EXPERIMENTAL BIOLOGY

Neurotransmitter Bioamine Supply of Thymic and Lymph Node Structures during Treatment with Somatotropic Hormone

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The effects of somatotropic hormone on bioamine-containing structures of immunocompetent organs in rats were studied after 1, 3, 7, and 14 days of treatment by fluorescent histochemical methods and microspectrofluorometry. The effect of somatotropic hormone on immune processes can be mediated by changes in the neurotransmitter content in the thymus and lymph nodes.

Key Words: *thymus; lymph node; somatotropic hormone; neurotransmitters*

The pituitary hormone somatotropin (STH) is an important hormone modulator of immune processes [1]. It regulates proliferative processes in the thymus and promotes differentiation of T lymphocyte precursors [8]. STH is locally produced in immune organs [13] and exerts autocrine and paracrine effects [12,15]; it plays an important role in proliferation of thymic epithelial cells and lymphocytes [14].

Neurotransmitters play an important role in central and local mechanisms of immune system regulation [4,6,7]. Histamine- and serotoninergic systems are involved in immunosuppression [5,9]. The presence of neurotransmitter receptors on lymphoid cells proves that the immune system is governed by neurohumoral effects [2,3]. However, despite the diverse effects of biogenic amines on immune organs and the whole organism, the mechanisms of their effects under normal conditions and after hormone treatment are still little known.

We investigated the effect of STH on fluorescence and histochemical characteristics of amine-containing structures of the thymus and lymph nodes.

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MATERIALS AND METHODS

Ninety random-bred male albino rats (180-200 g) were divided into 3 groups: group 1 rats (n=10) were intact controls, group 2 (n=40) comprised controls injected with 0.03 ml 1.7% glycerol (hormone vehicle), and group 3 rats (n=40) were injected with 0.03 ml STH (Humatrope, Eli Lilly) in a dose of 0.1 mg/kg. Daily intramuscular injections were performed under sterile conditions. Rats were sacrificed under deep ether narcosis on days 1, 3, 7, and 14 of treatment. Cryostat sections of the thymus and lymph nodes were treated by fluorescent histochemical methods [10,11]. The intensity of catecholamine (CA), serotonin (5-HT), and histamine fluorescence was evaluated under a LUMAM-4 fluorescent microscope with an FMEL-1A fluorometric attachment. Microspectrofluorometry data were expressed in arbitrary units. The mean values were compared using Student's t test.

RESULTS

Fluorescent and histochemical analysis showed a dark matter containing no fluorescing structures in the center of thymus lobules of control rats. Small subcapsu-

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lar cells were scattered in the cortical matter. Bright large premedullary cells were compactly arranged at the interface between the cortex and medulla and encircled the medulla. Thymocytic epithelial parenchyma in the cortex and medulla emitted weak diffuse yellow-green fluorescence. Few fluorescent cells (tissue basophils) were seen between premedullary cells and in the thymus cortex.

Treatment with STH for 7 days caused morphofunctional redistribution of glandular bioamines: cells with intense 5-HT, norepinephrine, and histamine fluorescence appeared in the medulla. Presumably, STH induced the appearance of a new population of fluorescent cells containing bioamines in the thymus. Under the effect of STH subcapsular cortical cells formed aggregates of 10-15 cells. Spectrofluorometric analysis showed increased concentrations of CA and decreased concentration of 5-HT in all studied structures of the thymus starting from day 3 of STH treatment. The content of histamine underwent wave-form fluctuations during treatment with STH.

Fluorescent histochemical methods detect the following bioamine-containing structures in the mesenteric lymph nodes of control animals: macrophages of B- and T-cell areas (intrafollicular and paracortical cells, respectively) and sinus macrophages. After 24 h of STH treatment, the fluorescence intensity in intrafollicular and paracortical cells decreased. Quantitatively, it manifested by decreased content of histamine and CA, which was shown by cytospectrofluorometry. By day 3 of hormone treatment, the content of histamine and CA in T-cell area macrophages smoothly increased. After 24 h the content of CA in intrafollicular cells in group 3 was 3 times lower than in group 1, while later this parameter gradually increased.

Norepinephrine is now regarded as an immunostimulator and 5-HT as an immunosuppressor [5]. We consider that the stimulating effect of STH on immune processes can be mediated by changes in the levels of the corresponding neurotransmitters in the thymus and lymph nodes.

Hence, STH causes quantitative and qualitative changes in the central and peripheral immune organs. It modifies fluorescence parameters histochemical characteristics, and the content of biogenic amines in the thymus and lymph nodes, which indicates the involvement of STH in the regulation of neurotransmitter homeostasis of immune organs.

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