

CHANGES IN THE ACTIVITY OF THE ENZYMES FRUCTOSE-1 PHOSPHATALDOLASE AND LACTATE DEHYDROGENASE IN HELIOTRINO HEPATITIS

¹Akbarhodjaeva Khurshida, ²Ziyamutdinova Zuhra, ³Kadirov Muhammadzarif

¹Phd in Biologi, Associate Professor, Tashkent Pediatric Medical Institute

²Phd in Biologi, Associate Professor, Tashkent Pediatric Medical Institute

³PhD in Chemistry, Tashkent Pediatric Medical Institute

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Abstract. *A problem of hepatitis is actual in the whole world. This disease in the flow of many years torments all humanity. Therefore the study of flowing mechanisms labours of many biochemists are sanctified to. In hired the changes of activity of enzymes of carbohydrate exchange were studied: hepatic-specific enzyme fructose-1-phosphate of aldolase (F-1PhA) and lactate dehydrogenase (LDG) at experimental hepatitis. In the article changes are considered in activity of these enzymes and the mechanisms of these changes are taken apart.*

Keywords: *hepatocytes, xenobiotics, enzyme fructose-1-phosphate of aldolase (F-1PhA), heliotrin.*

Increased lipid peroxidation in heliotrin poisoning can serve as a source that destabilizes mitochondrial, cytoplasmic, lysosomal and other cell membranes (Savin, et al., 1981).

The primary evidence of the breakdown of the integrity of the cytoplasm's membrane during xenobiotic intoxication was an increase in blood serum cytoplasmic enzyme activity (F-1-FA, LDH, ALAT, AS-T). An increase in the permeability of cytoplasmic membranes leads to a breakdown, first, of carbohydrate metabolism and transamination of amino acids, since glycolysis and its provision with separate substrates is carried out by cytosol enzymes.

Carbohydrates are extremely important as an energetic material for the synthesis of various phosphorus-containing high-energy compounds that ensure the processes of biosynthesis of all cell components and nucleic acids. The metabolism of carbohydrates is closely intertwined with the metabolism of nucleic acids, proteins and fats. Intoxication with hepatotropic xenobiotics inhibits the synthesis of glucose and its esters of lactic and pyruvic acids [1,5]. To cover the organism's energy needs (ATP) in glycolysis disorders, the hexosomonophosphate pathway is included in the process, i.e. direct glucose oxidation (pentose phosphate pathway).

Fructose-1-phosphate aldolase (F1-FA, CF. 4.1.2.7), which is one of the intermediate products of the fructose-6-phosphate pentose pathway under the action of the liver-specific enzyme, is included in glycolysis. The depletion of the liver in the glycogen process of glycolysis can be supported by the conversion of fructose-1-phosphate. Therefore, the activity of these enzymes is of great importance in the study of carbohydrate metabolism. A number of authors noted that the degree of increase in enzyme activity was directly dependent on the course of the pathological process and on the severity of xenobiotic poisoning in experimental animals.

In this regard, to determine the degree of permeability of cell membranes and the state of carbohydrate metabolism, we studied the F-1-FA activity in the liver and blood serum. The results of this study are demonstrated in table 1.

Table 1

Indicators of the activity of F1-FA (E / h tissue influenced) in the organs of rats treated with heliotrin (M + m) n = 8-10

Organs examined	Control	Days of research	
		50th	70th
Liver	86,5±4,3	30,5±0,9	22,5±1,3
Blood serum	58,8±2,94	500,1±51,6*	430,0±45,0*

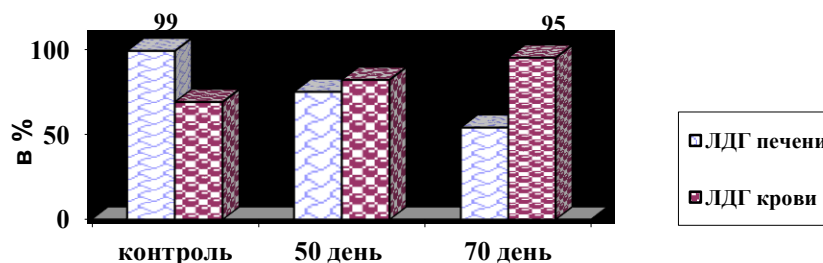
Note: * p <0.05-0.001 is calculated compared to control.

According to the table, with the administration of xenobiotics in experimental animals, a decrease in F-1-FA activity in the liver and a significant increase in blood serum are observed. Identical changes are observed on the 70th day of experiment. Thereby, in the liver of rats treated with heliotrin, on the 50th day, F-1-FA activity in the liver decreases 2.83 times, and on the 70th day, 3.84 times. In the blood serum, the activity of this enzyme increased 8.5 times on the 50th day and 7.3 times on the 70th day.

The next, very important for the organism pathway of the conversion of carbohydrates is the path of the transformation of trios (pyruvic and lactic acids). Reversible conversion of lactic acid into pyruvic acid (PVK) is catalyzed by lactate dehydrogenase (LDH) - lactate; oxidoreductase (KF.1.1.1.27). It should be noted that, apart from glucose, it can also be converted into a number of amino acids (ala, cis, thr, etc.), as well as glycerin. Consequently, this enzyme occupies a key place in the chain of metabolism.

The results of studies by various authors suggest that with hepatotropic xenobiotics intoxication (CCl₄, thioacetamide, heliotrin, etc.), there is an accumulation of PVC and lactic acid in the liver, an increase in the activity of lactate dehydrogenase in the blood serum and a decrease in its level in the liver tissue [6]. However, no studies have been conducted yet, regarding the establishment of the relationship between changes in LDH activity and structural and functional changes in immunocompetent organs during toxic hepatitis. There is no enough study about the relationship between the activity of these enzymes and the intensity of immune responses.

Рис. 1. Изменение активности ЛДГ в динамике отравления гелиотрином



In animals treated with heliotrin (Fig. 1), a 1.3 times decrease in LDH activity in the liver is observed on the 50th day; these indicators continue to increase on the 70th day of the experiment. In parallel with the decrease in the activity of this enzyme in the liver, an increase in its activity in the blood serum is observed.

Analysis of the dynamics of LDH activity in certain groups of animals treated with heliotrin revealed certain patterns that are important in understanding the mechanism of the development of the pathological process and their relationship with the structure and function of FL and glycolipids.

An increase in the activity of this enzyme in the blood serum and a decrease in the liver tissue is associated with an increase in the permeability of the cytoplasm's membranes with a subsequent breakdown of gluconeogenesis from lactic acid.

Determining of the activity of this enzyme is important in solving the fundamental issues of carbohydrate metabolism and general biological problems - problems of hypoxia in the process of intoxication with xenobiotics.

Everything described by determining of the activity of the key glycolysis enzymes - F-1-FA, LDH specifically reflects the biochemical changes occurring in the cytoplasm of the hepatocytes of experimental animals. In the early period of the disease, the activity of the enzyme in the blood serum increases significantly, whereas in the liver its level decreases.

The study of the activity of F-1-FA and LDH showed that during intoxication of rats with heliotrin, the indicated glycolytic enzymes undergo significant changes and lead to disturbance of carbohydrate and energy metabolism, of metabolism and structural and functional state of membranes.

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