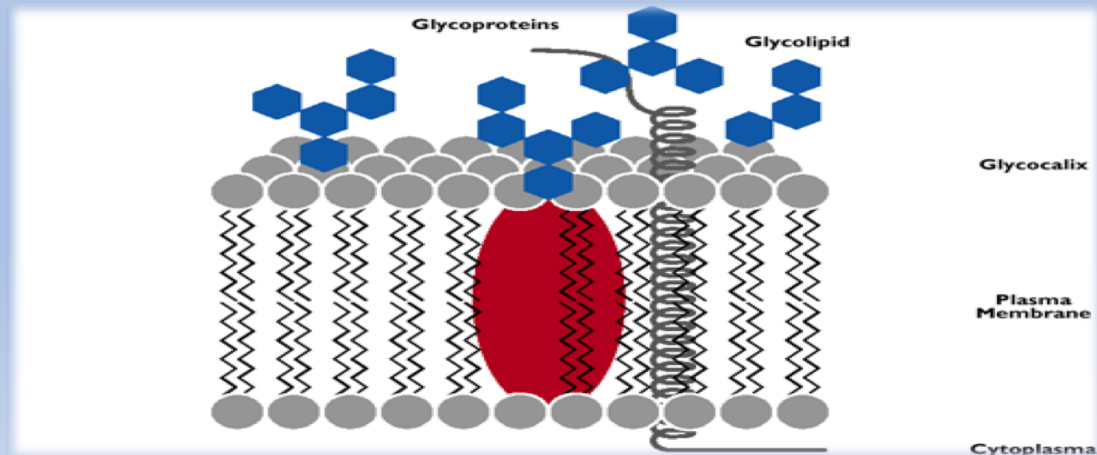
ROLE OF GLYCOLIPID IN CELL- CELL INTERACTION

Serves as recognition sites for cell-cell interaction. Sugar moiety of glycolipid binds to a specific complimentary carbohydrate.

GLYCOLIPID IN CELL MEMBRANE

Glycolipid in aqueous medium forms a bimolecular sheet instead of micelle.

Two fatty acids chains of glycolipid are too bulky to fit into interior of micelle . And so it forms a bilayer similar to that of phospholipid. The resulting hydrophobic interactions have three significant biological consequences



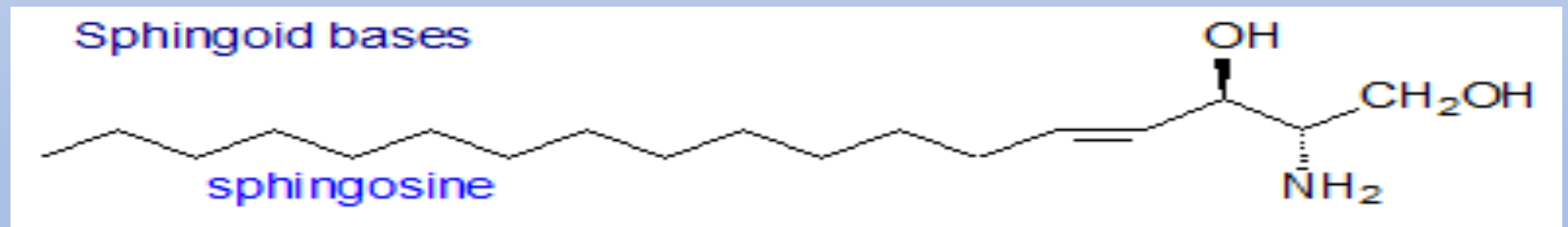
Classification of glycolipids

➔ **Nature Glycosphingolipids:** glycolipids are derivatives of ceramides in which a long-chain fatty acid is attached to the amino alcohol sphingosine.

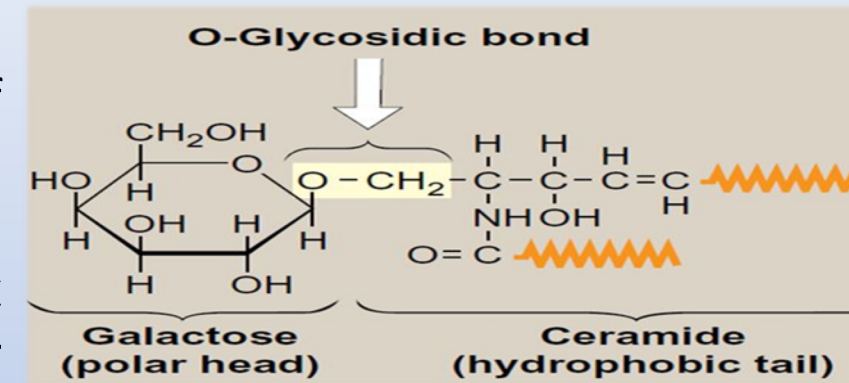
and its most common.

