

Shazma

Batch # 047

GSA

Assignment # 02:

Topic

=> Classification of carbohydrates / Proteins /
Fats:

1- Carbohydrates:

A carbohydrate is a naturally occurring compound, or a derivative of such a compound, with the general chemical formula $C_x(H_2O)_y$, made up of molecules of carbon, hydrogen and oxygen. Carbohydrates are the most widespread organic substances and play a vital role in all life.

Classification of Carbohydrates:

Carbohydrates can be divided into two main types:

- 1- Simple (made up of just one or two sugar units)
- 2- Complex (made up of many sugar units).

Simple Carbohydrates:

Simple carbohydrates are sometimes called "sugars" or "simple sugars". There are two types of simple carbohydrates:

monosaccharides and disaccharides.

i- Monosaccharides:

Monosaccharides contain just one sugar unit, so they are the smallest of the carbohydrates. The small size of monosaccharides gives them a special role in digestion and metabolism. Food carbohydrates have to be broken down to monosaccharides before they can be absorbed in the gastrointestinal tract and they also circulate in blood in monosaccharides form.

There are 3 monosaccharides:

1- Glucose

Glucose is found in fruits and vegetables, as well as honey, corn syrup, and high fructose corn syrup.

2- Fructose

Fructose found in fruits, vegetables, honey, high fructose corn syrup.

3- Galactose

Galactose found in milk and dairy products.

ii- Disaccharides:

They contain two sugar units bonded together.

There are 3 disaccharides:

- 1- Maltose (glucose + glucose)
- 2- Sucrose (glucose + fructose)
- 3- Lactose (glucose + galactose)

2- Complex Carbohydrates:

Complex carbohydrates are also called polysaccharides, because they contain many sugars. There are 3 main polysaccharides

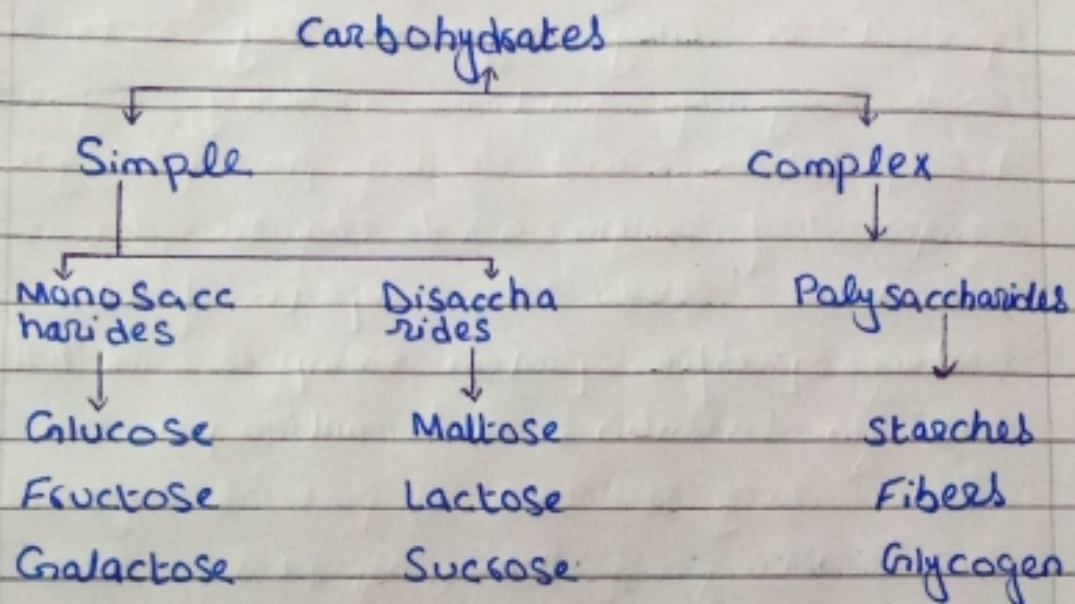
1- **Starch** is the storage form of carbohydrates in plants. For example soybeans, lentils, roots, tubers, nuts and seeds.

2- **Glycogen** storage form of carbohydrates in animals. Humans included. eg Liver glycogen, Muscle glycogen

3- Fiber

We find fiber in whole plant foods like whole grains, seeds, nuts, fruits, vegetables, and legumes.

