THE ROLE OF PROTEINS IN THE LIFE AND ACTIVITY OF LIVING ORGANISMS

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Annotation: One of the main factors of the external environment for man is food. Food replenishes the body's energy expenditure and ensures the plastic exchange of cells and the body. A person needs at least 2,500 kcal of energy per day, which is replenished mainly by carbohydrates, fats and proteins. Easy-to-digest animal, poultry and fish products are the main sources of protein. Food should be high quality and high in calories, with enough vitamins (especially vitamins that are not synthesized in the human body) in addition to protein, fat and carbohydrates. The body also needs enzyme-activating proteins and minerals (Na, K, Ca, Mn, C, S, P, etc.) that are part of biologically active substances.

Key word: Nitrogen, physiological, enzymes, carbohydrates, ammonium.

Malnutrition or lack of nutrients in the diet can lead to a deterioration in the physiological state of the body. For example, a lack of protein and vitamins in the diet can lead to stunted growth and development. In continental areas far from the oceans, such as in Central Asia, the external environment is also deficient in iodine in the diet. As a result, the activity of the thyroid gland is impaired. Iodine must be added to the salt to prevent such disorders.

In nature, the biological fixation of nitrogen is carried out by several prokaryotes: nitrogen-fixing nitrogen-fixing bacteria and legume nodule bacteria living in symbiosis at the roots of legumes. They convert gaseous nitrogen into ammonium salts. Ammonium salts are assimilated by plants and used for protein synthesis. Animals eat plants and their proteins are converted into animal proteins.

A single-celled organism, an amoeba, traps nutrients with its false legs and digests food as a result of the formation of digestive juices from the fluid in the cytoplasm. Digestive juice contains enzymes that break down proteins, fats, carbohydrates and nucleic acids. They break down these high-molecular-weight substances into amino acids, fatty acids, glycerin, glucose, and nucleotides. Feeding in infusoria is a bit more complicated. They have a special hole on the side of the body, a mouth hole at the bottom of the hole, and lashes around it. The mouth is connected to the short throat. A digestive vacuole forms at the base of the larynx. The undigested part of the food is expelled through a special outlet.

Proteins in living organisms perform a variety of functions, the molecules of these compounds determine the structure and shape of the cell, provide recognition and binding of various molecules, catalysis and regulation of chemical reactions in the body.

The function of a protein is closely related to its spatial structure, and this, in turn, depends on the sequence of amino acids in the protein, which is encoded in the gene (DNA).

1. One of the most important functions of proteins is **catalytic**. At the temperature and acidity of the environment, which is characteristic of a living cell, the rate of most chemical reactions is low. Nevertheless, the reactions in the cell proceed at a very high rate. An increase in the rate of chemical reactions is achieved due to the functioning of biological catalysts - enzymes.

Enzymes are the largest and most specialized class of proteins. It is enzymes that ensure the course of numerous chemical reactions in the cell, the totality of which constitutes metabolism or metabolism. Tens of thousands of different enzymes are currently known.

2. Compared to chemical catalysts, **enzymes** have a number of features:

Their catalytic efficiency is unusually high: enzymes are capable of accelerating chemical reactions 10^6-10^8 times, which is significantly higher than the efficiency of chemical catalysts.

Enzymes are very specific: usually an enzyme catalyzes only one reaction (that is, the conversion of one substance called a substrate) or several reactions of the same type.

In addition, the activity of enzymes in most cases is regulated by various chemical compounds present in the cell.

An important property of some enzymes is the ability to conjugate two chemical reactions and thus carry out energetically unfavorable processes for the synthesis of complex substances due to the energy released, for example, during the hydrolysis of ATP and other high-energy compounds.

3. The second important function of proteins is their **structural function**. Elements of the cytoskeleton are formed from structural proteins. Structural proteins include, for example, the fibrillar protein -keratin, which forms intermediate filaments of epithelial cells, is part of the hair, claws, horns and hooves of mammals, as well as the fibrillar protein collagen, the main structural protein of connective and bone tissue. The chemical structure of these proteins, which can withstand very high stress, is ideally suited to perform a mechanical function.

4. Other types of proteins provide **motor function**. Motor proteins are capable of ATP- or GTP-dependent movement along cytoskeletal filaments - microtubules and microfilaments. So, dyneins and kinesins "walk" along microtubules, and myosin - along actin filaments. Actin and myosin are included not only in the contractile fibers of muscle cells - myofibrils, but also participate in changing the shape of other types of cells.

5. Some proteins have **a transport function**.

a) First of all, these are membrane proteins that actively transfer substances from the environment to the cell and vice versa. Transport proteins also include some proteins built into biological membranes and forming pores (channels) in them.

7. Many living creatures (plants, fungi, bacteria, invertebrates, fish, amphibians, snakes) also secrete proteins and peptides called toxins to **provide protection and attack**. These proteins suppress vital processes in the cells of other organisms, they can destroy certain cellular polymers, which leads to the death of the organism.

8. Another important function of proteins is **regulatory**.

a) First of all, this function is performed by proteins - gene activators and repressors.

b) In addition, specialized proteins regulate the activity of enzymes.

c) In specialized animal cells, the synthesis of biologically active substances that go directly into the blood is carried out - hormones. Hormones are capable of regulating metabolism in very low concentrations. Some (but not all) hormones are peptides or proteins. The best known of the protein hormones is insulin, a hormone produced in the pancreas that regulates glucose levels in the cells of the body. When there is a lack of insulin in the body, a disease known as diabetes mellitus occurs.

Thus, biologically active substances of a protein nature and their receptors provide the regulatory function of proteins.

9. In addition, animal food proteins have an **energetic function** and a source of essential amino acids. During fasting, your own proteins are used as an energy substrate last - when glycogen and fat stores are used up. This can lead to a drop in muscle mass, skin diseases, ulcers, etc.

10. In some cases, proteins perform a **storage function**. This occurs most often in structures associated with reproduction. Such proteins are deposited in the seeds of many plants (aleurone grains), in animal eggs (ovalbumin).

Thus, proteins perform all the basic functions in a living organism, except for the functions of storing and transmitting hereditary information.

Conclusion

It can be concluded that the role of proteins is structural, protective (Physical protection, Chemical protection, Immune protection), Regulatory, Signal, Transport, Reserve (reserve) Receptor, Motor (motor).

The most well-known function of proteins in the body is to catalyze various chemical reactions. Enzymes are proteins with specific catalytic properties, that is, each enzyme catalyzes one or more similar reactions. Enzymes catalyze the reactions of the cleavage of complex molecules (catabolism) and their synthesis (anabolism), including DNA replication and repair and RNA matrix synthesis. More than 5,000 enzymes have been described by 2013.

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