Specific immunological areactivity formation during gestation period in pregnant sows

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Abstract. Changes in immunological reactivity to viral and bacterial antigens may cause increased susceptibility to infectious diseases. Different levels of this condition in newborn and adult animal organisms should be based on the fact that the fetus and newborn after birth first comes into contact with the antigen, while the adult body already has partial sensitization. Chronic carrier of pathogens in animals and their influence on the spread of the infectious process is an urgent problem of modern veterinary medicine. The possibility of vaccination in newborns is limited by the presence of maternal antibodies that have an immunosuppressive effect. A high level of functional reserves of the pregnant body is important in the prevention of intrauterine infection. On the one hand, infection in the prenatal period of development affects the processes of growth and development of the fetus, on the other hand, during this period, the mother's body is isoimmunized by fetal antigens, accompanied by increased sensitivity of the body with the predominant manifestation of cellular phenomena in the absence of enhanced antibody synthesis.

1 Introduction

Immunological reactivity changes to viral and bacterial antigens may cause increased susceptibility to infectious diseases. Different levels of this condition in newborn and adult animal organisms should be based on the fact that the fetus and newborn after birth first comes into contact with the antigen, while the adult body already has partial sensitization [1- 3], [12-15]. Chronic carrier of pathogens in animals and their influence on the spread of the infectious process is an urgent problem of modern veterinary medicine. The possibility of vaccination in newborns is limited by the presence of maternal antibodies that have an immunosuppressive effect [4-11].

Almost all newborn animals have the same passively acquired immunity, but the level of immunological load may be different. Despite many years of research on immunological reactivity, the processes of specific suppression of the immune response are insufficiently studied [10, 13, 14].

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The purpose of this study is to obtain additional information about changes in some parameters of immunological areactivity induction in animals of various degrees of antigenic load [4, 6, 7, 9].

2 Research materials and methods

Experiments were conducted on 30 sows of Large White breed. Test group included animals with increased antigenic load (hyperimmunization). Control group included animals subjected to the traditional vaccination scheme adopted on the farm.

In animals from the test group, the amount of IgG, IgA, IgM in the blood serum was determined by the Mancini radial diffusion method in agar/agarose gel using immunoplates from the company "Immunotest", Sofia.

To study lymphocyte receptors/markers, blood was taken from animals of test and control groups for flow cytometry method. The analysis of lymphocyte receptors was conducted by double immunofluorescence using a panel of monoclonal antibodies marked with phycoerythrin. Lymphocyte populations were identified by the following combinations: CD45/CD14, CD3/ content of CD19 lymphocytes and CD3/CD56 receptors.

Blood tests for CD+ receptors were performed using standard methods after 1, 2, 6, 8, and 12 weeks, using the two-color flow cytometry method. The data obtained were processed using nonparametric analysis.

3 Results

Figure 1 summarizes the results of laser flow cytometry in the study of lymphocyte markers. It was found that CD4 lymphocytes were significantly less in animals in the test group ($P<0.002$). There is a tendency to increase the level of CD8 lymphocytes in comparison with the indicators in animals from the control group. Therefore, the CD4/CD8 ratio is significantly lower ($P<0.05$), which reveals cell-mediated immune suppression. Another evidence in this regard is a significantly lower level ($P<0.042$) of CD56-carrying lymphocytes - that is, natural killer cells (NK).