Types of Carbohydrates:



2. Proteins:

Proteins are organic molecules that are present in living organisms. They serve a wide range of functions including organization, transportation, and defense. Proteins are composed of amino acid chains, and structure levels are up to four. Certain specific protein examples include collagen, insulin, and anticancer.

Classification of Proteins:

- 1- Primary (first level)
- 2- Secondary (second level)
- 3- Tertiary (third level)
- 4- Quaternary (fourth level)

1- Primary Structure of Protein:

- The primary structure of proteins is the exact ordering of amino acids forming their chains.

- The exact sequence of the protein is very important as it determines the final fold and therefore the function of the proteins.

- The number of polypeptide chains together form proteins. These chains

have amino acids arranged in a particular sequence which is characteristic of the specific protein. Any change in the sequence changes the entire protein.

2- Secondary Structure of proteins:

- The proteins do not exist in just simple chains of polypeptides.
- These polypeptide chains usually fold due to the interaction between the amine and carboxyl group of the peptide link.
- The structure refers to the shape in which a long polypeptide chain can exist.
- They are found to exist in two different types of structures α -helix and β -pleated sheets structure.
- This structure arises due to the regular folding of the backbone of the polypeptide chain due to hydrogen bonding between $-CO$ group and $-NH$ groups of the peptide bond.
- However, segments of the protein chain may acquire their own local fold, which is much simpler and usually takes the shape of a spiral or extended shape or a loop.

- These local folds are termed secondary elements and form the protein's secondary structure.

3- Tertiary Structure of protein:

- This structure arises from further folding of the secondary structure of the protein.

- H-bonds, electrostatic forces, disulphide linkages and van der Waals forces stabilize this structure.

- The Tertiary structure of proteins represent overall folding of the polypeptide chains, further folding of the secondary structure.

- It gives rise to two major molecular shapes called fibrous and globular.

- The main forces which stabilize the secondary and tertiary structures of proteins are hydrogen bonds, disulphide linkages, van der Waals and electrostatic forces of attraction.

~~4- Quaternary~~ x

4- Quaternary Structure of protein:
The spatial arrangement of various

tertiary structures gives rise to the quaternary structure. Some of the proteins are composed of two or more polypeptidic chains referred to as sub-units. The spatial arrangements of these subunits with respect to each other is known as quaternary structure.

3- Fats:

Fat is a term used to describe a class of macro nutrients used in metabolism called triglycerides. These make up one of three classes of macronutrients including proteins and carbohydrates. Fats have the highest energy storage potential of the macronutrients, and are very chemically stable, making them ideal for storing energy for later use.

Essential functions of fats:

- Lubrication of body surfaces.
- Component of cell membrane structures.
- Formation of steroid hormones.
- Energy storage.
- Insulation from cold.
- Carrying fat-soluble vitamins A, D, E, K.

Types of Fats:

There are four main types of fats in our diets. They are:

- 1- monounsaturated fats
- 2- Polyunsaturated fats
- 3- Saturated fats
- 4- Trans fats.

1- Monosaturated Fats:

Fat molecules that have one unsaturated carbon bond in the molecule, this is also called a double bond. Oils that contains monosaturated fats are typically liquid at room temperature but start to turn solid when chilled.

Sources:

Olive, Peanut and Canola Oils. Avocados, Nuts such as almonds, hazelnuts, and pecans. Seeds such as pumpkin and sesame seeds.

2- Polyunsaturated Fats:

There are two main types of fats saturated and unsaturated.

A saturated fat has no double bonds in its chemical structure whereas, an unsaturated fat has one or

more double bonds. If a fat molecule has one double bond, it's called a monosaturated fat, but if it has more than one, it's called a polyunsaturated fat.

Sources:

Sunflowers, Corn, Soybean, Walnuts, Fish, canola oil etc.

3- Saturated Fat:

A type of fat with certain chemical properties that is usually solid at room temperature.

Sources:

Oils, butter, ghee, biscuits, cakes, bacon, cheese, milk, meat etc.

4- Trans Fat:

A type of fat that has certain chemical properties and is usually found in processed foods such as baked goods, snack foods, fried foods, and certain vegetable oils. Eating trans fats increase blood cholesterol level and the risk of heart diseases.