MORPHOCHARACTERISTICS OF THE THYMUS DURING LONG-TERM INTAKE OF DISTILLED WATER

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ABSTRACT

Currently, experimental and clinical observations demonstrate significant changes in the morphofunctional state of the thymus under the influence of various factors. The literature lacks comprehensive data on the state of adaptive responses in the thymus after exposure to pesticides. All this justifies the need for a detailed study of morphofunctional changes in the gland after exposure to various factors.

Introduction. Currently, experimental and clinical observations demonstrate significant changes in the morphofunctional state of the thymus under the influence of various factors. The literature lacks comprehensive data on the state of adaptive responses in the thymus after exposure to pesticides. All this justifies the need for a detailed study of morphofunctional changes in the gland after exposure to various factors.

Study Objective: To study the morphological characteristics of the rat thymus after long-term administration of distilled water.

Materials and Methods. The experimental study was conducted on adult male rats weighing 150–200 g. Distilled water was administered intragastrically as a solution on an empty stomach. A standard syringe with a metal probe was inserted deep into the rat's mouth and slowly injected.

Animals were divided into groups (36 male rats in total): 1. Intact group – 6 rats. 2. Control group – 30 rats (they were administered distilled water; 30 animals were administered for 3, 7, 14, 30, and 90 days).

The following general histological methods were used for the study: hematoxylin and eosin staining of sections to examine the overall structure of the thymus, van Gieson staining to assess the condition of connective and muscle tissue, and toluidine blue staining.

Study Results.

Macroscopic characteristics of the thymus in control rats. The thymus is a central lymphoid organ, anatomically located in the anterior mediastinum, in the upper chest, behind the sternum. Macroscopically, the thymus has a paired lobular structure, with the right and left lobes arranged symmetrically and connected by thin, well-developed stromal layers composed of connective tissue. The organ has a soft, elastic consistency, is slightly deformed upon pressure, and regains its shape after the pressure is removed, indicating the functional integrity of the thymus parenchyma. The outer surface of the thymus is smooth and shiny, and the capsule is thin and intact. The color of the thymus varies from light gray to light reddish,

indicating its normal blood supply. The thymus is located in a clear topographic relationship with surrounding tissues, and its normal anatomical connections with the heart, lungs, and major blood vessels are preserved. The organ is easily distinguished from surrounding tissues, and there are no pathological adhesions or signs of perithymic fibrosis. In cross-section, the thymic parenchyma is dense, moist, and finely granular, indicating complete preservation of the overall organ architecture. The lobes are clearly delineated, and there are no sharp distinctions between the subcapsular and central regions.

Microscopic characteristics of the thymus in control rats. The thymus is externally surrounded by a capsule composed of dense fibrous connective tissue, from which the parenchyma is divided into numerous small segments by barriers directed inward. Each segment, in turn, consists of two main layers, morphologically and functionally distinct: the darkly stained cortex and the relatively lighter medulla. The cortex is densely packed with lymphoid cells, consisting primarily of lymphoblasts, thymocytes at various stages of differentiation, and epithelioid reticulocytes. The nuclei of these cells are hyperchromatic, and their cytoplasm is poorly defined, resulting in the dark coloration of the cortex. The number of cells in mitosis is low, but thymocytes with proliferative activity are detected in some areas. The boundary between the cortex and medulla is clearly defined, and they differ markedly in intensity, cell density, and structural features. The medulla has a relatively low thymocyte density, while epithelial reticulocytes, dendritic cells, and macrophages are more common. Thymic bodies (Hassall's corpuscles) of various sizes and shapes are found in this area, characterized by their composition of concentric layers of epithelial cells. The presence of thymic bodies is an important morphological feature indicating the development of immunological tolerance in the thymus and the normal course of thymocyte maturation. Physiological apoptotic processes are present in the parenchyma, and apoptotic thymocytes are detected as phagocytosed by macrophages.

Conclusion. Macroscopically, the thymus retained its anatomical location and bilobed structure. The organ's size is proportional to body weight, its consistency is soft and elastic, and slight blurring and small hyperemic spots are observed on the organ's surface.

Microscopically, a decrease in lymphocyte density is noted in the cortex. Condensation of nuclear chromatin in some cells is a sign of the onset of apoptotic processes. Slight capillary dilation was detected in the microcirculation system.