

Carbohydrates

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- What are Carbohydrates?
- Synthesized from carbon dioxide and water, CHO are the most common organic molecules on earth.
- Among the CHO are **sugar and starches**, which are the major sources of energy in the human diet.
- Sugars are generally in the form of **monosaccharides** (glucose, fructose, and galactose) or **disaccharides** [two monosaccharides joined together, such as sucrose (table sugar), maltose, and lactose]. The most frequent sugar in nature is glucose, which is a major fuel for most animal species. Most of the CHO found in nature are in the form of **polysaccharides**, which are high molecular weight polymers. Starch is a polymeric storage form of glucose found in plants. In animals, glucose is stored as glycogen.
- In general CHO are the most important source of energy in the diet. Approximately 50% of the total calories of the American diet is CHO, and this may reach to 80% in many developing countries. There are practical reasons for such large quantities of CHO in diet all over the world:
 - **first:** CHO are widely available, because they are easily grown in such plants as grains, vegetables, and fruits.
 - **Second:** CHO are relatively low in cost.
 - **Third:** CHO foods can be kept in dry storage for relatively long periods without spoilage. Modern processing and packaging further extend the self-life of CHO products almost indefinitely.

Why is carbohydrate an essential nutrient?

- Carbohydrate is essential primary because of the **high energy requirement of central nervous system tissue** (i.e the **brain**). the brain has limited ability to use noncarbohydrate energy sources. In humans, the brain requires an estimated (100)gram of glucose per day –which one third to one half of the CHO present in the average diet. Other tissues, such as hematopoietic tissues and white blood cells, are also obligate glucose users.
- The CHO fuel factor is 4, it should provide approximately (50--60%) of the total calories of a healthy persons well balanced diet. The minimum daily requirement for CHO is 100gm (400Cal).this is equivalent to 2 liters of 5% dextrose in water: this supplies enough energy as glucose to meet the need of the obligate glucose –using tissues and to minimize the breakdown of body protein for gluconeogenesis, this function called (protein-spare Effect)

Carbohydrate restriction or Regulation

- There are two types of dietary CHO restriction:
- **General:** the total amount of CHO consumed per day possibly per meal, has to be either restricted (I.e. type IV hyperlipidemia) or regulated (I.e. DM)
- **Specific:** The intake of one or more types of CHO must be either severely restricted or eliminated from the diet as a result of specific intolerance.

Sucrose Avoidance: Many sources of dietary sucrose are readily apparent like table sugar and obviously sweetened foods, most fruits, many vegetables must also be eliminated from the diet. Infants will require a milk formula in which the sucrose is replaced by glucose.

Lactose Avoidance:

Lactose is contained in human, cows, sheep and goats in milk, in milk products and manufactured foods containing milk. It is also present in some medicines and artificial sweeteners. Lactose intolerant infants will require a low lactose milk based on soya, such children may require extra protein from meat, fish, and egg, calcium supplements may also be needed.

Galactose Avoidance:

Avoidance similar to lactose intolerance, all milk and its products.

Starch Avoidance:

Primary starch intolerance is due to isomaltase deficiency and is usually associated with sucrose intolerance. This will require exclusion of sucrose containing food, in addition to flour and food containing flour (bread, cake), breakfast cereals, rice, potatoes, many manufactured meat products (sausages).

Health Problems

- Many health problems may be associated with CHO, the increased sugar consumption all over the world have been incriminated in the cause of several chronic diseases: coronary heart disease, obesity DM and dental caries.

The image features two large, vibrant yellow roses in full bloom, positioned diagonally across the frame. They are set against a dark teal background. The roses are rendered with soft shading to show the texture of their petals. Interspersed among the flowers are several dark green leaves. A dark brown stem runs through the scene, supporting the roses. Overlaid on the image is the text 'Thank you very much' in a stylized, reddish-brown font with a slight shadow effect. The words are arranged in two lines: 'Thank you' on the top line and 'very much' on the bottom line, centered between the two roses.

Thank you

very much