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STUDY OF THE ACTIVITY OF ENZYMES IN THE INITIAL AND FINAL STAGES OF CARBOHYDRATE HYDROLYSIS DURING ACUTE HELIOTRINE INTOXICATION OF THE LIVER

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Relevance:
Study of the activity of enzymes in the initial and final stages of carbohydrate hydrolysis during acute heliotrine intoxication of the liver; the slightest disturbance in the activity of the liver leads to serious morpho-functional changes in a number of organs and systems and, above all, the digestive system.

Keywords: Enzyme activities, heliotrine intoxication of the liver.

Introduction:

The physiological systems of the initial and final stages of nutrient hydrolysis do not always change unidirectionally under the influence of one and the same stress factor, and possibly a pathological one. In particular, when exposed to high external temperatures, a sharp suppression of the secretion of pancreatic α-amylase into the cavity of the small intestine occurs against the background of some constancy or even increase in the activity of enteral enzymes, the catalytic action of which is carried out on the outer surface of enterocytes. In addition, it has been established that in some pathologies it has place of selective defeat of either the actual transport or hydrolytic transport processes. Thus, in people suffering from Hartnup's disease, complete intolerance to certain amino acids was discovered, with unhindered absorption of the latter included in the diet in the form of di- and tripeptides. In the laboratory of A.M. Ugolev, it was found that in patients with extensive gastrectomy, the transfer of hexoses in the form of poly- and disaccharides increases, while the rate of glucose absorption remains the same or even decreases. Based on these and a number of other data, it was concluded that in some pathologies remains unchanged or the pool of “free” carriers decreases and the enzyme-transport pool increases

In the studies of B.A. Sadykov it was shown that in some stressful situations the opposite picture can be observed, i.e. the pool of free glucose transporters does not change, but the maltase transport and ɤ-amylase transport pools decrease. N.M.Timofeeva G.A.Makukhina and N.N. Ieisuitov also noted selective damage to the proper transport, or hydrolytic-transport systems after immobilization, hypothermia, overheating or exposure to other stress factors. These and some other facts available in the arsenal of modern gastoenterology allow us to conclude that knowing the spectrum of enzymes of cavity and membrane digestion, transport and hydrolytic transport systems of the small intestine in each specific situation, it is possible to make appropriate adjustments to the composition of the diet so that it corresponds to the functional capabilities of the small intestine.

Indeed, this kind of dietary therapeutic methods are now widely used in the nutrition of patients suffering from congenital or acquired forms of lactase, trehalase, sucrase and isomaltase deficiency. The basic principle of these methods is to exclude from the diet or reduce in it the substrate in relation to which the corresponding enzymatic activity is absent or weakly expressed. If the disease is associated with insufficiency of the hydrolytic transport system during the normal functioning of the transport system itself, then it is necessary to replace poly, dimeric food components with one-dimensional ones. This principle is the basis for the creation of various types of food mixtures for children suffering from insufficiency of certain hydrolytic transport

systems of the small intestine. Below we present a description of the data obtained on changes in the activity of digestive hydrolases during acute heliotrine intoxication of the liver, first for pancreatic α-amylase, and then for enteral carbohydrates.

It is now firmly established that the so-called specific or specific activity (arbitrary units min/g) consists of the rate of synthesis and degradation of the enzymatically active protein. At the same time, the total activity (arbitrary units/min/organ mass) also depends on the rate of renewal of the organ's cells and their half-life. Based on this, we considered it necessary to take into account both the specific and total activity of the enzymes we studied.

We presented data on the specific activity of α-amylase in the control and experimental groups of rats over the 90-day period of our experiments. It can be seen that the specific activity of pancreatic α-amylase remains at a fairly stable level for 30 days after the injection of heliotrine, and only on the 60th day of the experiment a significant increase in the activity of this enzyme is observed (927000±8700 mg/min/g) compared with that in rats of the control group by this day of the experiment (67950 ± 6250 mg/min/g; $P < 0.05$). On the 90th day of the experiment, the increased level of enzyme activity in rats of the experimental group remained (97020 ± 6111 mg/min/g in the experiment versus 76050 + 6000 mg/min/g in the control; $P < 0.05$).

As for the mass of the pancreas, after acute poisoning of rats it significantly decreased during the first seven days, and then by the 10th day it reached the control level and from the 30th to the 90th day it was at a level significantly exceeding

The total activity of cα-amylase in rats exposed to acute heliotrine intoxication in comparison with that in rats of the control group is presented. From the presented material it is clear that the total activity of α-amylase in the pancreatic tissue homogenate decreased sharply from the 3rd day to the 7th day after the administration of heliotrine. By the 10th day of the experiment it increased to the control level and then was at a level higher than in the control on the 30th, 60th and 90th days of the experiment. So, after acute liver intoxication caused by the administration of large doses of the hepatotoxic alkaloid heliotrine, the specific activity of pancreatic ob-amylase remained unchanged until the 30th day of the experiment, and then was increased on the 60th and 90th days. At the same time, the pancreas weight decreased until the 7th day and then slowly increased to the control level (day 10) and above this level (days 30, 60 and 90). This dynamics of changes in the mass of the pancreas was correspondingly reflected in the overall activity of pancreatic α-amylase. As a result, the latter turned out to be reduced in the early stages of the experiment and significantly increased in the later stages.

Conclusion:
Acute heliotrine intoxication leads to a significant decrease in the specific activity of intestinal carbohydrates, maximally grown for sucrase. Somewhat less for maltase and even less for ɤ-amylase. These data, together with the results of the relatively greater resistance of the mechanisms of cavity hydrolysis of polysaccharides to the influence of heliotrine, can serve as a theoretical basis for choosing a rational ratio of various carbohydrates in the diet for heliotrine hepatitis, and, possibly, other forms of liver disease.

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