Phospholipids Encyclopedia Article

Phospholipids

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Phospholipids

Phospholipids are complex lipids made up of fatty acids, alcohols, and phosphate. They are extremely important components of living cells, with both structural and metabolic roles. They are the chief constituents of most biological membranes.

At one end of a phospholipid molecule is a phosphate group linked to an alcohol. This is a polar part of the molecule--it has an electric charge and is water-soluble (hydrophilic). At the other end of the molecule are fatty acids, which are non-polar, **hydrophobic**, fat soluble, and water insoluble.

Because of the dual nature of the phospholipid molecules, with a water-soluble group attached to a water-insoluble group in the same molecule, they are called amphipathic or polar lipids. The amphipathic nature of phospholipids make them ideal components of biological membranes, where they form a lipid bilayer with the polar region of each layer facing out to interact with water, and the non-polar fatty acid "tail" portions pointing inward toward each other in the interior of the bilayer. The lipid bilayer structure of cell membranes makes them nearly impermeable to polar molecules such as ions, but proteins embedded in the membrane are able to carry many substances through that could not otherwise pass.

Phosphoglycerides, considered by some as synonymous for phospholipids, are structurally related to 3-phosphoglyceraldehyde (PGA), an intermediate in the catabolic **metabolism** of glucose. Phosphoglycerides differ from phospholipids because they contain an alcohol rather than an aldehyde group on the 1-carbon. Fatty acids are attached by an ester linkage to one or both of the free hydroxyl (-OH) groups of the glyceride on carbons 1 and 2. Except in phosphatidic acid, the simplest of all phosphoglycerides, the phosphate attached to the 3-carbon of the glyceride is also linked to another alcohol. The nature of this alcohol varies considerably.