Libyan International Medical University

Faculty of Pharmacy

Lipid

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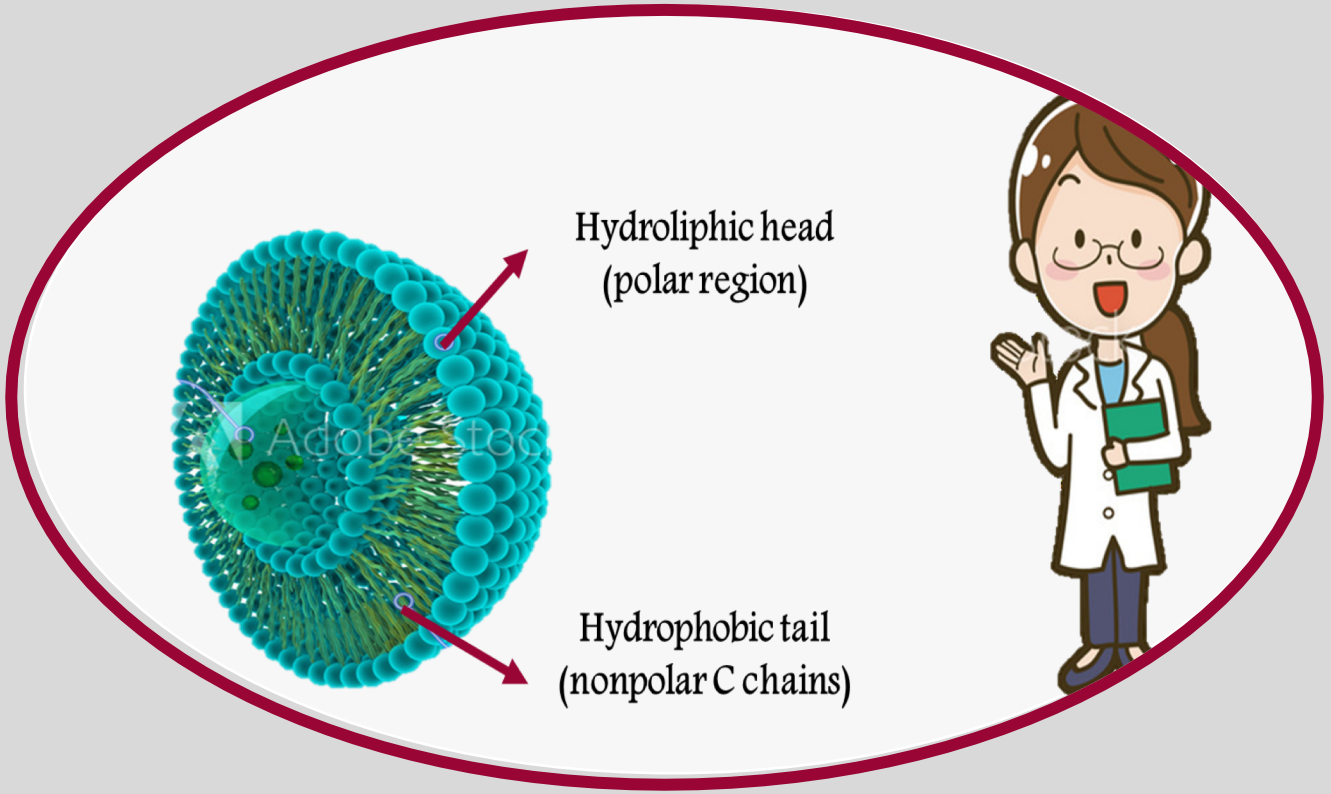
Intending learning outcomes:

1. Define lipids.
2. Describe the structure of lipids.
3. Describe the types of lipids.
4. Explain the forms of lipids.
5. List the functions of lipids.

