

Carbohydrates:-

→ Main source of energy, 3.9 calories of energy per gram. Glucose is produced when carbohydrates break down.

Classification:-

Carbohydrates are classified into simple and complex forms as

- i) Monosaccharides
- ii) Oligosaccharides
- iii) Polysaccharides

1. **Monosaccharides**:- They are the simplest carbohydrates since they cannot be hydrolyzed. Monosaccharides are composed of carbon, oxygen and hydrogen. Some of the common monosaccharides are glucose, fructose, ribose, xylose and mannose. All the monosaccharides are colorless, crystalline solids and are readily soluble in water but are insoluble in nonpolar solvents. Mostly they are sweet in the taste.

Functions Of Monosaccharides

1. They serve as primary source of energy for cells

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2. They are involved important for metabolism
3. They act as building blocks for more complex carbohydrates and for the synthesis of other molecules such as nucleic acid.
4. Glucose is stored as glycogen in the form of monosaccharides.

Subdivision Of Monosaccharides:-

Monosaccharides are subdivided into following categories -

- 1) Trioses
- 2) Tetroses
- 3) Pentoses
- 4) Hexoses
- 5) Heptoses

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2) Oligosaccharides:-

Oligosaccharides are compound sugars that consists of 2 to 10 molecules of small same or different monosaccharides that are linked together. Some of the common oligosaccharides are lactose (found in milk), maltose (found in malted barley), sucrose (table sugar), raffinose (beans) and fructooligosaccharides (bananas, onions and garlic). Many oligosaccharides are also sweet in taste and are generally soluble in water.

Functions Of Monosaccharides:-

1. Oligosaccharides act as a receptor and antigenic determinant.
2. Oligosaccharides protect cells from pathogens by acting as decoys.
3. They are involved in certain hormonal regulation processes.

Types Of Oligosaccharides:-

On the basis of number of sugar units

(2)

they contain, oligosaccharides are of different

1. Trisaccharides: - These are made up of three monosaccharides linked together. For example Raffinose that is made up of glucose, galactose and fructose.
2. Tetrasaccharides: These are made up of four units of sugar. Sesame is made up of 2 galactose, 1 fructose and 1 glucose unit.
3. Pentasaccharide: - These are composed of 5 sugar units. It includes verbascose, that is composed of three galactos, 1 fructose and 1 glucose unit.
4. Hexasaccharides. Hexasaccharides are made up of six sugar units.

Similarly, Heptasaccharides have seven and octasaccharides have eight monosaccharides etc.

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Polysaccharides:-

These are compound sugars and are composed of more than 10 molecules of monosaccharides. Polysaccharides are non-crystalline, hydrophobic in nature, many are insoluble in water and not sweet in taste. Some examples of polysaccharide are glycogen, starch and cellulose. They are found in potatoes, bread, cereals, rice, grains, corn, peas etc.

Functions Of Polysaccharides.

- 1) They store energy in forms of starch in plants and glycogen in animals.
- 2) They provide support to cells, like in plants cell wall is made of polysaccharide and in ~~some~~ fungi and insect chitin provides support to cell.
3. It forms glycolipids and glycoproteins that are used to send signals within and between the cells.

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Types

Polysaccharides are classified depending on the type of molecules produced as a result of hydrolysis. They may be

1) Homopolysaccharides:-

Polysaccharide that contains the monosaccharides of the same type. Some examples are glycogen, cellulose & starch.

2. Heteropolysaccharides:

These polysaccharides which contains different types of monosaccharides. For example hyaluronic acid, heparin & gamma globulin etc.

Proteins:

Proteins are chief builders of body and a source of energy. Proteins are complex molecules made up of carbon, hydrogen and oxygen.

Classification Of Proteins:-

Proteins can be classified on the basis of its structure and biological functions.

They are classified into four categories on the basis of its structure.

1) Primary Protein:- Proteins that exist as a long chain of amino acids arranged in a particular sequence. They are non-functional proteins. Primary structure proteins are synthesised in ribosomes.

2) Secondary Structure Protein:-

If the polypeptide chain is coiled into spiral or helix

structures having three dimensions where amino acids interact by the formation of hydrogen bonds. For example keratin, silk fibres etc.

3) Tertiary Structure Proteins

The long polypeptide chain becomes more stabilized by folding and coiling. This structure refers to three dimensional shape of polypeptide chain.

It is stabilized by formation of ionic and hydrophobic bonds or disulphide bridge. These are found in all functional proteins.

e.g. in enzymes like lysozyme. It determines the specific functions of proteins.

4. Quarternary Structure Proteins :-

When a protein is composed of more than one polypeptide or subunits of its own into a single functional protein, is said to be quarternary structure proteins. For example hemoglobin and insulin.

Fibrous Proteins:-

These proteins are long thread like structures which are insoluble in water and provide structural support. For example collagen, keratin, elastin.

Globular Proteins:

These proteins are spherical or globular in shape and are soluble in water. They perform various functions like transport and catalysis. For example Enzymes, hemoglobin, antibodies.

Membrane Proteins

These proteins are associated with cell membranes and are involved in transport, signalling and cell adhesion.

Function of Proteins:-

- 1) Proteins build new tissues of the body and replace damaged tissues and maintain.
- 2) Carrier proteins move molecules from one place to another around the body like hemoglobin.
- 3) Keratin protein forms hair, nail, feathers, horn and beaks.
- 4) Proteins are protective as antibodies.
- 5) They carry out regulating activities.
- 6) They are responsible for movement as contractile proteins actin and myosin form basic structure of muscles.

Lipids.

Lipids are naturally occurring compounds and are source of energy.

Types Of Fats

Fats/Lipids can be classified into categories.

1) Saturated Fats:-

These are solid at room temperature so it is known as solid fat. These are found in animal food like milk, cheese and meat. These contain no double bonds between carbon atoms in fatty acid chains. Saturated fats can raise cholesterol. A healthy diet has less than 10% of daily calories of saturated fats.

2) Unsaturated Fats:-

These are liquid at room temperature. It is mostly found in oils from plants. It helps to improve cholesterol level. It is further classified into:

i) Monosaturated Fats:-

These are found in avocado, nuts and vegetable oils. It helps lower your 'bad' 'LDL' cholesterol and keep 'good' HDL cholesterol level high.

ii) Polysaturated Fats:-

These are found in vegetable oils like safflower, sunflower, sesame, soyabean and corn oil. It is the main fat found in seafood. There are two types of polysaturated fats which are omega-3 and omega-6 fatty acids.

3. Trans Fats:-

This is a fat that has been changed by a process called hydrogenation, which increases the shelf life of fats and makes it harder at room temperature.

Harder fat makes crackers crispier and pie crusts flakier. Trans fat can raise cholesterol so it should be consumed as little as possible.

Trans fats can be found in processed foods, Snacks, cookies, margarine, salad dressings and

Food made with partially hydrogenated cells.

Function Of Lipids

- 1) Lipids are storage compounds which reserve energy of the body.
- 2) They protect vital organs like heart and kidney.
- 3) It maintains body temperature (brown fats).
- 4) They serve as source for fat soluble vitamins.
- 5) They act as electrical insulator.
- 6) Some lipids act as cellular metabolic regulators.
- 7) They regulate membrane permeability.
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