

Two thick salmon fillets are shown against a light blue background. The fillets are cut to show the characteristic orange-pink color of the flesh and the darker skin on the bottom. One fillet is in the foreground, and another is slightly behind it to the right.

Lipid Chemistry

A detailed image of a fish head, likely a salmon, is positioned in the lower half of the slide. The fish has a silvery, metallic sheen on its scales and a prominent eye. The head is angled towards the left.

Ph.D & Msc Students

A.Y. Al-Dubakel

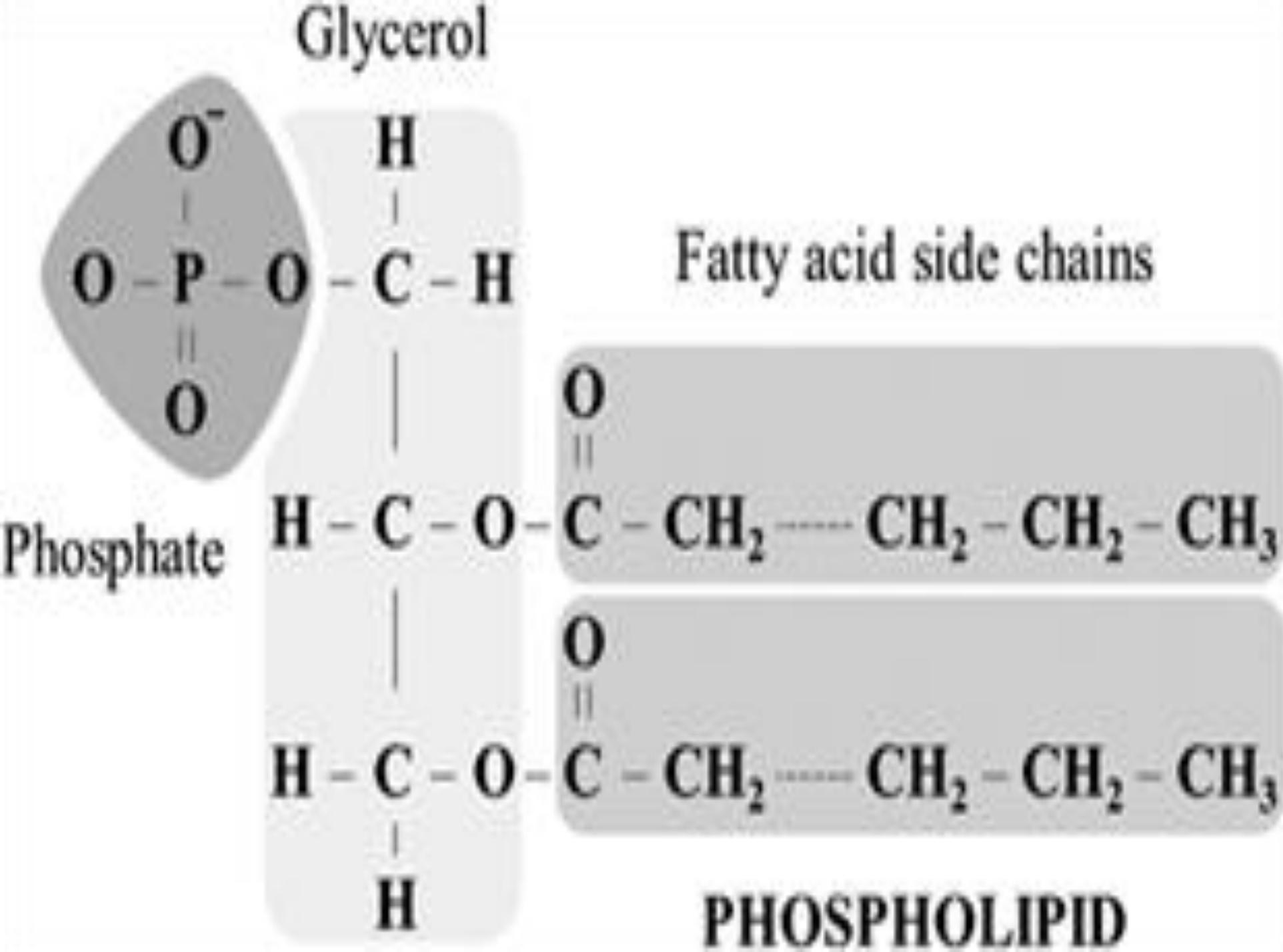
2019 -2020

Lecture 2

Phospholipid

Also called **Phosphatide**, any member of a large class of fatlike, phosphorus-containing substances that play important structural and metabolic roles in living cells.

A phospholipid is a type of lipid molecule that is the main component of the cell membrane. Each phospholipid is made up of **two fatty acids**, a **phosphate group**, and a **glycerol molecule**. When many phospholipids line up, they form a double layer that is characteristic of all cell membranes.



The phospholipids, with the sphingolipids, the glycolipids, and the lipoproteins, are called complex lipids, as distinguished from the simple lipids (fats and waxes) and from other fat-soluble cell components, mostly isoprenoids and steroids. The term phosphoglyceride is used by some as a synonym for phospholipid and by others to denote a subgroup of phospholipids.

On one end of the phospholipids molecule are the phosphate group and one alcohol; this end is polar, *i.e.*, has an electric charge, and is attracted to water(hydrophilic). The other end, which consists of the fatty acids, is neutral; it is hydrophobic and water-insoluble but is fat-soluble. This amphipathic nature (containing both hydrophobic and hydrophilic groups) makes phospholipids important in membranes; they form a two-layer structure, called the lipid bilayer.

with the polar head facing out on each surface to interact with water, and with the neutral “tails” driven inward and pointing toward one another. The lipid bilayer is the structural basis of all cell membranes and is nearly impermeable to ions and most polar molecules.

Proteins embedded in the phospholipid matrix transport many substances through the [membrane](#). [Lecithin](#) (*q.v.*; phosphatidyl choline) and the cephalins (phosphatidyl ethanolamine and phosphatidyl serine) are groups of phospholipids of widespread occurrence in plants and animals; lecithin is the most abundant, but is rare in microorganisms.

Other phospholipids include plasmalogens, present in brain and heart and apparently of limited occurrence in nonanimal tissues; phosphoinositides, present in brain; and cardiolipin, initially isolated from heart.

Phospholipid Structure

A phospholipid is made up of two fatty acid tails and a phosphate group head. Fatty acids are long chains that are mostly made up of hydrogen and carbon, while phosphate groups consist of a phosphorus molecule with four oxygen molecules attached. These two components of the phospholipid are connected via a third molecule, glycerol.

Phospholipids are able to form cell membranes because the phosphate group head is hydrophilic (water-loving) while the fatty acid tails are hydrophobic (water-hating). They automatically arrange themselves in a certain pattern in water because of these properties, and form cell membranes. To form membranes, phospholipids line up next to each other with their heads on the outside of the cell and their tails on the inside.