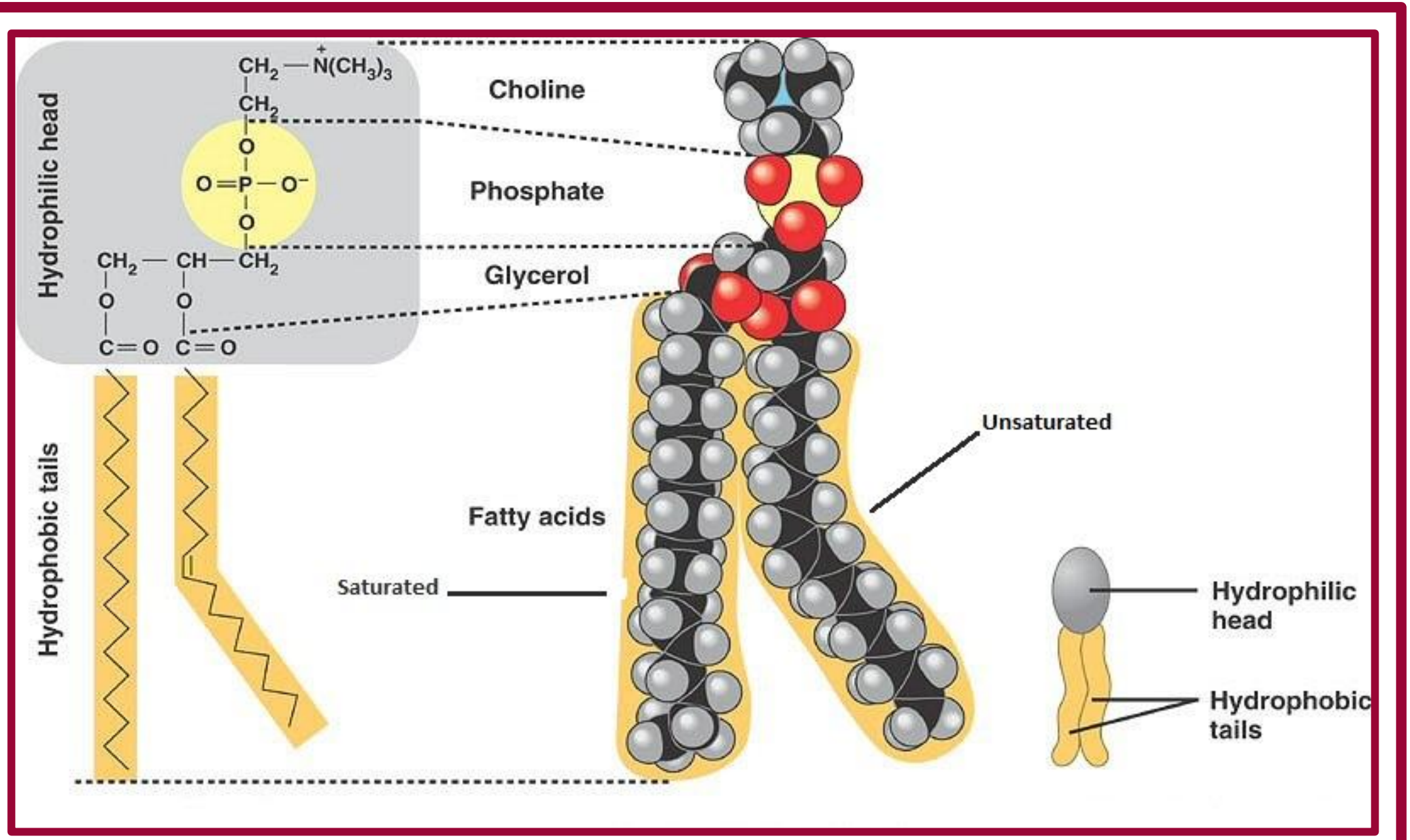
1. lipids



Lipids are naturally a macro biomolecule heterogeneous group of water-insoluble (hydrophobic "nonpolar") organic molecules that amphipathic (containing both nonpolar and polar) and it is a molecule from plants or animals that soluble organic solvents and can be extracted from tissues by nonpolar solvents.

Lipid molecules contain a large hydrocarbon portion and not many polar functional groups, which accounts for their solubility behavior.

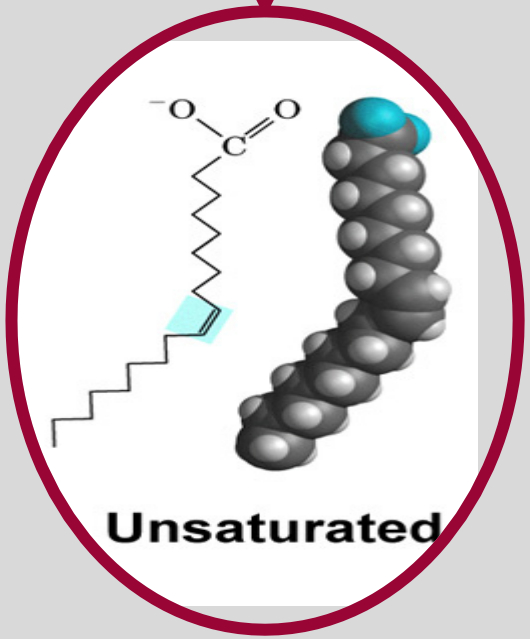
2. The Structure of lipid:



