

Amine-Containing Lymph Node Structures during Chronic Glucocorticoid Administration

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Luminescent histological studies show that synthetic corticosteroid triamcinolone acetate induces a bioamine reaction in intrafollicular and paracortical macrophages in lymph node. Long-term administration reduces the number and size of lymph node follicles (B-zone) and paracortical cells. Chronic (1 month) administration of hydrocortisone elevates the content of serotonin and catecholamines in the B-dependent zone and serotonin content in paracortical macrophages.

Key Words: *lymph node; glucocorticoids; serotonin; catecholamines*

Hydrocortisone (HC) exerts an antimitotic effect on thymic cortical lymphocytes, promotes destructive processes in cells, and induces reticuloepitheliocytes hypertrophy [6]. Administration of HC elevates the content of serotonin in the thymus and reduces it in other organs [4]. The effect of HC on energy metabolism depends on the dose of the hormone and the time of exposure [1]. HC induces enlargement of premedullary thymocytes and accumulation of neurotransmitters in these cells [5], stimulates functional activity of mast cells, in particular, promotes their propagation, accumulation of serotonin and catecholamines, facilitates degranulation, and reduces the mean size of mast cells. Administration of HC to experimental animals reduces their body weight and the size of lymph nodes, alters cytoarchitectonics of the cortical zone and medullary cords, and suppresses phagocytic activity of macrophages [2,7,9]. Corticosteroids stimulate phagocytic activity of neutrophil granulocytes, increase the number of antibody-producing cells and spontaneously active lymphocytes. The immunosuppressive effect of HC in a dose of 100 mg/kg was more pronounced in individuals with elevated initial blood concentration of the hormone.

In the present study luminescent histochemical methods were used for quantitative evaluation of amine-containing structures of T- and B-dependent areas of mesenteric lymph nodes in the norm and after long-term administration of the synthetic corticosteroid triamcinolone acetate (TA).

MATERIALS AND METHODS

Experiments were carried out on 60 albino male rats weighing 250-300 g. The animals were divided into 3 age- and gender-matched groups: intact animals ($n=10$, group 1) and rats weekly receiving intramuscular injections of TA in a dose of 0.1 mg/100 g body weight ($n=30$, group 2) or 0.1 ml physiological saline ($n=30$, group 3) for 1 or 2 months. Lymph nodes were removed under deep ether narcosis. Cryostat sections (15- μ thick) of mesenteric lymph nodes were treated using luminescent histochemical methods [8] and the contents of serotonin and catecholamines were measured microspectrofluometrically; monoamine oxidase (MAO) and serotonin-containing structures were visualized by the methods of Glenner and Masson—Fontana, respectively. The intensity of catecholamine and serotonin luminescence was measured using a Lyumam-4 microscope with an FMEL-1A fluorometric device (interference filters 6 and 8, respectively). The means were compared using Student's t test. Mor-

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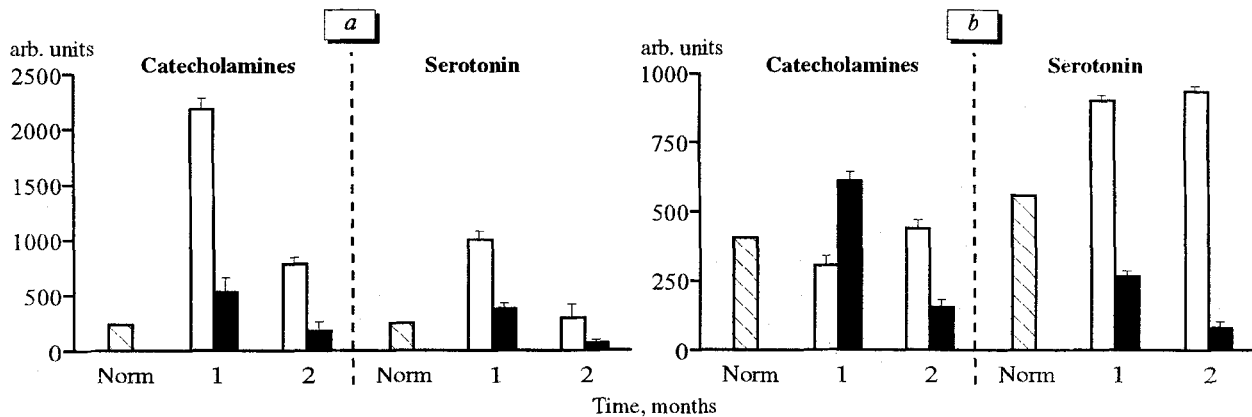


Fig. 1. Effect of hydrocortisone (light bars) and physiological saline (dark bars) on concentration of catecholamines and serotonin in intrafollicular (a) and paracortical (b) macrophages of lymph node.

photometric analysis of hematoxylin-eosin stained sections was carried out using an MBI-3 light microscope with an MOB-1 photometric device (in $1\ \mu$).

RESULTS

Administration of TA for 2 months considerably (3-fold) reduced the size of lymph nodes and the content of luminescent structures; the number of luminescent follicular cells decreased in comparison with the control. Germinal centers shrank due to reduced number of proliferating cells and young lymphocytes. Cytofluorimetry revealed a sharp decrease in the contents catecholamines and serotonin in comparison with animals treated with TA for 1 months (Fig. 1).

Amine-containing structures of the T-dependent area responded to corticosteroid in a different way: dim paracortical macrophages with orange-pale luminescence were seen as small scattered agglomerates. Cytofluorimetric analysis revealed an upsurge of serotonin content in paracortical macrophages by the end of the first month of TA treatment, while after 2 months serotonin content 2- and 10-fold surpassed that in intact and control animals, respectively. This was confirmed by the presence of serotonin-positive structures with intense argentaffin reaction on lymph node sections treated by the method of Masson—Fontana. Their distribution in lymph nodes was identical to the location of monoamine-containing luminescent cells. Moreover, judging from the presence of formazan granules, the content of MAO in these structures was also affected. It was previously demonstrated that elevated serotonin content is associated with lymphoid cell re-

distribution and accumulation of T and B suppressors in central and peripheral immunocompetent organs [3].

Thus, administration of the synthetic corticosteroid TA induces a bioamine reaction in intrafollicular and paracortical macrophages of the lymph node. The distribution of biogenic amines is different in T- and B-dependent areas of the lymph node. Long-term glucocorticoid treatment (weekly for 1-2 months) reduces the size and number of lymph node follicles (B-dependent area) and paracortical cells. Chronic administration of HC for 1 month leads to a sustained increase in the content of serotonin and catecholamines in the B-dependent area and manifold increase in the content of serotonin in paracortical macrophages.

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