

Observations regarding the values of immunocompetent cells at lambs according to age

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Abstract

The scientific researches reflected in this study aimed to investigate some immunological aspects regarding the values of the indices of immunocompetent cells at lambs in different age periods. The obtained data indicate that the cellular defense mechanisms are performed by lymphocyte cells endowed with immune defense functions and are responsible by cellular and humoral mechanisms. These determines the importance of cellular mechanisms in triggering and controlling immune reactions. The results of the study reveal the evaluation of cell indices at lambs by finding significant values of both T and B immunocompetent cell activity. These researches allow us to conclude on the fact that the installation of the immunological reactivity of the animal organism takes place and in the same time, the adaptation to the changes of the environmental conditions.

Key words: Immunity, Lambs, Immunocompetent cells, T lymphocytes, B lymphocytes.

Introduction

The immune system represents the fight against microbial pathogens. The functions of the immune system are determined primarily by generating a specific immune response against the invasive pathogen and controlling infection; second, by recalling this first "conflict" and triggering an accelerated immune response following re-exposure to the same microbial pathogen. At the same time, the immune system consists of a complex network of cells, tissues and organs that participate together in the defense of the animal organism [1, 10].

Knowing the complex structure and the function of the immune system helps to understand the basis of immune deficiencies and to perceive the potential ways in which the immune system can be modulated in specific diseases. Immunocompetent cells of the immune system are represented by T lymphocytes, B lymphocytes, NK cells, granulocytes, macrophages or monocytes, fibroblasts, epithelial cells, dendritic cells [3,11].

Most of the pathogens agents have a very high proliferative capacity, and the prevention of systemic infections requires adequate and rapid responses from the inborn immune system and the acquired immune system. For these reasons, non-specific or inborn immunity provides the first line of defense against pathogenic microbial agents [4, 6].

It is characterized by nonspecific, rapid and equally intense immune responses, regardless of the type of pathogen, which are rarely enough to completely eliminate cellular microbial infections and by a lack of immunological memory or long-lasting protective immunity. It is ensured through anatomical barriers (skin, membranes, mucous membranes), physiological barriers (temperature, pH), chemical factors (interferons, complement system), cells with phagocytic activity (macrophages / monocytes, dendritic cells, neutrophils, fibroblasts, epithelial cells), cell-mediated cytotoxicity (NK cells) [2].

Bibliographic studies confirm that one billion human lymphocytes are produced daily by humans and animals. Circulating and recirculating through the network of blood and lymph vessels, the cells and molecules of the immune system ensure the surveillance of the body, the recognition of molecules and non-self cells, to eliminate them. Investigations into the activity of immunocompetent cells in correlating immune status have allowed us to determine a number of features in the development of cellular and humoral immunity. The elements of the immune system - macrophages, T and B lymphocytes are developing until the birth of the animal, after which they

begin to function intensively. B lymphocytes are the predecessors of plasma cells, and T lymphocytes favor the possibility of developing the immune response in the first days of life of the newborn animal [5,8].

Currently, the problem of immunodeficiency has become more and more acute and has become widespread in medical clinical practice. This is explained by the result of immunodeficiencies of T and B cells of the immune system. Therefore, the stimulation of T and B lymphocytes that act on the mucous membranes thus increases the specific resistance of the entrance gates and prevents infectious processes from the first days of animal life [7,9].

The study of the cells of the immune system reflects the cooperation between them, in the mutual formation on the necessity of reaction, which control each other in their activity through molecules secreted by lymphocytes or macrophages, with an extremely important role in organizing and controlling immune reactions. From this point of view, the main objective of this research is to study the activity of cellular immunity determined by the indices of immunocompetent cells at lambs at different periods of age.

Material and method

The investigations were performed in a private immunology laboratory in Chisinau. To perform the investigations were used blood samples from lambs from the household of a private sheep farm.

Blood samples were taken from the jugular vein with heparin based on the calculation of 0.3 ml heparin per 10 ml blood for anticoagulation. The samples were used to identify leukocyte, lymphocyte and immunocompetent T and B cells.

Results and discussions

The results obtained regarding the immune investigations on the immune system regarding the values of immunocompetent cells at lambs in dependence of age show that the level of leukocytes and lymphocytes varies at different stages of animal age (Table 1).

