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Enzymes and their Significance

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A B S T R A C T

The role of enzymes in the life of all living organisms, plants, animals and bacteria is very high. Enzymes are actively involved in biosynthetic reactions in living organisms and ensure their normal course. This article is about the importance of enzymes in living organisms.

A R T I C L E I N F O

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Enzymes, lat. fermentum - yeast, enzymes - protein catalysts in living cells of animals, plants and bacteria. Enzymes differ from conventional catalysts in their special properties and acceleration of chemical reactions. They lower the activation energy of chemical reactions such as catalysts.

In 1914, the Russian chemist G. S. Kirchhoff decomposed starch into sugar from barley grain extract. In 1933, the French chemists A. Payen and J. Persot for the first time isolated the enzyme amylase from barley grain. In the middle of the 19th century the founder of microbiology, L. Pasteur, argued that the fermentation process is caused by living microorganisms and is associated with their survival. In 1897, the German chemist E. Buchner isolated from yeast an enzyme that causes the process of alcoholic fermentation.

By the beginning of the 20th century the German chemist R. Wilstetter and his collaborators widely used the adsorption method in the separation and purification of enzymes. In the 1920-1930s, J. Samor isolated the first crystalline enzyme (urethras), then pepsin and a number of other proteological enzymes in crystalline form.

By the middle of the 20th century the development of physicochemical analysis and protein chemistry revealed the primary structure of a number of enzymes. For example, ribonucleic enzymes in the bovine pancreas have been shown to consist of 124 amino acid residues linked by four disulfide bonds. The secondary and tertiary structures of several enzymes were then determined using X-ray diffraction analysis. Many enzymes have been shown to be quaternary, meaning that they are made up of a number of protein subunits that differ in molecular composition and structure.

Enzymes, like all proteins, are simple and complex. Molecules of complex enzymes consist of two components: protein and non-protein - a component of the prosthetic group. In cases where the prosthetic group is easily separated from the apoenzyme, it is called a cofactor or coenzyme. Carbohydrates, nucleotides, ions and other compounds of various metals, vitamins and their derivatives can be coenzymes. With avitaminosis and hypovitaminosis, the function of many enzyme systems is disrupted, which leads to disruption of normal life.

Many enzymes are so rare in organs and tissues that it is difficult to determine their absolute amount. Therefore, the number of enzymes in any organ is determined by their activity. The unit of enzyme

activity is the number of enzymes used to catalyze the change of a given amount of substrate per minute.

The action of enzymes depends on a number of factors, including the temperature and pH of the environment. The optimal route of exposure to F. is 38–60°C, and at higher temperatures the enzymes usually denature and lose their activity. Beijing Some enzymes can withstand temperatures up to 100°C. Human and warm-blooded enzymes operate at 37-38°, or body temperature. Tragodependent activity of enzymes is used in medical practice, including surgery.

Most enzymes are active in a neutral reaction (pH 7.0) and lose their activity in acidic and alkaline environments. These include pepsin, active in an acidic environment, and some tissue proteolytic enzymes, trypsin, active in an alkaline environment (at pH 8.0).

Enzymatic activity is manifested by various substances that enhance (activate) or stop it. Various inorganic ions, in particular various metal ions, are enzyme activators. Enzyme-inhibiting compounds combine with inhibitory enzymes to form a complex that loses enzymatic activity.

The biosynthesis of enzymes is controlled by the genetic code. They can change under the influence of internal and external factors: mutations, ionizing radiation, nutritional conditions, and others. Enzymes that have the same catalytic action, but differ in their physicochemical properties, are called isoenzymes. The structures that make up the cell - mitochondria, microsomes, etc. - play a major role in controlling the activity of enzymes in the cell.

Disorders of various enzyme systems, called enzymopathies or fermentopathies, can lead to many diseases in humans.

A decrease in the activity of enzymes in the blood was observed when the optimal conditions for the action of enzymes changed under the influence of various factors. This function is used in diagnostics. The method for determining the activity of enzymes in blood serum is widely used. With this method, the disease can be detected at the very beginning.

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