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SOME ANATOMO-PHYSIOLOGICAL INDICATIONS IN ALLOXAN DIABETES IN RATS WITH DIFFERENT PHENOTYPES REGARDING THE ACTIVITY OF THE LIVER MONOXYGENASE SYSTEM.

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Abstract:
The aim of the work was to evaluate the features of some physiological indicators of rats with different phenotypes by the activity of the liver monooxygenase system. The experiments were conducted on 100 white male rats. They were divided into fast, medium and slow metabolizers based on nembutal sleep and food and water consumption, as well as diuresis, were studied. The results showed that the distribution in the general population of fast, intermediate and slow metabolizers was in the ratio of 1:1.5:2.5, and that the absolute weight of fast metabolizer rats was lower than that of intermediate and slow metabolizers, and the absolute water consumption and diuresis were higher.

Keywords: Nembutal sleep, fast metabolizers, intermediate metabolizers, slow metabolizers, weight, food intake, water intake, diuresis.

Abstract.
It is known that the activity of the detoxification function of the liver is individual, which is a consequence of the individuality of the functional activity of the microsomal monooxygenase system in the endoplasmic reticulum of hepatocytes. The cytochrome R-450-dependent microsomal monooxygenase system not only metabolizes xenobiotics, but also changes a number of endobiotics that appear in the body during metabolism. Usually, the activity of metabolic processes is reflected in physiological reactions, and this state determines the individual metabolic status of the organism. It is on this basis that the state of some physiological indicators of the body, depending on the functional activity of the detoxification function of the liver, is also of interest.

The Purpose of the Study.

Evaluation of peculiarities of some anatomo-physiological parameters in alloxan-induced diabetes in rats with different phenotypes according to liver detoxification functional activity.

Materials and Methods.

The experiments were conducted on a total of 110 white male rats. To phenotyping the experimental animals based on the activity of the liver monooxygenase enzyme system, Nembutal was administered to the animals in a dose of 40 mg/kg intraperitoneally. The time (in minutes) between falling into a drug-induced sleep and waking up from sleep and standing on all fours under the influence of Nembutal was calculated. The total population of rats was divided into 3 groups according to the activity of the liver detoxification function - fast, intermediate and slow metabolizers using the Nembutal sleep test. The day before modeling diabetes mellitus, the animals were given a 4% ascorbic acid solution instead of water. This protects them from death when primary hyperglycemia occurs in them and reduces the mortality of the animals [6]. To model experimental alloxan-induced diabetes, rats were injected intraperitoneally with 150 mg/kg of alloxan monohydrate (Sigma, USA) in 0.4 ml of citrate buffer. Anatomical and physiological parameters were studied before alloxan administration (control) and on days 7, 14, and 21 after administration (experiment).

To determine the food intake of the experimental animals, each rat was kept in a separate cage, and the amount of food and water given to it was measured on a CAS SWN portion scale (USA) before and 24 hours after the rat was placed in the cage. The difference between the weights of food and water was calculated per 100 g of rat weight, and the rat's food and water consumption for 1 hour was calculated. The results were expressed in mg*s/100 g and µl*s/100 g. To measure diuresis in rats, a volume of water (in ml) equal to 2% of their body weight was introduced into their stomachs using a probe. Then they were kept separately in metabolic cages consisting of a poly metal mesh and a conical bottom for 4 hours, urine was collected in glass containers, and then its amount was measured. The results were calculated per 100 g of rat weight and expressed in ml*4 s/100 g.

Research Results.

The results of the study showed that the duration of Nembutal sleep in the total population of rats taken for the experiment was equal to 216.36±16.67 minutes. The duration of sleep varied from 76 to 418 minutes. The analysis of the results made it possible to divide the general population into 3 groups: fast metabolizers (sleep duration - 76-98 min., average - 91.11±2.35 min.), medium metabolizers (sleep duration - 110-150 min., average - 130 ,29±3.80 min.) and slow metabolizers (sleep duration - 183-418 min., average – 313.54±15.10 min.). The differences between the separated groups were statistically reliable (R < 0.001). In this case, the indicators of fast, medium and slow metabolizing animals were higher than the initial indicators by 83.5, 58.4 and 46.4%, respectively. Feed consumption increased on the remaining days of the experiment. For example, on day 14 of alloxan diabetes, fast, intermediate, and slow metabolizing animals had 115.6, 78.7, and 58.6% of baseline, respectively, and on day 21, 157.7, 107.0, and 76.0, respectively. % was higher.

Some anatomical and physiological indicators in the development of alloxan-induced diabetes in rats with different metabolic functions of the liver

Show-children	Phenotype	Periods of experience			
		initial	Day 7	Day 14	Day 21
Weight, g	Fast	217±7.98	203.4± 6.48	186.8± 5.89*	169.65± 6.55*
	Medium	221.7±12.35	213.14±11.59	200.14±10.88	184.14±10.01*
	Sequin	232.2±9.36	222.38±8.72	213.5±8.39	200.7±7.89*
Food consumption, mg*s/100 g	Fast	331.09±21.84	607.54 ± 42.80*	713.9± 49.66*	853.13± 76.74*
	Medium	336.97 ± 20.55	533.71± 37.77*	602.27±42.73*	697.48±49.50*
	Sequin	332.75 ± 20.06	487.29± 31.47*	527.61±34.23*	585.58±37.96*
Water consumption, mkl*s/100 g	Fast	454.10 ± 51.34	804.96± 78.30*	950.76± 91.05*	1163.15± 141.44*
	Medium	438.62 ± 42.25	703.33± 69.57*	797.9±79.21*	926.69±91.90*
	Sequin	438.64 ± 42.23	646.55± 58.14*	702.93±63.34*	783.14±70.57*
Diuresis, ml*4 s/100 g	Fast	1.28 ± 0.17	2.62± 0.39*	3.09± 0.46*	3.80± 0.72*
	Medium	1.20 ± 0.09	2.25± 0.18*	2.56±0.20*	2.97±0.23*
	Sequin	1.21 ± 0.09	2.02± 0.15*	2.19±0.16*	2.45±0.18*

*Note: * - R<0.05 relative to baseline.*

Conclusion.

The obtained results showed that weight loss, food and water consumption and diuresis parameters were significantly higher in fast metabolizing rats under conditions of alloxan diabetes compared to medium and slow metabolizing rats. The differences identified are statistically reliable, which indicates that the rate of development of diabetes depends to some extent on the functional-metabolic state of the body, including the initial metabolic state of the liver.

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