Component of glycosphingolipids are:

- Fatty acid
- Sphingosine
- Amino alcohol (choline)
- Carbohydrates (monosaccharides or oligosaccharides)

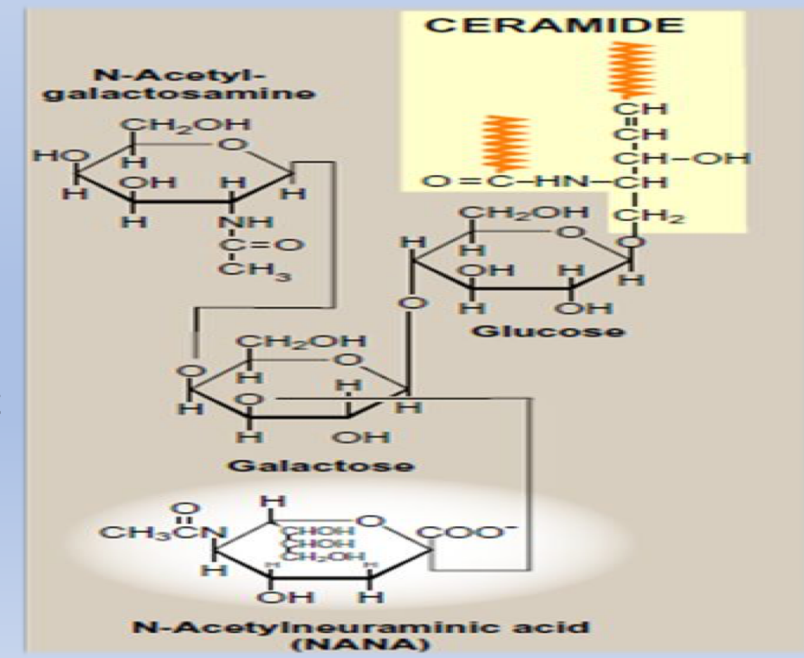


The simplest neutral (uncharged) glycosphingolipids are the cerebrosides. These are ceramide monosaccharides that contain either a molecule of galactose (galactocerebroside—the most common cerebroside found in membranes, or glucose (glucocerebroside, which serves primarily as an intermediate in the synthesis and degradation of the more complex glycosphingolipids). [Note: Members of a group of galactocerebrosides (or glucocerebrosides) may also differ from each other in the type of fatty acid attached to the sphingosine.] As their name implies, cerebrosides are found predominantly in the brain and peripheral nervous tissue, with high concentrations in the myelin sheath.



