

## Types and Functions of Phospholipids

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### DESCRIPTION

Phospholipids are the complex or compound lipids containing phosphoric acid, in addition to fatty acids, nitrogenous base and alcohol. There are 2 classes of phospholipids namely glycerophospholipids and sphingophospholipids.

#### Glycerophospholipids

Glycerophospholipids (GPLs) are unsaturated fatty diglycerides with a phosphatidyl ester attached to the terminal carbon. They are the main lipid component of cell membranes and are important in the cells semi-permeability. Also interact with triacylglycerols and cholesterol to increase their solubility in the blood [1]. The terminal ester groups are predominantly ethanolamine, choline, serine, or inositol. GPLs are exceptionally amphiphilic and are part of cell or vesicle layers.

Glycerophospholipids can be classified based on the amino alcohol group. Two common types are lecithins (contains choline) and cephalins (contain ethanolamine). These are highly available in brain and nerve tissues. Lecithin is generally utilized for GPL combinations, which contains most part of phosphotidyl choline. Lecithins are utilized in food sources as emulsifiers and surface dynamic agents for modifying thickness and crystallization properties. It likewise has modern purposes as an emulsifying agent in materials, beauty care products, paints, plastics and bug sprays. The highest amount of lecithin is in soybean oil, where it is available at levels of around 1%-3% [2].

The amphipathic nature of glycerophospholipid drives the development of the phospholipid bilayer of membranes. The cell membrane examined under the electron microscope comprises of two recognizable layers, which are comprised of glycerophospholipid particles. In human erythrocytes, the cytosolic side (the side confronting the cytosol) of the plasma layer comprises predominantly of phosphatidylethanolamine, phosphatidylserine, and phosphatidylinositol. The exoplasmic side predominantly comprises of phosphatidylcholine and sphingomyelin, a kind of sphingolipid.

Each glycerophospholipid particle comprises of a polar head and two long hydrophobic chains. In the cell membrane, the two

layers of phospholipids are organized as the hydrophobic tail and hydrophilic head. The hydrophobic tails are inside whereas hydrophilic head are towards the cytosol [3]. Glycerophospholipids are present mostly in the cell layers and less amounts in adipose tissue. Glycerophospholipids serve as an anchor for proteins in cell layers and also as component in cell flagging structures. Phosphotidylinositol, with inositol as polar head group plays a major role in cell signaling. The other one is cardiolipin, which is found in mitochondrial membrane.

#### Sphingophospholipids

Sphingomyelins are phospholipids that are based on the 18-carbon amino alcohol sphingosine, instead of a glycerol. Sphingomyelins are common constituent of plasma membranes. Ceramide acts as a second messenger by regulating programmed cell death. It also regulates skin's water permeability [4].

#### Functions of phospholipids

These are responsible in maintaining the cellular respiration, absorption of fats from intestine, synthesis of different lipoproteins; prevent the accumulation of fats in liver. These help in the removal of cholesterol from the body. Cephalin is involved in blood clotting. Phosphotidyl inositol is involved in the action of some hormones. Sphingomyelin acts as insulator for nerve fibers. It also plays a significant role in cell apoptosis.

### CONCLUSION

Phospholipids are the complex or compound lipids containing phosphoric acid, in addition to fatty acids, nitrogenous base and alcohol. Glycerophospholipids are unsaturated fatty diglycerides with phosphatidyl esters. They are the main lipid component of cell membranes and are important in the cells semi-permeability. In the cell membrane, the two layers of phospholipids are organized as the hydrophobic tail and hydrophilic head. Glycerophospholipids are present mostly in the cell layers and less amounts in adipose tissue. Sphingomyelins are phospholipids that are based on the 18-carbon amino alcohol sphingosine, instead of a glycerol. These are responsible in maintaining the cellular respiration, absorption of fats from

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intestine, synthesis of different lipoproteins; prevent the accumulation of fats in liver. Phosphatidylinositol is involved in the action of some hormones.

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