3. Types of lipids:

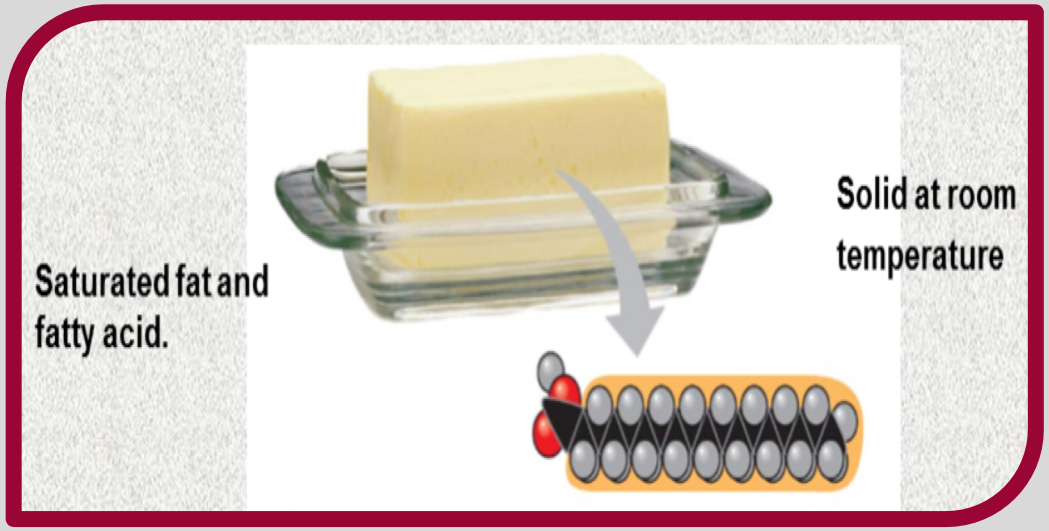
Saturated

Unsaturated



Saturated fat:

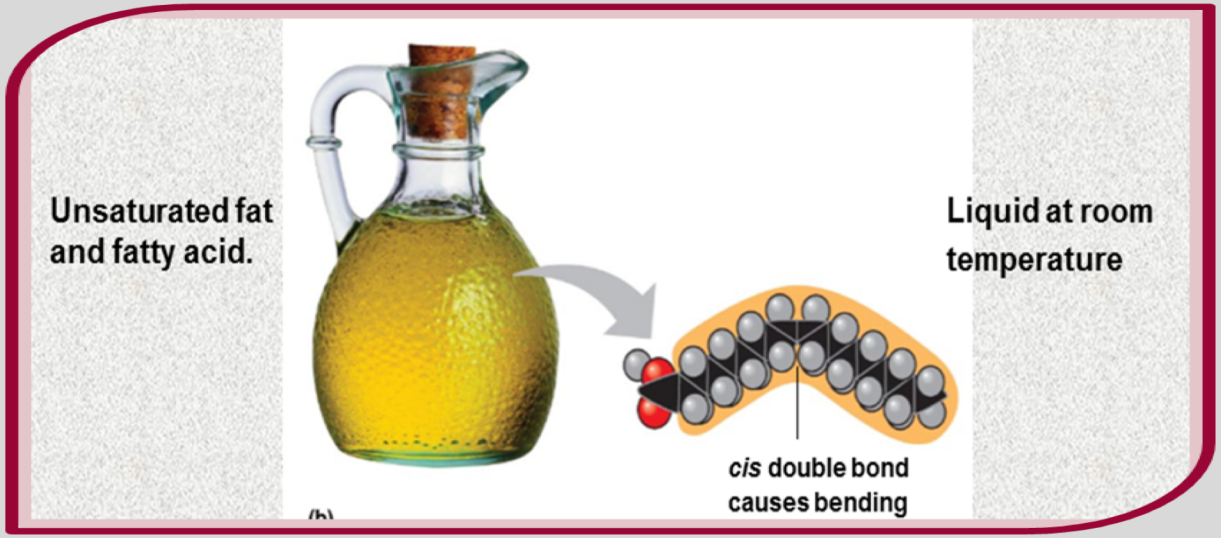
These fats have single bonds between their molecules and are “saturated” with hydrogen molecules. They tend to be solid at room temperature.



