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PROTEINS AND THEIR FUNCTION IN LIFE

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Abstract.

Given the important role of proteins in living nature, as well as the fact that proteins make up half of the mass of a living organism and have a number of remarkable properties, understanding the structure and function of proteins, and being the basis for solving important problems for biology and medicine, requires the study of biochemistry courses in medical institutions - starting with this class, organic substances. Proteins perform a variety of and many functions characteristic of living organisms, some of which we will get acquainted with during the course. In current medical literature, high-molecular nitrogen-containing compounds are called proteins. The term protein is based on the fact that egg white turns white when heated. Proteins are the main part of the tissue of any living organism and are important in various processes occurring in the tissue. Proteins form the basis of both the structure and function of living organisms. According to F. Crick, one of the founders of molecular biology, proteins are very important substances that can perform various functions very easily and delicately. There are approximately 1010-1012 different proteins in nature, which provide the activity of 106 different living organisms, from viruses to humans. Today, the structure and structure of very few of the large number of natural proteins are known. Each organism is characterized by its own set of proteins. The diversity of phenotypic traits and functions is determined by the specificity of these proteins, which in most cases have a multimolecular structure.

Key words: proteins, medicine, natural proteins, biology, organism.

Introduction.

There are about 3,000 different proteins in an E. coli cell, and more than 100,000 in the human body. All natural proteins are made up of a small number of simple building blocks, the monomer molecules being amino acids. Amino acids are linked together in a polypeptide chain. Natural proteins are made up of 20 different amino acids. These amino acids can be linked in different sequences. Therefore, they form a very large number of different proteins. Different isomers can be formed by arranging the specified number of amino acids in a polypeptide in different ways. If

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only 2 isomers can be formed from 2 amino acids, then theoretically 24 isomers can be formed from 4 amino acids. The sequential arrangement of nucleotides in a DNA molecule determines the sequence of amino acid residues in the polypeptide chain of the protein being synthesized. The resulting polypeptide chain has functional information and, accordingly, has a stable tertiary structure. Protein makes up 25% of the mass of the human body, and after drying it reaches 45-50%. The amount of proteins in different organs and tissues varies. Protein performs the following functions in human and animal organisms:

1. Structural function - all tissues, cells and organoids are made of protein. Fibrous proteins (collagen, keratin, elastin, etc.) play an important role here.

2. Catalytic function - biocatalysts in the body - enzymes are of a protein nature and control the occurrence of all biochemical reactions, that is, they allow the rate of reactions to proceed in a certain order and be controlled.

3. Energy function - proteins are broken down in the gastrointestinal tract and absorbed in the form of simple amino acids. A certain part of the amino acids is oxidized to produce energy.

4. Transport function. Proteins have the property of being well soluble in water and blood, and by forming complexes with substances that are insoluble in water and blood, they ensure their solubility and transport. For example: blood plasma protein albumin transports fatty acids, lipids, other proteins, iron, copper, vitamins, hormones to target organs.

5. Contractile function - actin, myosin, troponins, which are part of muscle proteins, have the ability to contract. These proteins are part of muscles and participate in performing mechanical work. The contractile function is also characteristic of cytoskeletal proteins, which ensure the processes of cell life .

Results and Discussion

The elemental composition of proteins is as follows: carbon 50.6 - 54.5%, nitrogen 15-17%, oxygen 21.5 - 23.5%, hydrogen 6.5 - 7.3%, sulfur - 0.5%. The amount of nitrogen in a protein molecule is constant and averages 16%. In addition to these elements, small amounts of phosphorus, iron, zinc, copper, manganese, magnesium and iodine are found. The amount of protein in plasma is determined using the amount of nitrogen. When proteins are hydrolyzed with acid, alkali and enzyme, amino acids are formed. Amino acid composition of proteins and classification of amino acids Proteins include 20 different amino acids. These amino acids are L-series α-amino acids. Amino acids in a protein molecule are divided into the following groups:

1. By structure, amino acids are divided into 3 classes: aliphatic, aromatic and heterocyclic.

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2. By electrochemical properties, amino acids can be divided into the following three classes: acidic, neutral and basic.

The modern rational classification of amino acids is based on the polarity of radicals (R-groups), that is, their ability to react with water at physiological pH values (pH about 7.0). 5 classes of amino acids that trap radicals are distinguished as follows (Table 2):

1. nonpolar (hydrophobic);
2. polar (hydrophilic);
3. aromatic (most often nonpolar);
4. negatively charged;
5. positively charged.

Materials and methods. Proteins have unique physicochemical properties such as high viscosity of solutions, low diffusion, swelling ability, optical activity, mobility in an electric field, low osmotic pressure and high oncotic pressure, and absorption of light at 280 nm. Proteins have amphoteric properties like amino acids due to the presence of free NH2- and COOH-groups. They have all the properties of acids and bases. Depending on the pH of the environment and the ratio of amino acids with acidic and basic nature, proteins have a negative or positive charge in solutions and move towards the anode or cathode. This property of theirs is used in the separation of proteins by electrophoresis. Proteins also have hydrophilic properties.

Conclusions

Proteins are multimolecular organic compounds, the molecules of which are made up of α-amino acids. The following elements are included in the composition of proteins (%): carbon - 50.1-54.5%, oxygen - 21.5-23.5%, hydrogen - 6.5-7.3%, nitrogen - 16.6-17.6%, sulfur - 0.3- 2.5%, phosphorus - 0.1-2%. Some proteins contain small amounts of iodine, iron, copper, bromine, manganese, calcium, and other substances. Proteins are the most important components of cells. In the body, proteins perform various functions: serve as the structural material of the cell; catalyze all reactions of the exchange of substances in the tissue; Proteins are a source of energy, and their oxidation releases energy. Proteins are divided into two classes: simple proteins and complex proteins. Simple proteins include albumins, globulins, histones, and protamines. Complex proteins include phosphoproteins, glycoproteins, chromoproteins, nucleoproteins, and lipoproteins.

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