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Maternal Toxic Hepatitis and Structural and Functional Formation of the Offspring Thymus in the Dynamics of Early Postnatal Ontogenesis

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Annatation: the effect of chronic toxic hepatitis in female rats on the growth and development of the thymus of the offspring during early postnatal ontogenesis was studied. It has been established that chronic maternal hepatitis leads to growth and developmental delays in 1 - 3 days after birth, expressed in decreased body weight, retarded growth and decreased weight of the thymus, liver and spleen; in the dynamics of early postnatal ontogenesis it also contributes to morphological manifestation of retarded development of structural and functional thymus zones; hypoplasia phenomena are noted in the organ.

KEYWORD: early postnatal ontogenesis, hepatitis, thymus development, the ratties.

The thymus as the primary organ of the immune system largely determines not only the state of the peripheral organs of immunogenesis, but also the severity of protective reactions of the whole body [1,2,3]. Immunodeficiency states in young children are quite common in clinical practice. Among the causes leading to immunodeficiencies, the main ones are adverse exogenous influences of various etiologies in the prenatal period of ontogenesis, as well as the presence of maternal pathology [4,5,6,7,8].

In recent years, the incidence of various extragenital diseases in women of childbearing age is increasing. First of all, this applies to lesions of the hepatobiliary system due to viral hepatitis [9,10,11,12]. Chronic lesions of the mother's liver cause various changes in hematological parameters, cellular and humoral immunity in the offspring [13,14,15]. At the same time, in the available literature, the influence of chronic maternal hepatitis on the formation of the thymus in the offspring during early postnatal ontogenesis still remains understudied. The aim of our study was to investigate the effect of chronic toxic hepatitis in female rats on the formation of the offspring thymus in the dynamics of early postnatal ontogenesis.

Material and methods

Experiments were performed on 50 half-mature female white mongrel rats weighing 130-150 g. All animals were quarantined for two weeks to rule out infectious diseases. The animals were divided into two groups (25 rats in each): experimental and control. A model of heliotrine hepatitis was

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obtained by weekly administration of 0.05 mg of heliotrine per 1 g body weight for 6 weeks. The control group received sterile saline instead of heliotrine. Ten days after the last injection, males were added to the females. Subsequently, the course of the pregnancy was monitored. It should be pointed out that to all animals the ratties were decapitated under light ether anesthesia on days 1, 3, 7, 14, 21, and 30 after birth. Thymus slices were fixed in 12% neutral formalin or Buena fluid and embedded in paraffin after appropriate wiring. Sections 5-7 μm thick were stained with hematoxylin and eosin and used for morphological and morphometric studies.

Results and discussion.

According to morphological studies, in newborn rats of the control group, the thymus was sufficiently formed and consisted of two lobes. Externally, the thymus was covered by a capsule, from which connective tissue septa, dividing the lobes into lobules, departed. Cortical and cerebral substance are clearly differentiated in the lobules. The density of cell distribution in the cortical substance of the thymus lobule is greater than in the cerebral one. Cortical substance was mainly represented by lymphocytes and constituted two thirds, cerebral, consisted mainly of reticuloepithelial cells and corresponded to one third of the lobule. Lymphoblasts were located mainly in the subcapsular space of the cortical substance, in some cases, in rats a narrow epithelial-free space was found under the capsule. Mitotically dividing lymphocytes and a large number of medium and small lymphocytes were more frequently found in the cortical substance of the thymus lobules.

The brain matter was characterized by a reduced number of lymphocytes, between which there were both individual reticular epitheliocytes with increased cytoplasm oxyphilia, macrophages and monocyte-like cells, and thymic Hassall's corpuscles.

Our study revealed not only certain dynamics of morphological changes in the thymus of the offspring against the background of chronic maternal hepatitis. As the results of our study have shown, chronic maternal toxic hepatitis contributes to growth retardation in the offspring, expressed in a decrease in body weight on day 1-3 after birth and body length of the animals noted on day 7-14 after birth. We also found a decrease in the weight of the thymus and liver of the ratties on day 1-3 and a decrease in the weight of the spleen up to 14 days after birth.

Thymus of newborn rats, experimental group of animals developing against the background of maternal toxic hepatitis leads to pronounced structural disorders of thymus differentiation processes into cortical and brain matter, which is quite clearly expressed in newborn rats. However, the density of cell distribution in the cortical substance was markedly reduced. Compared to the control group, the number of lymphoblasts decreased by 15% and small lymphocytes by 20%. This tendency persisted in the subsequent terms of postnatal thymus development. The increase in the number of destructive thymopites, which were 2-3 times higher than those of the control group at different times after birth, is noteworthy. At the same time, large macrophages with dense inclusions in the cytoplasm were found in the thymus sections of the experimental group much more frequent than in the control group, apparently, also being a sign of increased thymocytolysis. The severity of the described changes decreased only by day 30 of postnatal ontogenesis.

Thus, in chronic maternal hepatitis there is a lag in growth and development of the ratties on day 1-3 after birth, manifested in decreased body weight, retardation in growth and decreased weight of the thymus, liver and spleen. Morphologically, in the thymus of the offspring born from female rats with chronic heliotrine hepatitis, in the dynamics of early postnatal ontogenesis, the phenomena of hypoplasia and delayed development of structural and functional zones of the organ are observed.

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