Unsaturated fat:

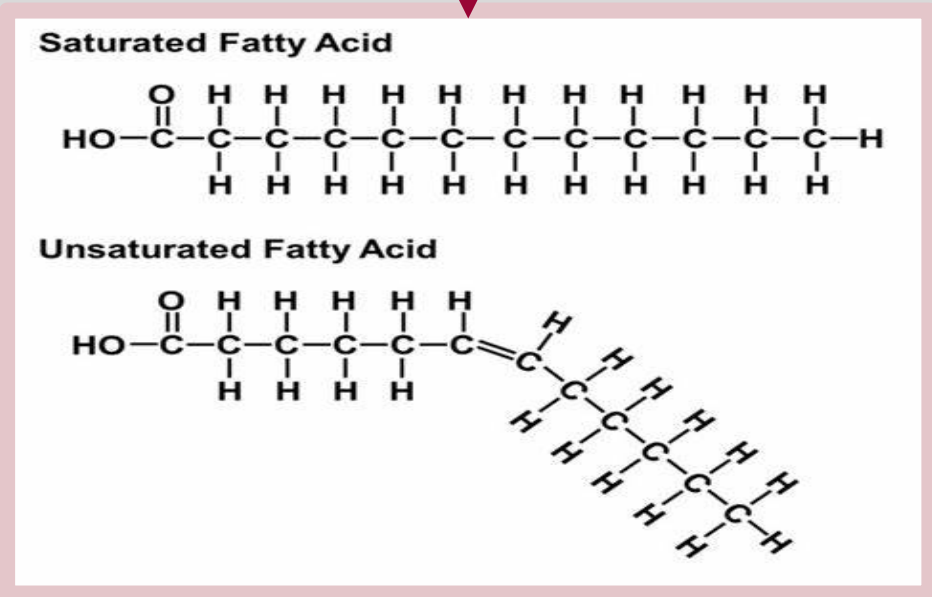
contain one or more double or triple bonds between the molecules. These fats are liquid at room temperature in oil form. They also occur in solid foods.

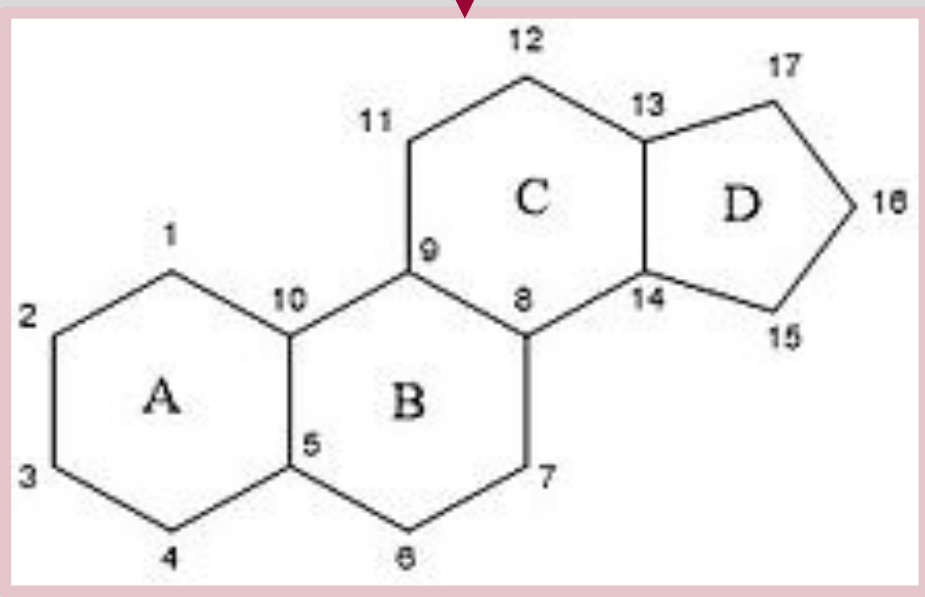
This group breaks down further into two categories, called monounsaturated fats and polyunsaturated fats.



4. Forms Of lipid:

- Fatty acids
- Steroids





Fatty acids:

Fatty acids are the building block of most lipids, made of long-chain organic acids having one polar carboxyl group (head) and a non-polar hydrocarbon chain (tail).

Waxes :

- Waxes are hydrophobic that produced by combining fatty acids with long-chain alcohols (carboxylic acid esters).
- Performs external protective functions.

Triglycerides

- Animal fats and vegetable oils are triglycerides or triacylglycerides, in which three fatty acid residues are joined to glycerol by ester bonds.
- The main function is to store energy for later use.