Significant results of leukocyte and lymphocyte indices were registered at lambs of 10 and 20 days age, constituting leukocyte values of 7.85 ± 0.81 and 6.82 ± 0.81 compared to the values obtained at 30 days old lambs, where the indices constituted the level of 7.33 ± 0.81 . At the same time, the number of lymphocytes at newborn animals was determined and assessed, which denotes appreciable values at the age of 10 days, constituting 3.71 ± 0.81 compared to 20- and 30-days-old lambs constituting 3.82 ± 0.8 and 3.41 ± 0.81 .

Table 1
Leukocyte and lymphocyte dynamics at lambs depending on age, %

Age (days)	Leukocytes (thousands/mcl)	Lymphocytes (thousands/mcl)
10	$7,85 \pm 0,81$	$3,71 \pm 0,81$
20	$6,82 \pm 0,81$	$3,82 \pm 0,81$
30	$7,33 \pm 0,81$	$3,41 \pm 0,81$

As a result of cellular activation, complex processes are initiated characterized by the initiation and realization of the functions of the cells involved in the immune response. Cells go through the stages of the cell cycle. Activation of T cells is achieved by antigen signals and a costimulatory molecule represented by a cytokine (IL-1). At the same time, activations of B lymphocytes are triggered as a result of the recognition of the antigen by the BCR molecules. Following the activation of B cells, the proliferation and synthesis of antibodies is performed.

Table 2
Dynamics of T and B lymphocytes at lambs depending on age, %

Age (days)	T-active lymphocytes	Total T lymphocytes	B
10	22,0 ± 0,08	13,3 ± 0,08	10,0 ± 0,81
20	25,0 ± 0,08	15,0 ± 0,08	12,0 ± 0,81
30	23,6 ± 0,08	14,1 ± 0,08	13,28 ± 0,81

The research results reveal important values of T and B lymphocytes in various age periods (Table 2). Therefore, the level of T-active lymphocytes indicates values of 22.0 ± 0.08 and 25.0 ± 0.08 at the age of 10 and 20 days, compared to the age of 30 days, where these indices constituted 23.6 ± 0.08 . Simultaneously at the age of 10 and 20 days, the values of total T-lymphocytes also determined important characteristic values constituting 13.3 ± 0.08 and 15.0 ± 0.08 compared to the age of 30 days where the level of these T-total lymphocytes constituted 14.1 ± 0.08 .

The comparative aspects of B lymphocytes at lambs determined comparative characteristics regarding their concentration in different age periods. Thus, at the age of 10 days, the level of B lymphocytes was 10.0 ± 0.81 , compared to the age of 20 and 30 days, where the values of B lymphocytes were 12.0 ± 0.81 and 13.28 ± 0.81 .

Research conducted to determine the immunobiological characteristics of lambs from birth to the age of 30 days has revealed some peculiarities in the emergence and development of cellular and humoral immunity. Thus the main factor of cellular immunity is represented by T and B lymphocytes with the respective subpopulations, which determine the organism's immune reactions. Between these immunocompetent cells there is a certain interaction of the T system, which promotes the immunocompetence of lymphoid cells and regulates the system. The elements of the immune system, macrophages, T and B lymphocytes are developing in the organism until the birth of the animal, after which they begin to function intensively.

At all ages, from the 10th day of life until the 30rd day of life, significant increases in T and B lymphocyte indices were determined, which allows us to conclude that it has place the installation of the immunological reactivity of the newborn organism and the adaptation to the changes of the environment conditions and especially to the action of the pathogenic microorganisms.

The mechanisms of cellular defense against bacteria are performed by effector cells with phagocytic functions (neutrophils, macrophages, etc.), cytotoxic cells, etc.

Through various cell-mediated mechanisms, macrophages undergo an activation process performed by lymphokines secreted by T lymphocytes. Therefore macrophages have an important

role in triggering and controlling cellular reactions, which will activate B lymphocytes for antibody synthesis.

That is why it is important to know the specific prophylaxis methods of some diseases of the youth, regardless of the species, which requires the study of the optimal age, doses, inoculation pathways and other parameters depending on the response capacity of the animal.

Conclusions

1. Immunological investigations have shown that cellular immunity gradually develops at lambs during certain periods of growth and development. Therefore, the T and B values of lymphocytes reveal the well-defined functions of the cellular reactions characteristic to the installation of the organism's resistance.
2. The study and interpretation of the mechanisms of formation of the immune system of the animal organism offers the possibility to analyze the evolution of cellular and humoral reactions, which maintain the organism's immune homeostasis, being considered the main ones in the regulation of the immune system.

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