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Morphological Features of Immune Organs in the Presence of Antigenic Effects

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ABSTRACT

The article is devoted to one of the urgent problems of modern histology - structural and functional changes of immune organs in the dynamics of antigenic exposure. The paper presents up-to-date data on the ultrastructure of immune cells and intercellular relationships between stromal and effector cells of immunogenesis.

Introduction: In recent years, due to the intensive development of theoretical and applied immunology, the understanding of the structural foundations of immunity has significantly expanded. The cellular and subcellular bases of immunity and the main mechanisms of cooperative interactions of immunocomponent cells are elucidated T -, V-lymphocytes and macrophages (A-cells), which provide the body's immune response [1, 2, 3, 4,5,6].

The morphological substrate of the immune system is the organs of the immune system and functionally related structures - tissues, cells, biologically active substances such as prostaglandins, lymphokines, and other substances.

Currently, it is customary to divide the immune system into central and peripheral. The central organs of immunity include the thymus gland (thymus) and the bone marrow. Peripheral organs include lymph nodes, spleen, lymphoid formations of the digestive and respiratory tracts, and urinary tract walls. In the central organs of immunity, lymphocytes undergo a number of transformations, as a result of which they acquire the functions of cellular and humoral immunity, enter the peripheral organs, forming thymus-dependent (T-dependent), as well as thymus-dependent (bursa-dependent or B-dependent)in them, respectively structural and functional zones.

It is known that the development of the immune system begins in the embryonic period and continues in the early postnatal period. In the development of the immune system, the condition of the placenta and breast is of great importance [7, 8,9,10].

Consequently, the immune system, which includes central and peripheral organs, as well as synergistic structures with them, in unity and in interaction with each other, provides immune homeostasis of the body.[1,2.7,9,11,12,13].

To date, the structural and functional bases of the immune response to various antigenic effects have not been sufficiently elucidated. The works available in this plan are mainly devoted to the quantitative characterization of an organ of a given system and they are performed mainly in cell suspensions in vitro and therefore cannot reflect the essence of intercellular interactions at the tissue, organ and inter-organ levels.

All this provides a basis for deepening the ongoing research work and obtainingcompetitive results and conclusions.

Material and methods: Experiments were carried out on white outbred male rats with an initial weight of 150-170 grams, which were on normal laboratory nutrition. Prior to the experiment, 10 rats underwent laparotomy under ether anesthesia under sterile conditions for macroscopic examination of all internal organs and lymphoid formations of the gastrointestinal tract. After the examination, Ploskirev medium and bismuth sulfate agar were seeded from the contents of the ileum and colon for bacteriological studies. Analyses of these studies showed no growth of salmonella and other pathogenic microbes.

The experimental animals were divided into three groups. The first group consisted of 32 intact rats. The second group — experimental (218 rats). After 48 hours of fasting, 2 ml of whole cow's milk was injected into their stomachs through a probe to neutralize gastric juice, and 30 to 35 minutes later, taking into account the urgency of the problem of salmonellosis in our region, the animals were infected with the pathogenic strain of mouse-type salmonella No. 5775 (Salm. tyhimurium) in a dose of 2 billion microbial bodies in 2 ml of saline solution.

The third group consisted of 100 control rats. After 48 hours of fasting, 2 ml of whole cow's milk was injected into the stomach through a probe, and then after 30-35 minutes, 2 ml of sterile saline solution was injected into the stomach.

In order to enhance gastric motility and reduce intestinal motility, animals of the second and third groups were administered 1 ml of 0.1% morphine hydrochloride solution.

Experimental and control animals were slaughtered by decapitation, on an empty stomach, after 3, 6, 12, 24 hours, 3, 5, 7, 14, 21 days after infection.

Blood smears, bone marrow grains, and pieces of the thymus, spleen, and mesenteric lymph nodes were used as the research material.

For electron microscopic studies, bone marrow grains, pieces of thymus, spleen, and mesenteric lymph nodes were fixed in 2.5% glutaraldehyde solution at 4°C for 40 minutes, followed by additional fixation in 1% osmic acid solution for 1 hour at 4°C. The materials were dehydrated in alcohols of increasing concentration, and poured into araldite and epon-812. Ultrathin sections were obtained after taking and corresponding coloring of sighting semi-thin sections (E. Enkuzes, F. Ehrenpreis 1980) on an ultramicrotome manufactured by LKB-1 (Sweden). The contrast was performed with uranyl acetate and lead citrate, after which the sections were viewed using JEM-100B and YEM-100S electron microscopes manufactured by Geol (Japan).

Results of our own research: Our studies have shown that structural and functional rearrangements of the immune system organs in experimental salmonella infection have a certain dynamics. which can be divided into three periods :

1. Early period (3-12 hours after infection);

2. The peak period of infection (1-7 days);

3. Convalescence period (14-21 days).

Ultrastructural studies of immune organs in the early period of the experiment reveal a number of changes in the submicroscopic organization of their cells. One of the earliest signs is disorders of the microcirculatory bed and destructive changes in some cells and flowing blood. Microcirculatory disorders are manifested in the form of dilation of hemocapillaries, arterioles, venules and blood stasis. Destructive changes, manifested in the form of expansion of perinuclear spaces and destruction of subcellular organelles, are observed in both parts of stromal and hematopoietic cells. These changes, in our opinion, are the result of both toxic decomposition products of salmonella and cells occurring in the early stages of the study.

The most pronounced structural and functional rearrangements are observed on days 1-7 of experiments, which we conventionally called the period of pronounced immunomorphological rearrangements, anemia is noted in the blood, associated with a parallel decrease in hemoglobin and the number of red blood cells.

One of the characteristic signs of the height of the experiment is a significant increase in the number of plasma cells reaching their maximum on the 5th day of the study.

In the period of recanvalescence of experimental salmonella infection (14-21 days of the study), the qualitative and quantitative changes in immune cells indicated in the first period tend to normalize. However, on day 14. studies on the part of the blood differ in leukocytosis and less pronounced anemia. On day 21. in experiments, these changes are relatively normalized, but the structural and functional tension of immunogenesis cells is still preserved.

CONCLUSIONS: 1. Morpho-functional rearrangements of the central and peripheral organs of the immune system are characterized by certain dynamics, including periods of early changes, pronounced immunomorphological rearrangements and convalescence.

2. Each of these periods is characterized by structural and functional and quantitative features, which together determine the essence of adaptive responses of the immune system in response to antigenic effects.

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