

NAME: JIBRIL HALIMA
MATRIC NO: 18/MHS06/033
DEPARTMENT: MEDICAL LABORATORY SCIENCE
COURSE: BCH 202

Vitamin C is a coenzyme. This is so as it is involved in various biochemical reactions. Vitamin C plays its role as a coenzyme especially in the formation of collagen and synthesis of corticosteroid hormones.

In the formation of collagen, vitamin C plays the role of a coenzyme in hydroxylation of proline and lysine while procollagen is converted to collagen that is post-translational modification. The hydroxylation reaction is catalysed by lysyl hydroxylase for lysine and prolyl hydroxylase for proline. This reaction is dependent on vitamin C, molecular oxygen and alpha ketoglutarate.

Adrenal gland possesses high level of ascorbic acid, particularly in periods of stress. It is believed that vitamin C is necessary for the hydroxylation reactions in the synthesis of corticosteroid hormones.

Chemistry of Phospholipids

Phospholipids are complex lipids containing phosphoric acid, in addition to fatty acids, nitrogenous base and alcohol. There are two classes of phospholipids.

- a. Glycerophospholipids or phosphoglycerides that contain glycerol as the alcohol.
- b. Sphingophospholipids or sphingomyelin that contain sphingosine as the alcohol.

Glycerophospholipids are the major lipids that occur in biological membranes. They consist of glycerol 3-phosphate esterified at its carbon 1 and carbon 2 with fatty acids. Usually carbon 1 contains a saturated fatty acid while carbon 2 contains an unsaturated fatty acid.

There are different types of phospholipid.

1. Phosphatidic acid: this is the simplest phospholipid. It does not occur in good concentration in the tissues. Basically, phosphatidic acid is an intermediate in the synthesis of triacylglycerols and phospholipids.
2. Lecithins/ phosphatidylcholine: these are the most abundant group of phospholipids in the cell membranes. Chemically, lecithin is a phosphatidic acid with choline as the base. Phosphatidylcholines represent the storage form of body's choline. There are two forms of phosphatidylcholine.
 - a. Dipalmitoyl lecithin is an important lecithin found in the lungs. It is a surface active agent and prevents the adherence of inner surface of the lungs due to surface tension. Respiratory distress syndrome in infants is a disorder characterized by the absence of phosphatidylcholine.
 - b. Lysolecithin is formed by removal of the fatty acid either at carbon 1 or carbon 2 of lecithin.
3. Cephalins/ phosphatidylethanolamine: ethanolamine is the nitrogenous base present in cephalins. Thus, lecithin and cephalin differ with regard to the base.
4. Phosphatidylinositol: the stereoisomer myo-inositol is attached to phosphatidic

acid to give phosphatidylinositol. This is an important component of cell membranes.

5. Phosphatidylserine: the amino acid serine is present in this group of glycerophospholipids.
6. Plasmalogens: when a fatty acid is attached by an ether linkage at carbon 1 of glycerol in the glycerophospholipids, the resultant compound is plasmalogens.
7. Cardiolipin: it is so named as it was first isolated from heart muscle. Structurally, a cardiolipin consists of two molecules of phosphatidic acid held by an additional glycerol through phosphate groups. It is an important component of inner mitochondrial membrane. Cardiolipin is the only phosphoglyceride that possesses antigenic properties.

B. Sphingomyelins: sphingosine is an amino alcohol present in sphingomyelins. They do not contain glycerol at all. Sphingosine is attached by an amide linkage to a fatty acid to produce ceramide. The alcohol group of sphingosine is bound to phosphorylcholine in sphingomyelin structure. Sphingomyelins are important constituents of myelin and are found in good quantity in brain and nervous tissues.

Functions of phospholipids

1. Phospholipids participate in the absorption of fat from the intestine.
2. In association with proteins, phospholipids form the structural components of membranes and regulate membrane permeability
3. Phospholipids are essential for the synthesis of different lipoproteins, and thus participate in the transport of lipids
4. Accumulation of fat in liver can be prevented by phospholipids, hence they are regarded as lipotropic factors.
5. Phospholipids act as surfactants. For instance, dipalmitoyl phosphatidylcholine is an important lung surfactant.
6. Cephalins, an important group of phospholipids participate in blood clotting
7. Phosphatidylinositol is involved in signal transmission across membranes.

Difference between phospholipids and glycolipids

Phospholipids are complex lipids with phosphoric acid, fatty acids, nitrogenous base and alcohol while glycolipids are complex lipids with fatty acid, carbohydrate, fatty acid, and nitrogenous base, alcohol (sphingosine)