Lipids

Lipids are on of biochemistry compounds that are insoluble in water but soluble in non-polar solvents such as ether, acetone and chloroform. Fats supply over twice as much energy per unit weight as proteins or carbohydrates. There are three main components of lipids: carbon, oxygen and hydrogen, some of them contain in addition nitrogen or phosphorus.

Classification of Lipids

A- Simple Lipids

Esters of fatty acids and alcohols, in turn divided to:

1- **Neutral lipids:** Esters of fatty acids with triple alcohol "Glycerol", as it produces what is called "Glycerides". Glycerides present in adipose tissues, especially subcutaneous and around the organs such as heart or kidneys.

2- **Waxes:** Esters of fatty acids with alcohols have high molecular weights (other than glycerol). They are the components of the layer covering the body of animals, such as the skin, fur and feathers, and cover the leaves of waxy plants, as well as Beeswax.

B- Compound (Conjugated) lipids

1- Esters of fatty acids containing chemical groups (non- lipid product) in addition to alcohol.

2- Depending upon the chemical groups, they are further subdivided into phospholipids, glycolipids and lipoproteins.

C- Derived lipids

They are the hydrolysis products of simple and compound lipids, these include fatty acids (saturated as well as unsaturated), glycerol, steroids, bile acids, vitamins A, D, E and K.

Proteins

The amino acids are the building blocks for proteins - nearly all proteins are made from the twenty standard amino acids. Other amino acids are also found in proteins, but most arise by modification from the twenty after they have been incorporated in the protein.

Classification of Protein

Proteins are classified according to its chemical structure or their association with other organic and inorganic materials.

1- Simple proteins

Only amino acids are produced by the hydrolysis of simple proteins. These proteins are further classified based on their solubility in different solvents to:

a. Fibrous protein: Includes proteins that are insoluble or solvent-resistant, and make up the support parts of animal organs such as **Collagen** and **Keratin**.

b. Globular proteins: Includes dissolved proteins and have a global shape as a result of being wrapped together and forming sulfur bonds, such as Albumins and Globulins.

2- Conjugated proteins

These are simple proteins combined with some non-protein substances, such as Hemoglobin, Phosphlipids.

Vitamins

Vitamins are low molecular weight organic compounds required in small amounts in the diet. Most of the vitamins are not synthesized in the human body but are synthesized by the plants. Hence these essential nutrients are mainly obtained through the food.

Classification of vitamins

1- **Fat-soluble vitamins:** includes vitamin K, A, D and E

2- **Water-soluble vitamins:** includes B complex and vitamin C