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Histochemical Analysis of Morphological Changes in the Spleen Under the Influence of Heavy Metal Salts in Experimental Hypodynamic Conditions

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ABSTRACT

During the study of the morphological and cumulative properties of heavy metal salts and aluminum compounds in the spleen of 3-month-old white outbred rats in a state of hypodynamia under experimental conditions, it was found that the spleen capsule and its trabeculae were thickened and expanded (stained in dark pink when stained with Van Gieson's dye). Since the reactive center-germinative zone has shrunk, we can see that the mantle and marginal zones have shrunk. As a result of the increase in toxic substances in the blood, the PALS zone (T-lymphocytes decreased) has shrunk, neutrophil infiltration in the red pulp has increased, the splenic bands have shrunk, the sinusoids have narrowed, and the hemolysis of erythrocytes has increased. This has led to the development of immunodeficiency, hypoplasia, and atrophy of the spleen tissue.

KEYWORDS: hypodynamia, white pulp, red pulp, spleen, morphology, rats.

The aim of the study was to study the histochemical analysis of morphological changes in the spleen under the influence of heavy metal salts in the experimental hypodynamia.

Materials and methods: The study used 120 male white outbred rats kept in ordinary vivarium conditions for 3 months. All laboratory animals were divided into 2 groups: group 1 - animals in standard vivarium conditions and with an intact diet (n=60); group 2 - laboratory animals on a background of physical inactivity with heavy metal salts in a standard diet (n=60). Laboratory animals were euthanized. Their spleens were removed for morphological studies. Morphological studies were conducted on the spleen. Upon completion of the experiments, the corpses of white outbred rats were disposed of. When conducting morphological studies, biological safety rules and ethical requirements for working with laboratory animals were observed.

Staining of histological preparations prepared from the spleen in Van Gieson is carried out in the following manner: Van Gieson is adapted for the study of connective tissue components, and a mixture of acid fuchsin and picric acid is used as a stain, the first stain stains collagen fibers in a

light red color, and the second stain stains other tissues in a yellow color. To prepare the stain, 100 ml of a saturated aqueous solution of picric acid and 5 ml of a 1% acid fuchsin solution are mixed. If the solution is stored for a long time, the stain weakens, if this happens, a few drops of a freshly prepared acid fuchsin solution should be added. Micropreparations are stained in the following order: To remove paraffin from the section, they are placed in a xylene solution and placed in a decreasing solution of ethyl alcohol, for example, 2 portions are placed in orthoxylene for 2-5 minutes, and in alcohol solution 96%, 90, 80% solutions are placed alternately for 3 minutes. Iron hematoxylin is stained with Weigert stain for 3-16 minutes. Washed in running water for several minutes. Washed in distilled water. Stained with Van Giesen stain for 5 minutes. Washed in distilled water for 5-15 seconds. Immersed in 96% ethanol solution for 1-2 minutes. Neutral balsam is dripped onto the slide and covered with a coverslip. Immersed in 96% ethanol for 1-2 minutes. According to the results obtained: cell nucleus - black, collagen - red, tissue elements such as muscle tissue and erythrocytes - yellow.

Results and conclusions. In our study, we studied the morphological and cumulative properties of heavy metal salts and aluminum compounds in the spleen of 3-month-old white outbred rats in a state of hypodynamia under experimental conditions. It was found that the spleen capsule and its trabeculae were gradually thickened, and the delicate connective tissue was gradually expanded, which was stained in a dark pink color when stained with Van Gieson's dye. It was found that the spleen tissue is highly involved in the immune-protective function, and subsequently, as a result of increased toxicity and hypoxic processes, atrophic changes occur in the spleen tissue. In the white pulp area of the spleen tissue; We can see that the reactive center-germinative zone has shrunk, along with the mantle and marginal ridges. As a result of the increase in toxic substances in the blood, the PALS zone (T-lymphocytes decreased) has also shrunk, the arterial blood vessel has thickened, and has undergone deformative changes. Neutrophilic infiltrate foci have appeared in the red pulp, the splenic bands have shrunk, the sinusoids have narrowed, and hemolysis of erythrocytes has begun. The above pathological processes were relatively milder in 3-month-old white outbred rats. This led to a deficiency in the immune defense system and rapid development of atrophy of the spleen tissue.

Conclusion. In our study, we studied the morphological and cumulative properties of heavy metal salts and aluminum compounds in the spleen of 3-month-old white outbred rats in a state of hypodynamia under experimental conditions. The spleen capsule and its trabeculae were found to be thickened and expanded (when stained with Van Gieson's dye, they were stained in a dark pink color). The high level of participation of the spleen tissue in the immune-protective function and the resulting atrophic changes in the spleen tissue can be seen in the white pulp area: the reactive center-germinative zone decreased, as well as the mantle and marginal zones. Due to the increase in toxic substances in the blood, the PALS area (decreased T-lymphocytes) also decreased, neutrophil infiltration increased in the red pulp, splenic bands decreased, sinusoids narrowed, and hemolysis of erythrocytes increased. The immune system of the spleen tissue has developed a deficiency, hypoplasia, and atrophy.

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