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TOPIC- Phosphatidycholine

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Phosphatidylcholine

* Phosphatidylcholine (PC) is a phospholipid attached to a choline particle.

* Phospholipids contain fatty acids, glycerol, and phosphorous.

* Phosphatidylcholine or 1,2-diacyl-*sn*-glycero-3-phosphocholine (once given the trivial name 'lecithin') is a neutral or zwitterionic phospholipid

* It is usually the most abundant phospholipid in animals and plants, often amounting to almost 50% of the total complex lipids, and as such it is obviously a key building block of membrane bilayers.

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* In particular, it makes up a very high proportion of lipids of the outer leaflet of the plasma membrane.

* Virtually all the phosphatidylcholine in human erythrocyte membranes is present in the outer leaflet, for example, while in the plasma membranes of nucleated cells, 80 to 90% of this lipid is located on the outer leaflet.

* Phosphatidylcholine is a chemical contained in eggs, soybeans, mustard, sunflower, and other foods.

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* Phosphatidylcholine is also the principal phospholipid circulating in plasma, where it is an integral component of the lipoproteins, especially the HDL.

* On the other hand, it is less often found in bacterial membranes, perhaps 10% of species, but there is none in the 'model' organisms *Escherichia coli* and *Bacillus subtilis*.

Functions of Phosphatidylcholine

* It is ideally suited to serve as the bulk structural element of biological membranes, and makes up a high proportion of the lipids in the outer leaflet of the plasma membrane.
* The unsaturated acyl chains are kinked and confer fluidity on the membrane.
* Dipalmitoyl phosphatidylcholine is the main surface-active component of human lung surfactant.
* 1-oleoyl-2-palmitoyl-phosphatidylcholine, is located specifically at the protrusion tips of neuronal cells and appears to be essential for their function, while 1-palmitoyl-2-arachidonoyl-phosphatidylcholine is important in the regulation of the progression of the cell cycle and cell proliferation.
* Phosphatidylcholine is present bound non-covalently in the crystal structures of a number of membrane proteins, including cytochrome c oxidase and yeast cytochrome bc_1.
* Some of the phosphatidylcholine synthesised in the liver is secreted into bile by a specific flippase together with bile acids where it assists in the emulsification of dietary triacylglycerols in the intestinal lumen to facilitate their hydrolysis and uptake.

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* Phosphatidic acid generated from phosphatidylcholine by the action of phospholipase D in plants has key signalling functions.

* Phosphatidylcholine is the biosynthetic precursor of sphingomyelin and as such must have some influence on the many metabolic pathways that constitute the sphingomyelin cycle.

* It is also a precursor for phosphatidic acid, lysophosphatidylcholine and platelet-activating factor, each with important signalling functions, and of phosphatidylserine.

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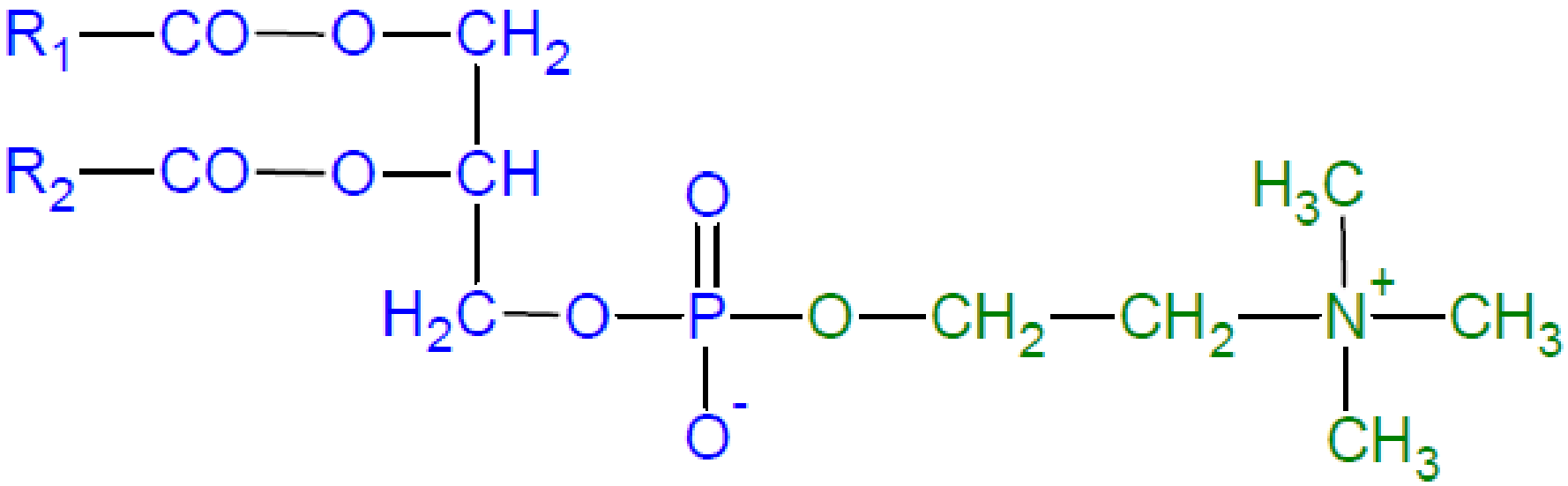
* Phosphatidylcholine levels correlate with flowering time, and this lipid is believed to be master regulator of flowering.

* In prokaryotes, phosphatidylcholine is essential for certain symbiotic and pathogenic microbe-host interactions.

* For example, in human pathogens such as *Brucella abortus* and *Legionella pneumophila*, this lipid is necessary for full virulence, and the same is true for plant pathogens, such as *Agrobacterium tumefaciens*.

* Bacteria symbiotic with plants, e.g. the rhizobial bacterium *Bradyrhizobium japonicum*, require it to establish efficient symbiosis and root nodule formation.



Phosphatidylcholine