Acidic glycosphingolipids

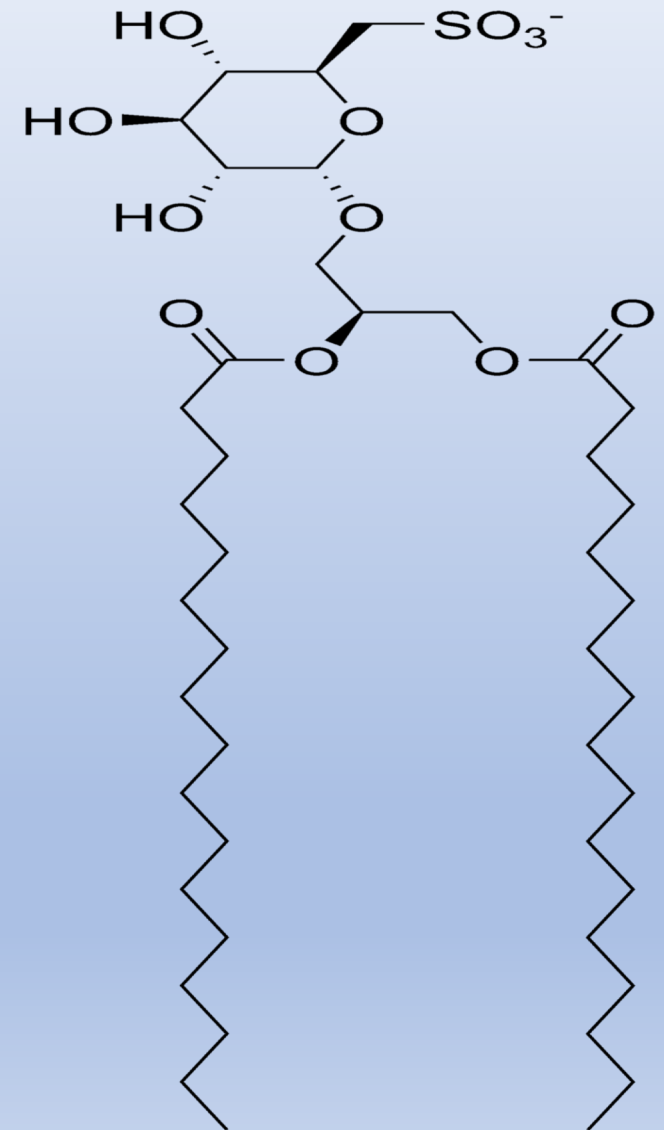
Acidic glycosphingolipids are negatively charged at physiologic pH. The negative charge is provided by N-acetylneuraminic acid (NANA, a sialic acid, see Figure in gangliosides



Sulpholipids

- **Sulfolipids:**

Sulphates these are formed when sulphate groups are attached to ceramide oligosaccharide. All these complex lipids are important components of membranes of nervous tissue. Failure of degradation of these compounds results in accumulation of these complex lipids in CNS. This group of inborn errors is known as lipid storage disease.

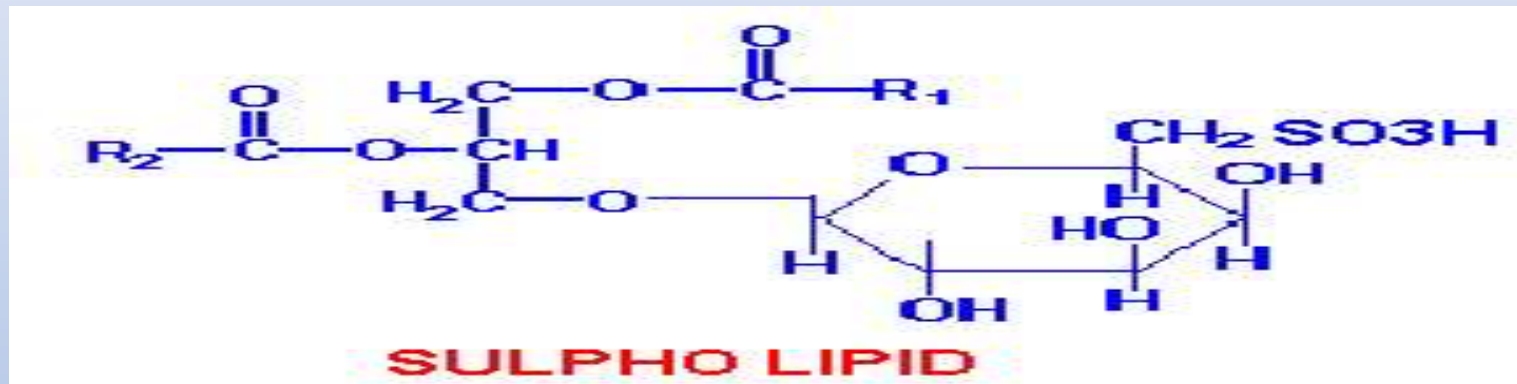


A decorative header at the top of the slide consisting of a complex, low-poly geometric pattern. The pattern is composed of numerous overlapping triangles and polygons in various shades of red, pink, magenta, blue, and cyan, creating a vibrant, abstract design.

Site:

- The sulpholipid is mostly present in chloroplasts, predominantly in the membranes of thylakoid.
- Plant membrane are also rich in sulpholipids.

- Structure:



- They are membrane glycolipids with sulfur containing functional groups. Sulfonated glucose is joined to the C₃ of diacylglycerol in glycosidic linkage. The sulfonated head group of sulfolipid holds a negative charge .

