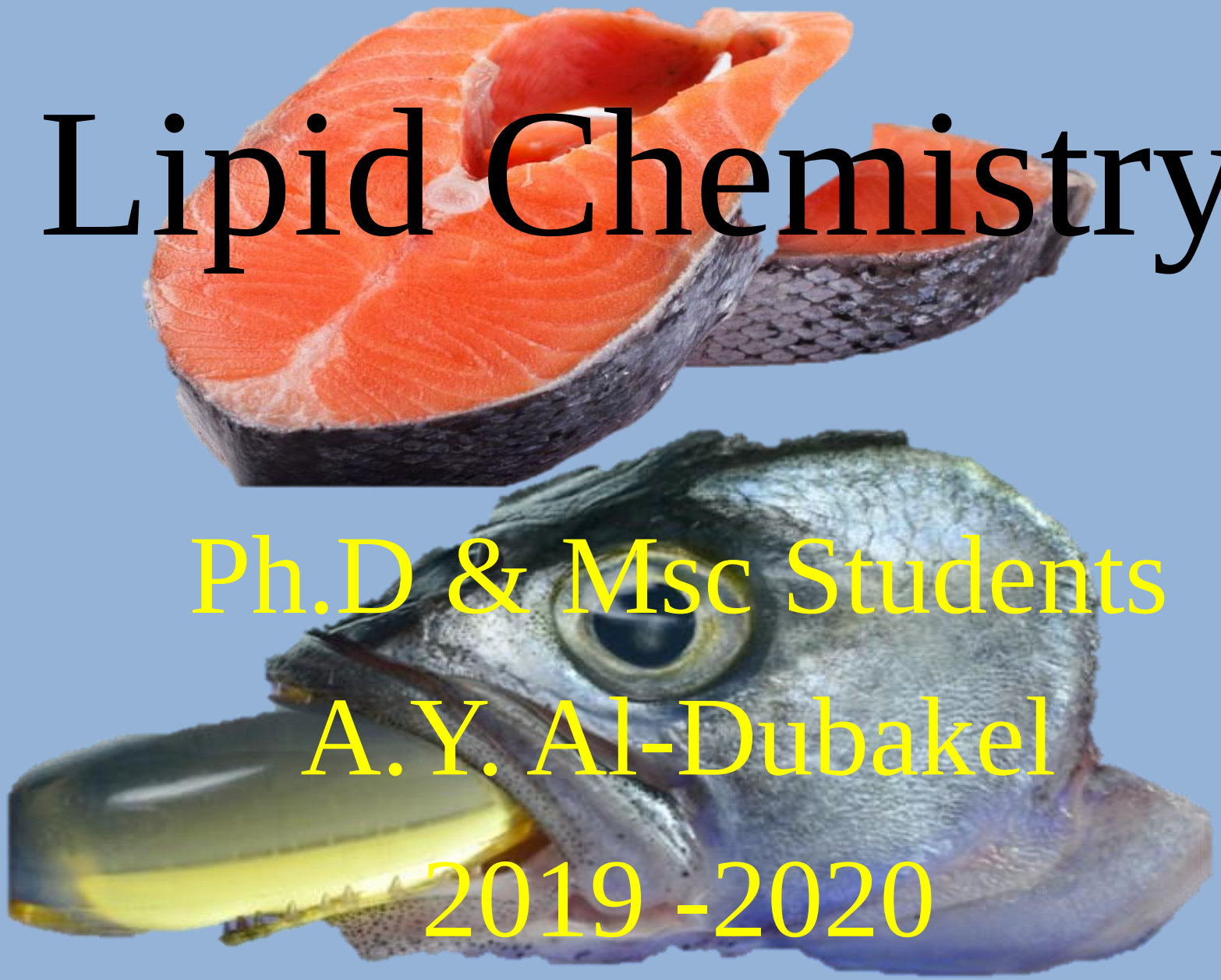
Lipid Chemistry



Ph.D & Msc Students

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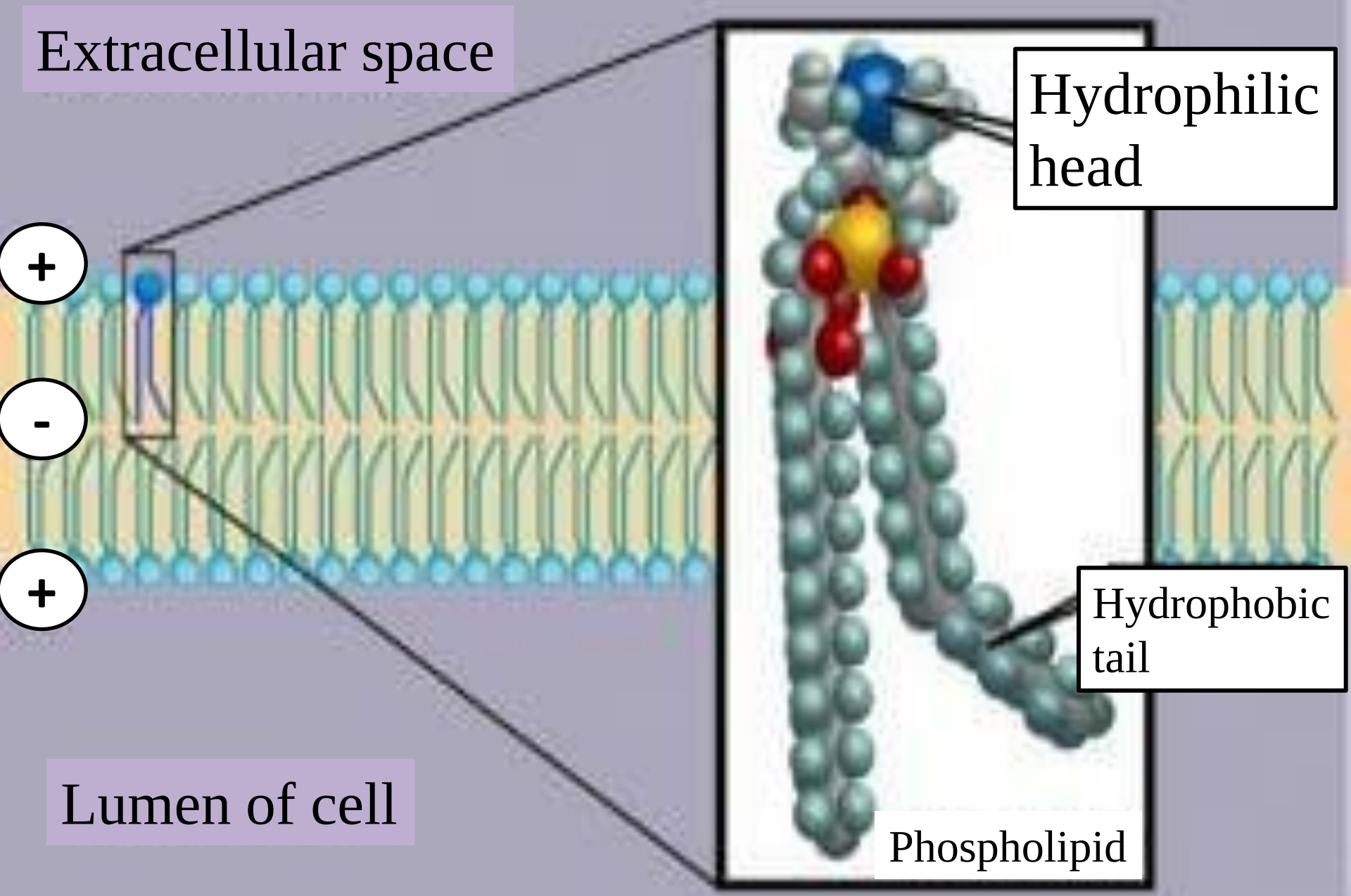
A second layer of phospholipids also forms with heads facing the inside of the cell and tails facing away. In this way, a double layer is formed with phosphate group heads on the outside, and fatty acid tails on the inside. This double layer, called a lipid bilayer, forms the main part of the cell membrane. The nuclear envelope, a membrane surrounding a cell's nucleus, is also made up of phospholipids arranged in a lipid bilayer, as is the membrane of mitochondria, the part of the cell that produces energy.


