AJPMHS GLOBAL RESEARCH NETWORK

AMERICAN Journal of Pediatric Medicine and Health Sciences
Volume 3, Issue 2, 2025 ISSN (E): 2993-2149

Comparative Characteristics of Morphometric Parameters of the Spleen After Hormonal Therapy of Intestinal Scar Processes in Experimental Conditions

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Abstract: Analysis of the literature shows that with a short-term course of hormonal drugs administered to rats, as a result of macro- and microscopic studies, a decrease in immunogenesis, degenerative changes in splenic follicles, and some increase in the relative mass of the spleen were revealed. At the same time, it remains relevant for researchers to study the morphometric and immunohistochemical indices of the spleen, which is sensitive to homeostasis disorders, after hormonal therapy of cicatricial processes in the experimental intestine.

Keywords: intestine, cicatrization, hormones, spleen, experiment.

Introduction

Immune reactions from the earliest stages of their development are closely related to the endocrine system. Hormones have either a stimulating or depressing effect on the immune system, phagocytosis, proliferation, differentiation processes of immunocompetent cells, formation of cell-mediated cytotoxicity, antibody formation and apoptosis. Phagocytosis, being the initiation of the immune reaction, subsequently ensures the intensity and degree of its development. At the same time, there are very few studies devoted to the study of the effect of hormones on phagocytosis. It is known that glucocorticoids reduce the expression of adhesion molecules, thereby reducing chemotaxis and, in general, the clearance function of cells of the mononuclear phagocyte system. After treatment with glucocorticoids, the formation of superoxide by neutrophils decreases. The introduction of glucocorticoids does not significantly affect the ability of cells to phagocytosis, but changes the ability of macrophages to digest phagocytic objects. At the same time, when certain types of microbes interact, especially those with an analogue of lysosomes with a set of their own hydrolytic enzymes, everything is decided by the ratio of the functional activity of phagocytes and the enzymatic activity of the living object of phagocytosis. In this case, changes in the activity of lysosomal enzymes within one macrophage line are most pronounced during interaction with a living object of phagocytosis and change little during phagocytosis of killed microorganisms. An important aspect of the action of large doses of glucocorticoid hormones, which largely determines their inhibitory effect on the humoral cellular immune response, is the ability of hormones to inhibit proliferation processes, and their effect on proliferative processes depends on the ability to suppress the production of IL-1 and IL-2. It is known that IL-1, produced by stimulated macrophages and monocytes, itself activates the processes of lymphocyte proliferation and is a factor inducing the production of IL-2 by T cells, which is necessary for the normal process of cell proliferation [4].

Treatment of intact T-helpers (CD4+) with glucocorticoids suppresses their ability to proliferate and secrete cytokines. However, the suppression effect is removed by adding IL-2 and CD28+ to the medium. When stimulating T-cells, when the production of interferon-γ is activated, glucocorticoids, suppressing the activity of Th1, enhance the activity of Th2. In recent years, there has been increased interest in the effects of hormones on cell apoptosis, including immunocompetent cells. The possibility of a direct effect of glucocorticoids, estradiol and progesterone on the expression of molecules that regulate the initiation of the cascade of apoptotic reactions has been shown [3].

Methodology

In addition, glucocorticoids enhance the potential of cells in vitro, increasing their survival and functional reactivity [6]. The effect of glucocorticoids on human peripheral blood neutrophils is interesting. Dexamethasone has been shown to inhibit apoptosis of these cells in culture, extend lifespan, and enhance functional activity [2]. It is known that the sensitivity of T cells to glucocorticoids depends on the stage of lymphocyte development. Bone marrow T cell precursors and immature thymus T cells are extremely sensitive to physiological doses of glucocorticoids. Certain subpopulations of mature T lymphocytes, including natural killer cells, cytotoxic lymphocytes, and Th cells, have been shown to undergo apoptosis under the influence of glucocorticoids [3]. B cells are also sensitive to glucocorticoids depending on their stage of development. B-cell precursors and immature B-cells in the bone marrow are killed by apoptosis under the influence of glucocorticoids. Mature B-cells are insensitive to glucocorticoids [7].

The immune system makes a significant contribution to maintaining human health. Numerous studies have shown that immunity determines the body's resistance to infectious factors. Of particular interest is the spleen as an immune organ, since the human and animal immune system is one of the most sensitive systems in the body, quickly responding to any impact [4].

Results and discussion

The spleen, being a key organ of the peripheral part of the immune system, performs three main functions: removing damaged, old, defective blood cells and circulating microorganisms from the bloodstream, initiates immune responses to antigens (in the form of formation of antibodies to polysaccharide antigens), and ensures extramedullary hematopoiesis in the fetal period or after birth in conditions of medullary hematopoiesis deficiency [1, 2, 8]. Thus, the spleen plays a significant role not only as an organ of fetal hematopoiesis, but also as a site of sequestration and destruction of cells [4]. The macroscopic structure of the spleen is determined by the structure of its vascular bed, primarily by the nature of the branching of the arteries [2]. The features of the histophysiology of the spleen are associated with its unique blood supply. The splenic artery enters the splenic hilum and branches into trabecular arteries. The adventitia of the arteries is loosely connected to the trabecular tissue. The middle layer is clearly visualized in the section of the trabecular artery due to the muscle bundles directed in a spiral as part of its wall [8]. The pulp arteries branch off from the trabecular arteries, from each of which radially directed arterioles begin, ending in capillaries in the thickness of the periarterial lymphoid cuffs (PALC) and in the lymphoid nodules, in the red pulp and in the marginal zone separating the periarterial lymphoid cuffs and lymphoid nodules from the red pulp [2, 3]. The spleen has a capillary bed of lymphoid nodules, pulp and sinuses [3]. These three areas of blood flow enable the spleen to perform multiple functions simultaneously. The rich capillary network of lymphoid nodules supplies the lymphoid tissue with blood, which allows it to perform the functions of protecting the body. Arterial capillaries open directly into the sinuses [7].

The immune formations of the spleen have a more complex anatomical structure, compared to that of other peripheral organs of the immune system. Cellular and non-cellular components of the blood are subject to immune control in the spleen. Blood components that are genetically damaged, do not correspond to the immune state of the body, are recognized and removed from the bloodstream. In the red pulp (which is sometimes called the "graveyard of red blood cells"),

their destruction occurs [5, 6]. The spleen, being the largest organ of the peripheral part of the immune system, has a number of distinctive features compared to the lymphoid tissue of other organs of immunogenesis. The most important parts of the spleen are the white and red pulp, which perform a number of obligatory and auxiliary functions. When studying lymphoid nodules located in all parts of the white pulp, it is customary to distinguish four zones: periarterial, center of reproduction, mantle and marginal. In humans, lymphoid nodules are located at different distances from the beginning of the lymphoid cuff.

Conclusion

Analysis of literature data showed that both stress and other damaging factors lead to morphofunctional changes in the spleen at the organ, tissue, cellular and molecular levels. The reaction of immune structures consists of redistribution of the ratio of lymphocyte-macrophage elements of the organ parenchyma and changes in the structure of microvessels in response to the effect of the factor. The nature and degree of expression of changes depend on the intensity of the factor and the time after its cancellation. The data accumulated to date in the scientific literature on morphofunctional transformations of the structural components of the spleen dictate the need to expand studies of the influence of environmental factors on the largest peripheral lymphoid organ, which is the spleen, which controls the immune response in physiological and pathological conditions.

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