Lipoprotein

- **DEFINITION:**

A molecule that is a combination of lipid and protein. Lipids do not travel in the blood by themselves, but they are carried through the bloodstream as lipoproteins

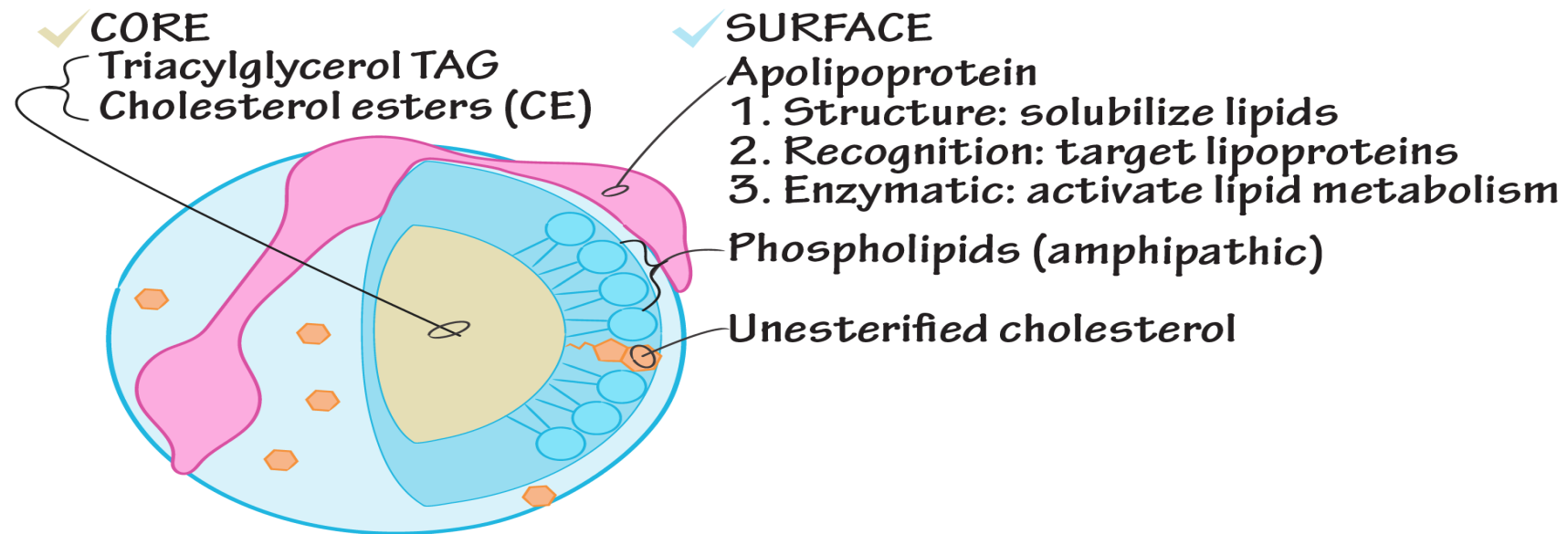
- **FUNCTION:**

lipoprotein is a [biochemical](#) assembly whose primary purpose is to transport [hydrophobic lipid](#) (also known as [fat](#)) molecules in water, as in [blood plasma](#) or other [extracellular fluids](#). They have a single-layer [phospholipid](#) and [cholesterol](#) outer shell, with the [hydrophilic](#) portions oriented outward toward the surrounding water and [lipophilic](#) portions of each molecule oriented inwards toward the lipids molecules within the particles. Thus, the complex serves to [emulsify](#) the fats in extracellular fluids. A special kind of protein, called [apolipoproteins](#), is embedded in the outer shell, both stabilising the complex and giving it a functional identity that determines its fate.

- **STRUCTURE:**

The lipoprotein structure consists of a core of lipids surrounded by a covering of proteins. The functions of the lipoproteins can only be described as extremely crucial. Too much of lipoproteins in the blood is to be avoided because then, they can cause complications that can be described as extremely dangerous.

Lipoprotein Structure





References

- https://link.springer.com/chapter/10.1007/978-94-009-5907-1_5
- <http://ecoursesonline.iasri.res.in/mod/page/view.php?id=9107>
- <https://www.easybiologyclass.com/biochemistry-membrane-lipids-properties-structure-classification/>