Extracellular space
+
-
+
Hydrophilic head
Hydrophobic tail
Phospholipid
Lumen of cell

Functions of Phospholipids

As membrane components, phospholipids are selectively permeable (also called semi-permeable), meaning that only certain molecules can pass through them to enter or exit the cell. Molecules that dissolve in fat can pass through easily, while molecules that dissolve in water cannot. Oxygen, carbon dioxide, and urea are some molecules that can pass through the cell membrane easily. Large molecules like glucose or ions like sodium and potassium cannot pass through easily. This helps keep the contents of the cell working properly and separates the inside of the cell from the surrounding environment.

Functions of Phospholipids

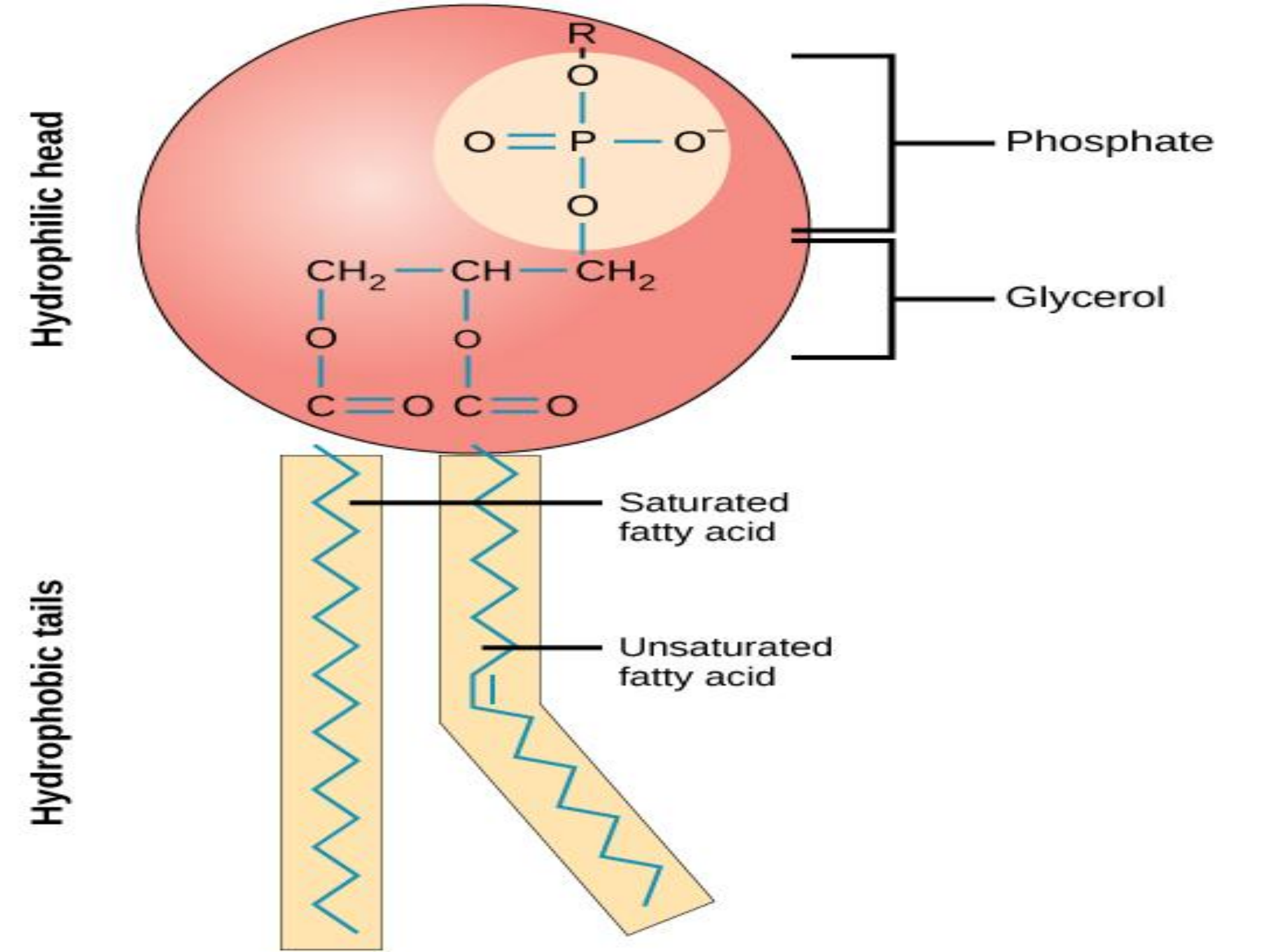
Phospholipids can be broken down in the cell and used for energy. They can also be split into smaller molecules called chemokines, which regulate a variety of activities in the cell such as production of certain proteins and migration of cells to different areas of the body. Additionally, they are found in areas such as the lung and in joints, where they help lubricate cells.