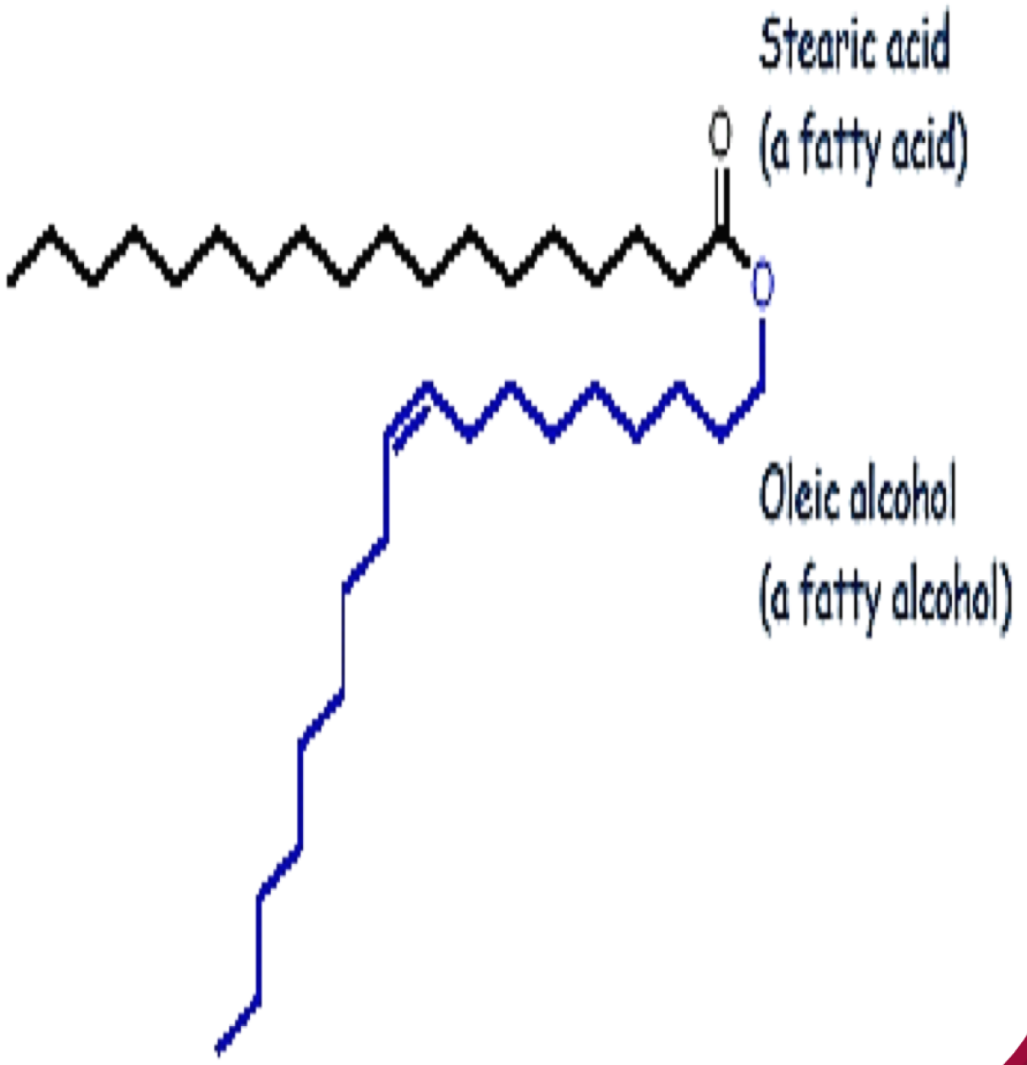
Fatty acids:

