

CHARACTERISTICS OF CHANGES IN THE THYMUS UNDER CHRONIC EXPOSURE TO PESTICIDE

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ABSTRACT

Various experimental and clinical observations demonstrate dramatic changes in the morphofunctional state of the thymus under pesticide exposure. However, morphological and histochemical changes in the thymus after exposure to different pesticide doses are incomparable. Furthermore, complete information on the processes occurring in the gland under the influence of various pesticides is lacking.

Introduction. Various experimental and clinical observations demonstrate dramatic changes in the morphofunctional state of the thymus under pesticide exposure. However, morphological and histochemical changes in the thymus after exposure to different pesticide doses are incomparable. Furthermore, complete information on the processes occurring in the gland under the influence of various pesticides is lacking.

Purpose of the study: To study morphological changes in the thymus of rats chronically exposed to the defoliant Ento Defol.

Materials and methods of the study.

An experimental study was conducted on adult male rats weighing 150–200 g. Ento Defol was administered intragastrically, in solution, on an empty stomach at a dose of 1/50 LD₅₀ (correspondingly, 2 times higher, allowing the effect to be compared with 1/100 LD₅₀). Repeated administration was carried out for 3 months, which corresponds to 1/10 of the animal's life.

The animals were divided into groups (a total of 66 male rats): 1. Intact group (6 rats). 2. Control group - 30 rats (distilled water was administered; 30 animals - for 3, 7, 14, 30, 90 days). 3. Group 1/50 LD₅₀ - 30 rats (daily for 3 months, examination on days 3, 7, 14, 30, 90).

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.

Characterization of macroscopic changes in the thymus over 3 days exposed to Ento Defol at a dose of 1/50 the LD50. The thymus has retained its anatomical location in the anterior mediastinal region. It has a bilobed structure with relatively minor signs of asymmetry in lobe size. The thymus is relatively reduced in size, with a soft, elastic consistency. Tensioned areas characteristic of reactive interstitial edema are observed in some areas. The capsule is dense and thin, the luster of the outer surface is slightly reduced, the color has changed from light gray-red to dark red, and signs of punctate hyperemia are noted. Sectional examination revealed a slight decrease in parenchymal density and increased moisture content.

Microscopic examination revealed signs of interstitial edema in some areas, with preservation of the thymus capsule and interlobular barriers. In thymus fragments, the morphological relationship between the cortex and medulla is preserved, with decreased thymocyte density in the cortex. Early signs of nuclear pyknosis and chromatin condensation in some thymocytes indicate activation of apoptotic processes. Elements of mild vacuolization were detected in epithelial reticulocytes. A relative increase in macrophages was noted in the medulla, and an uneven arrangement of concentric layers in the thymic bodies was observed. Signs of capillary dilation and venous filling were detected in the blood vessels.

Characteristics of macroscopic changes in the thymus after 90 days of exposure to Ento Defol at a dose of 1/50 the LD50. A persistent atrophic focus develops in the thymus; the organ is small and dense.

Microscopically: The corticomedullary border is poorly defined, and stromal elements predominate instead of lymphoid tissue. Thymic bodies are few in number, and degenerative changes are prevalent. Signs of sclerosis are observed in the blood vessels.

Thus, according to the histochemical study results, minimal reactive changes were observed in the early periods (3–7 days). An increase in interstitial collagen was noted on days 14–30. On day 90, it was established that the number of fibrotic signs had increased, while compensatory signs were partially preserved. A moderate increase in mast cell numbers was observed on days 3–7. Degranulation was less pronounced on days 14–30. On day 90, the cellular composition remained virtually unchanged.

Conclusion. Histochemical changes in the rat thymus developed relatively slowly under Ento Defol at a dose of 1/50 the LD50. A slight reactive increase in collagen fibers was noted in the early stages, but by days 14–30, only signs of interstitial fibrosis were visible. By day 90, stromal dystrophic changes had reversed, with their expression levels significantly lower than at higher doses. The number of mast cells and the degree of degranulation were also less pronounced. Furthermore, signs of metachromasia were weak by days 14–30, and by day 90, the cellular composition approached a nearly intact state.