In pharmaceuticals, phospholipids are used as part of drug delivery systems, which are systems that help transport a drug throughout the body to the area that it is meant to affect. They have high bioavailability, meaning that they are easy for the body to absorb. Valium is an example of a medication that uses a phospholipid-based drug delivery system.

Functions of Phospholipids

In the food industry, phospholipids can act as emulsifiers, which are substances that disperse oil droplets in water so that the oil and water do not form separate layers. For example, egg yolks contain phospholipids, and are used in mayonnaise to keep it from separating. Phospholipids are found in high concentrations in many other animal and plant sources, such as soybeans, sunflowers, cotton seeds, corn, and even cow brains.

https://biologydictionary.net/phospholipid/


Hydrophilic head
Hydrophobic tails
R
O
O
P
O⁻
O
CH₂
CH
CH₂
O
O
C
O
C
O
Phosphate
Glycerol
Saturated fatty acid
Unsaturated fatty acid

Classification

Phospholipids are classified into four main classes depending on their backbones and bonding types:

1) Glycerophospholipids.
2) Sphingolipids.
3) Ether phospholipids.
4) Phonophospholipids.

In contrast to other phospholipids types, glycerophospholipids have been widely used in foods, pharmaceuticals and other industrial fields.

Or Phospholipids are classified into two types.

1. Glycerophospholipids (or) Phosphoglycerides that contain glycerol as alcohol.
2. Sphingophospholipids that contain sphingosine as alcohol.

Glycerophospholipids

These are the major lipids that occur in biological membranes. They present in all plant and animal cells. They are abundantly present in heart, brain, kidney, egg yolk and soyabean. The important glycerophospholipids are **lecithin**, **cephalin**, **phosphotidyl inositol**, **cardiolipin** and **plasmalogen**.

Lecithins contain glycerol, fatty acids, phosphoric acid and choline (nitrogenous base). Lecithins generally contain a saturated fatty acid and an unsaturated fatty acid.

Cephalin contains glycerol, fatty acids, phosphoric acids and ethanol amine as nitrogenous base.

Phosphatidyl inositol contains a hexahydric alcohol called as inositol.

Plasmalogens posses an ether link instead of ester link. The alkyl radical is an unsaturated alcohol and they are found in brain and nervous tissue

Spingophospholipids

These are present in plasma membrane and myelin sheath. They are amphipathic lipids having polar head and non-polar tail. They contain an amino alcohol called shingosine. It is attached to a fatty acid by an amide linkage to form ceramide. Ceramide is linked to phosphoryl choline to form sphingomyelin, which is an important member of sphingophospholipids.