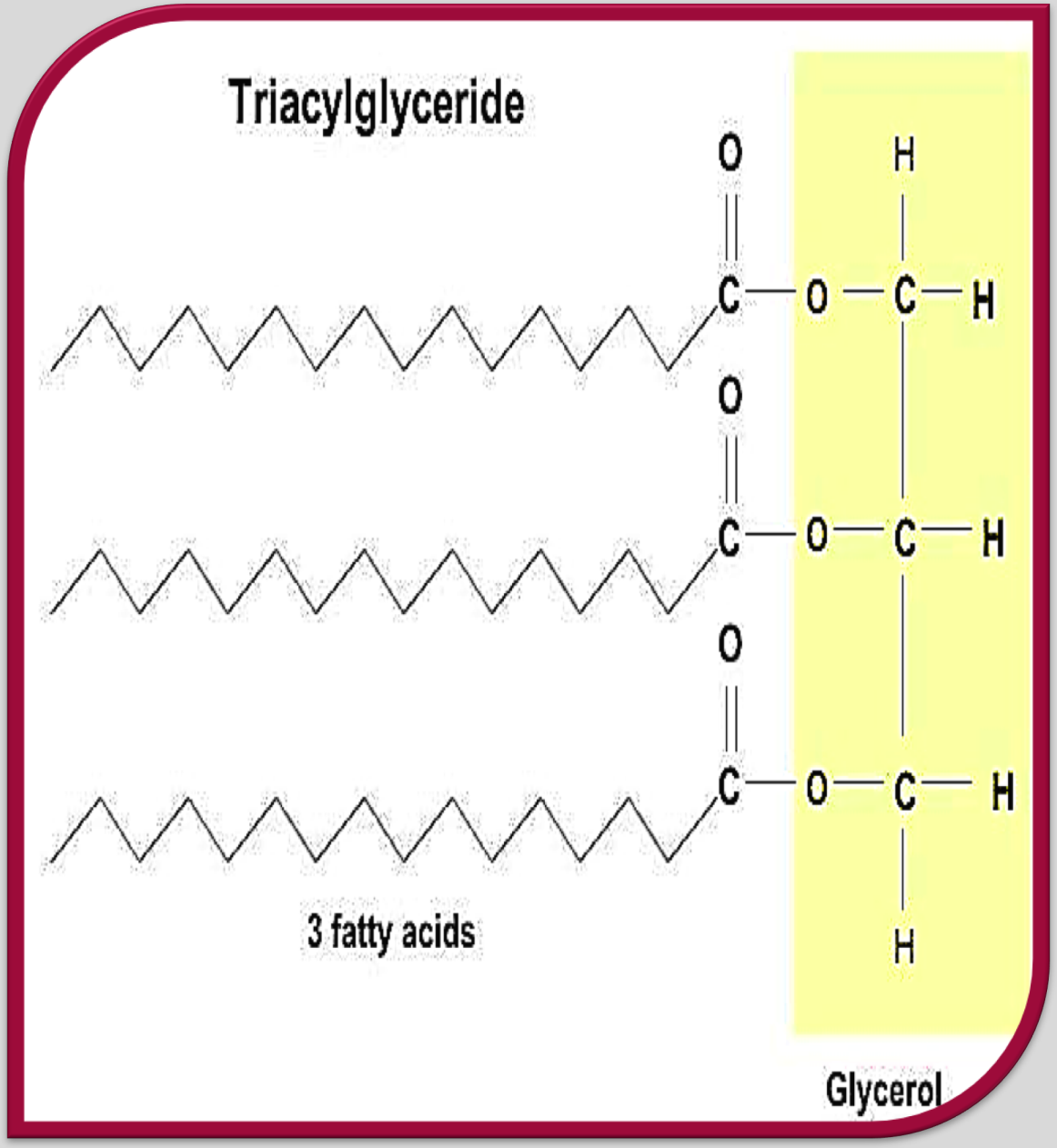
Glycerophospholipids:

