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BIOMEDICAL SIGNIFICANCE OF MONOSACCHARIDES

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Introduction. Carbohydrates are substances that belong to the class of polyhydroxycarbonyl compounds. These are the most common organic compounds in nature, which are components of the cells of all plant and cellular organisms. Carbohydrates are formed in plants during photosynthesis [1]. During respiration, carbohydrates are oxidized, resulting in the release of energy necessary for the vital activity of a living organism.

The main material. There are three main classes of carbohydrates:

1. Monosaccharides, or simple sugars, consist of a single polyhydroxyaldehyde or ketone unit. The most common monosaccharide in nature is D-glucose, sometimes called dextrose.

2. Oligosaccharides are composed of short chains of monosaccharide units or residues connected by characteristic glycosidic bonds. The most common disaccharides are those with two monosaccharide units (e.g., sucrose (cane sugar)).

3. Polysaccharides are sugar polymers containing more than 20 or so monosaccharide units, and some have hundreds or thousands of units (e.g., starch) [2].

Polysaccharides are of two types in terms of function and composition:

- storage polysaccharide - starch;
- structural polysaccharide - cellulose.

Monosaccharides are classified according to three different characteristics: the location and nature of their carbonyl group; the number of carbon atoms they contain; and their chiral properties [2].

If the carbonyl group is an aldehyde, then the monosaccharide is an aldose. If the carbonyl group is a ketone, the monosaccharide is a ketose [2].

Monosaccharides with three carbon atoms are called trioses, and they are the simplest representatives of monosaccharides. Those with four carbon atoms are called tetroses, those with five atoms are called pentoses, those with six are called hexoses, etc. [2]. The most important monosaccharides contained in fruits and vegetables are

hexoses: glucose and fructose. Other “minor” monosaccharides include mannose, galactose, xylose, and arabinose.

Monosaccharides are usually found in the cytosol. Their content is very high in some fruits and vegetables, such as corn, peas, and sweet potatoes.

Glucose is a six-atom aldehyde alcohol and often enters the human body in isometric forms, such as galactose and fructose (monosaccharides), lactose and sucrose (disaccharides), or starch (polysaccharides). Excess glucose is stored in the body as glycogen, a polymer of glucose that is activated during fasting. In addition, glucose can be produced through gluconeogenesis, a process that involves the breakdown of fats and proteins [3].

Given the primary importance of carbohydrates in maintaining the homeostasis of the human body, numerous sources contribute to the production of glucose. When there is glucose in the body, the sugar molecule moves through the bloodstream to tissues that require energy. Glucose undergoes a series of biochemical reactions to release energy in the form of adenosine triphosphate (ATP). The ATP obtained as a result of these processes powers virtually all energy-requiring processes in the body. In eukaryotes, most of the energy comes from aerobic processes that start with the glucose molecule [3].

Glucose is first broken down through the anaerobic process of glycolysis, producing some ATP and pyruvate as end products. Under anaerobic conditions, pyruvate is converted to lactate by reduction. In contrast, under aerobic conditions, pyruvate can enter the citric acid cycle to generate energy-rich electron carriers that produce ATP in the electron transport chain [3].

Monosaccharides, in particular glucose, are the main source of energy for cells in most organisms. They are involved in cellular respiration (glycolysis), where glucose is broken down into pyruvate to form ATP, the main energy molecule in the human body. The brain and red blood cells mainly use glucose to maintain their vital functions and the homeostasis of the body as a whole [3].

Monosaccharides are key components in metabolic processes. For example, blood glucose levels are regulated by hormones (insulin and glucagon), which affect the metabolism of carbohydrates, fats, and proteins. Ribose and deoxyribose are monosaccharides that are part of nucleotides and form the basis of DNA and RNA. Other monosaccharides, such as glucosamine, are part of structural biopolymers, such as chitin and glycoproteins.

Monosaccharides also serve as building blocks for synthesis:

- disaccharides and polysaccharides (sucrose, starch, glycogen, cellulose).
- glycoproteins and glycolipids, which play an important role in cell membranes, in particular in signaling processes.

Monosaccharides are also involved in the formation of glycans, which affect the immune response, cell adhesion, and pathogen recognition. Mannose, for example, is part of the lectin pathway of complement activation in the immune system.

It's worth noting that monosaccharides form glycosylated molecules that provide intercellular communication. Glycoproteins and gangliosides containing

monosaccharides are involved in cell recognition, which is very important in the development of the body and immune responses.

Conclusions. Thus, the biomedical significance of carbohydrates and monosaccharides is crucial for the vital activity of various organisms, as they are the main source of energy for cells. Monosaccharides are involved in the construction of complex molecules (polysaccharides, nucleic acids), regulate metabolic processes and ensure the functioning of many biochemical processes in the body.

References

1. Biochemistry (2023). Carbohydrates. https://www.sathyabama.ac.in/sites/default/files/course-material/2020-10/note_1456404597.pdf

2. Oluk, A.C. & Karaca, O.B. (2016). 18 - Functional food ingredients and nutraceuticals, milk proteins as nutraceuticals nanoScience and food industry. Editor(s): Alexandru Mihai Grumezescu. *Nutraceuticals*, 715-759. Academic Press. https://doi.org/10.1016/B978-0-12-804305-9.00018-X.

3. Hantzidiamantis , P. J., Awosika, A. O., & Lappin, S. L. (2024). Physiology, Glucose. In *StatPearls*. StatPearls Publishing. https://pubmed.ncbi.nlm.nih.gov/31424785/