BIOCHEMISTRY. FUNCTIONS OF BIOCHEMISTRY. METABOLISM IN THE LIVER

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Abstract. *Biochemistry is a science that studies the chemical composition of substances, the structure and ways of transformation of natural compounds in cells, organs, tissues and whole organisms, as well as the physiological role of chemical reactions and the regularities of their regulation. Biochemistry is traditionally divided into static, which deals with the analysis of the structure and properties of all organic. and inorganic. compounds that are part of living objects (cellular organelles, cells, tissues, organs); dynamic, studying the whole set of transformations of different substances, such as the exchange of substances and energy. Functional, exploring physiological. the role of molecules of substances and their transformations in certain manifestations of life activity, as well as comparative and evolutionary biochemistry determining the similarities and differences in the composition and metabolism of organisms belonging to different groups.*
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Depending on the object of research, biochemistry distinguishes into different groups: man, plant, animals, microorganisms, blood, muscles, neurochemistry and others, and as knowledge deepens and their specialization in sections, enzymology, which studies the structure and mechanism of action of enzymes, carbohydrates, lipids, nucleic acids, membranes, becomes. Biochemistry studies the substances that make up organisms, organic substances, their structure, distribution, transformations and physiological role in the body. Static biochemistry: the study of the chemical composition and structure of b-b Dynamic biochemistry: the study of metabolic processes in the body Functional biochemistry: the study of biochemical processes underlying the functions of the body. Metabolism or metabolism is a set of chemical reactions in the body that provide it with substances and energy necessary for vital activity. In metabolism, two main stages can be distinguished: preparatory - when the substance received in an alimentary way undergoes chemical transformations, as a result of which it can enter the blood and then penetrate into the cells, and metabolism itself, i.e. chemical transformations of compounds that have penetrated into the cells. The metabolic pathway is the nature and sequence of chemical transformations of a particular substance in the body. The intermediates formed during metabolism are called metabolites, and the last compound of the metabolic pathway is the final product. The process of decomposition of complex substances into simpler ones is called catabolism. Thus, proteins, fats, carbohydrates entering the food are broken down into simpler components (amino acids, fatty acids and monosaccharides) under the action of enzymes of the digestive tract. This releases energy. The reverse process, i.e. the synthesis of complex compounds from simpler ones is called anabolism. It comes with the expenditure of energy. From the amino acids, fatty acids and monosaccharides formed as a result of digestion, new cellular proteins, membrane phospholipids

and polysaccharides are synthesized in cells. There is a concept of amphibolism, when one compound is destroyed, but another is synthesized. A particular pathway of metabolism is a set of transformations of one specific compound (carbohydrates or proteins). The general path of metabolism is when two or more types of compounds are involved (carbohydrates, lipids and partially proteins are involved in energy metabolism). Substrates of metabolism are compounds coming from food. Among them are the main food substances (proteins, carbohydrates, lipids) and minor ones, which come in small quantities (vitamins, minerals). The intensity of metabolism is determined by the cell's need for certain substances or energy, regulation is carried out in four ways:

1) The total rate of reactions of a certain metabolic pathway is determined by the concentration of each of the enzymes of this pathway, the pH value of the medium, the intracellular concentration of each of the intermediates, the concentration of cofactors and coenzymes.

2) The activity of regulatory (allosteric) enzymes, which usually catalyze the initial stages of metabolic pathways. Most of them are inhibited by the end product of this pathway and this type of inhibition is called "feedback principle".

3) Genetic control that determines the rate of synthesis of an enzyme. A striking example is the appearance of inducible enzymes in the cell in response to the receipt of the appropriate substrate.

4) Hormonal regulation. A number of hormones are able to activate or inhibit many enzymes of metabolic pathways.

Living organisms are thermodynamically unstable systems. For their formation and functioning, a continuous supply of energy in a form suitable for multidimensional use is necessary. To obtain energy, almost all living beings on the planet have adapted to hydrolyze one of the pyrophosphate bonds of ATP. In this regard, one of the main tasks of bioenergetics of living organisms is the replenishment of used ATP from ADP and AMP. The main source of energy in the cell is the oxidation of substrates by oxygen in the air. This process is carried out in three ways: the addition of oxygen to the carbon atom, the splitting off of hydrogen or the loss of an electron. In cells, oxidation occurs in the form of a sequential transfer of hydrogen and electrons from the substrate to oxygen. Oxygen plays the role of a reducing compound (oxidizer) in this case. Oxidative reactions occur with the release of energy. Biological reactions are characterized by relatively small changes in energy. This is achieved by splitting the oxidation process into a number of intermediate stages, which allows it to be stored in small portions in the form of macroergic compounds (ATP). The reduction of an oxygen atom in interaction with a pair of protons and electrons leads to the formation of a water molecule. Among the undoubted successes of biochemistry are: the discovery of the participation of the biological membrane in energy generation and subsequent research in the field of bioenergetics; the establishment of ways to transform the most important metabolic products; cognition of the mechanisms of transmission of nervous excitement, biochemical foundations of higher nervous activity; elucidation of mechanisms of transmission of genetic information, regulation of the most important processes in living organisms.

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