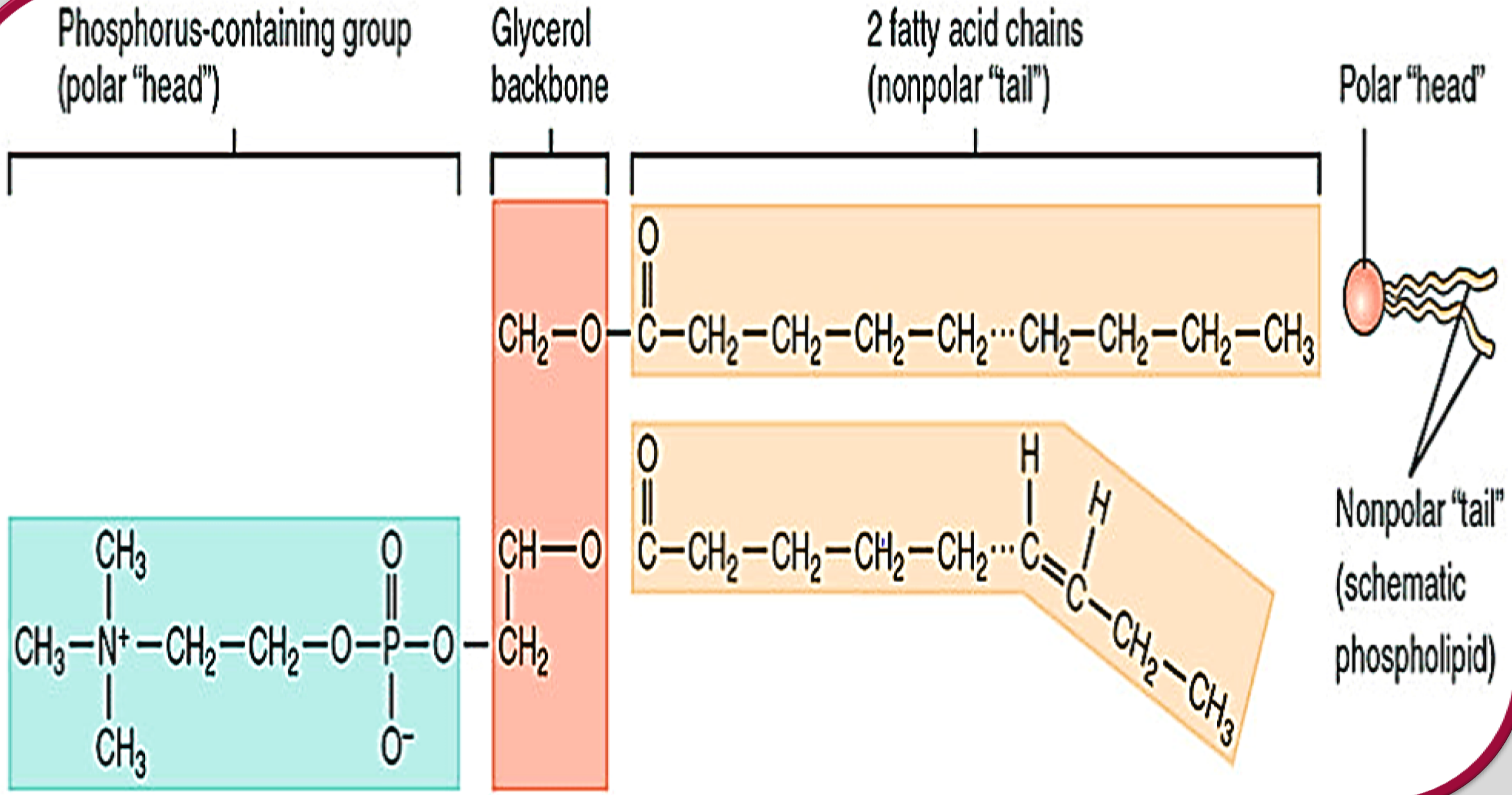
- Glycerophospholipids are made by combining glycerol, two fatty acids, a phosphate group, and alcohol.
- serve as a structural component of biological membranes.

Sphingolipids:

- Sphingophospholipids are made by combining sphingosine, a fatty acid, a phosphate group, and alcohol.
- They are present in brain and nerve tissues. These compounds play important role in signal transmission and cell recognition.


Stearic acid
(a fatty acid)
O
O
Oleic alcohol
(a fatty alcohol)


Triacylglyceride
O
C
O
C
H
3 fatty acids
Glycerol


Phosphorus-containing group
(polar "head")
Glycerol
backbone
2 fatty acid chains
(nonpolar "tail")
Polar "head"
Nonpolar "tail"
(schematic
phospholipid)

Steroids:

Steroid Hormones:

- Hormones, molecules that regulate the function of organs and tissues, come in a variety of forms.
- Some, such as sex hormones and adrenocorticoid hormones, are steroids.
- All steroid hormones are derived from cholesterol.

Bile Salts:

- Bile salts are synthesized in the liver from cholesterol, conjugated with glycine or taurine and secreted in bile with cholesterol and lecithin.
- where they aid digestion by forming emulsions with dietary lipids.

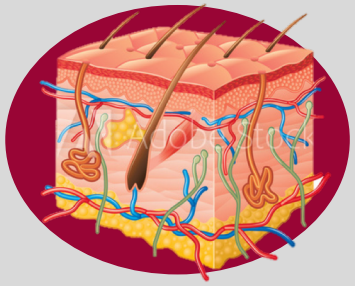
Steroids:

Cholesterol:

Cholesterol is the steroid found in humans and other animals. In cholesterol, the nonpolar rings and hydrocarbon chain are hydrophobic and the - OH group is hydrophilic Overall, this makes the molecule hydrophobic. Cholesterol is a component of cell membranes The primary biological starting material for the biosynthesis of other steroid hormones, the bile acids, and vitamin D.

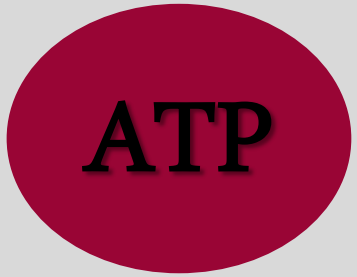
5. Functions of lipid:

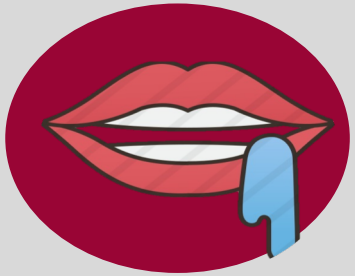
- Structural components of bio membranes (phospholipids and cholesterol).



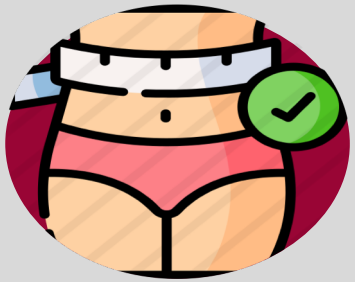
- Provide insulation against changes in temperature (subcutaneous fat).

- Storage form of energy (triglycerides).





- Improve taste and palatability of food.

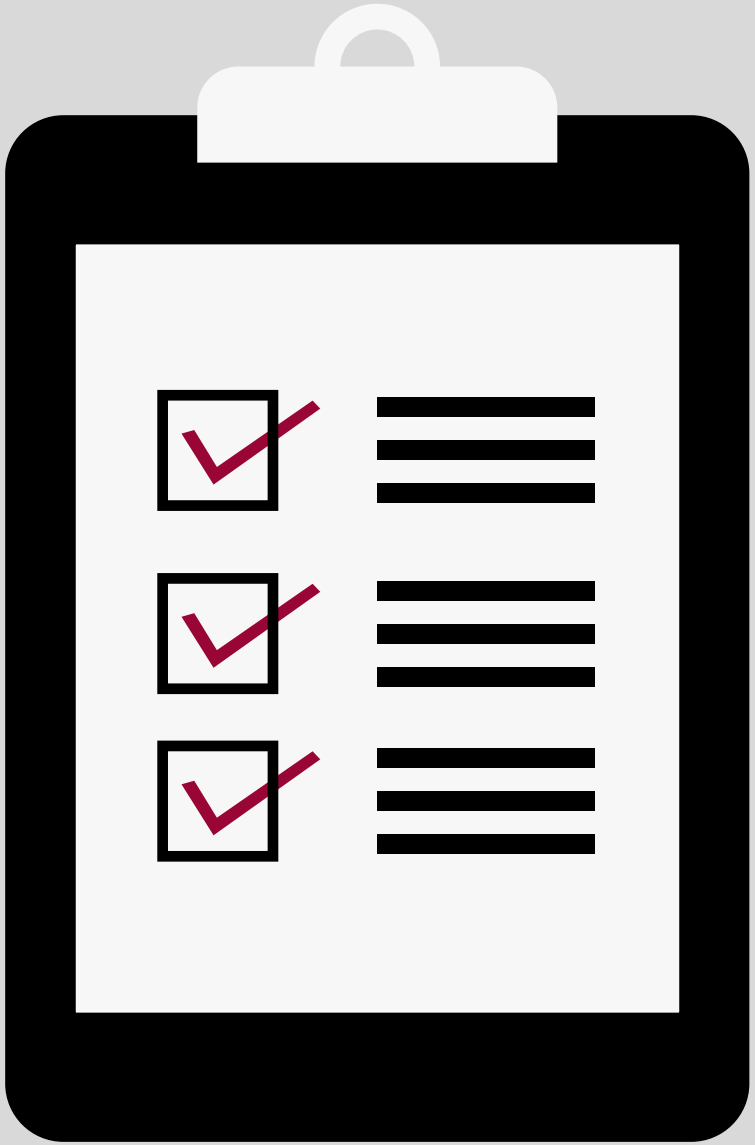


- Give shape and contour to the body.

- Metabolic regulators (steroid hormones and prostaglandins)

- Help in absorption of fat soluble vitamins (A, D, E and K).

Summary:



- In conclusion: you learned today the definition of lipids which are macro biomolecule that composed from heterogeneous groups; the structure of lipids which describe the 2 heterogeneous groups (the polar and non-polar portions); then the types of lipids (fats) that divided into 2: saturated (single bonds), and unsaturated (double and triple bonds), also some forms of lipids (fatty acids and steroids) and finally the functions of lipids.

References:

- https://classconnection.s3.amazonaws.com/1165/flashcards/722565/jpg/phospholipid_structure.jpg.
- Microsoft PowerPoint - Chap11 (uga.edu).
- Saturated vs. unsaturated fats: Which is more healthful? (medicalnewstoday.com).
- *Microsoft Word - lecture_notes_ch8_lipids_current.docx (saddleback.edu).
- Champe C. Pamela, Richard A. Harvey, and D.R.F. Lippincott's. Third edit. Champe C. Pamela, Richard A. Harvey.
- textbook of biochemistry for medical students. Dm Vasudevan, sreekumari S, Kannan Vaidya Nathan. 6th edition.

Thank you