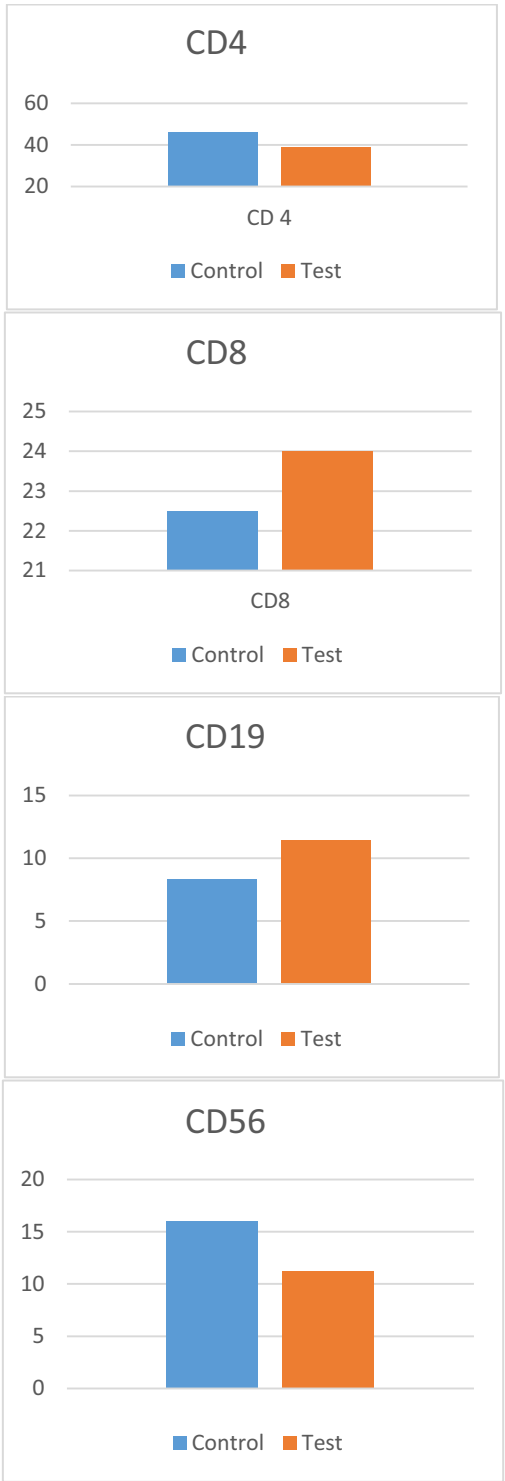

Fig. 1. Changes in lymphocyte markers in the studied animals

Data obtained during studies of the immunobiological status showed that all animals in the test group had changes in the cellular level of immunity compared to animals from the control group. Table 1 shows changes in the humoral immunity indicators of the studied animals. Low levels of IgG (approximately 38%), IgA (approximately 20%) , and IgM (approximately 17%) in animals from the test groups compared to those from the control group. Only three of the animals we examined from the test group showed an increase in immunoglobulins. This biological trend was not observed in other groups.

Table 1. Immunoglobulin levels in pregnant sows

Indicator	Group 1	Group 2	Control group
	n=12	n=12	n=12
IgG	36.1±0.08	34.7±0.22	34.5±0.08
IgA	18.4±0.01	16.8±0.25	19.5±0.01
IgM	10.7±0.11	18.3±0.17	12.6±0.11

*p<0.05; **p<0.01.

At the same time, the indicators for determining lymphocyte receptors in the test groups were characterized by a tendency to decrease the content of CD3+ (44.8±0.87%), CD4+ (26.3±0.61%), CD16+ - lymphocytes (9.2±0.17%) (P<0.001) and an increase in the level of CD19+ lymphocytes (28.2±0.09%, P<0.01) in relation to the indicators of animals from the control group. A significant decrease in the immunoregulatory index by 1.4 times relative to the control group was revealed (1.36±0.14 units and 1.84±0.15 units, respectively, P<0.001). In animals with moderate antigen load, there was also a significant decrease in the relative content of CD3+ (55.6±1.1%), CD4+ (32.1±0.8%) (P<0.001), CD16+ lymphocytes (9.9±0.5%, P<0.05) and an increase in the level of CD19+ lymphocytes (26.7±0.8%, P<0.01) in relation to the control group data. In animals with moderate antigen load, there was also a significant decrease in the relative content of CD3+ (55.6±1.1%), CD4+ (32.1±0.8%) (P<0.001), CD16+ lymphocytes (9.9±0.5%, P<0.05) and an increase in the level of CD19+ lymphocytes (26.7±0.8%, P<0.01) in relation to the control group data.

Table 2. The level of lymphocyte receptors in pregnant sows

Indicator	Group 1 (n=12)	Group 2 (n=12)	Control group (n=12)
CD3, %	59.1±0.15***	54.5±0.08***	65.2±0.16
CD4, %	32.3±0. 24***	27.9±0.11***	39.5±0.17
CD8, %	21.4±0.33	22.8±0.40	25.8±0.10
CD4/CD8	1.42±0.08	1.14±0.02***	1.57±0.05
CD16, %	15.4±0.11	10.5±0.11*	12.3±0.24
CD19, %	22.8±0.83	25.9±0.41**	22.3±0.31

*p<0.05; **p<0.01, ***p<0.001.

3 Discussion

Summarizing the data on the production of receptor antibodies and T-cells, it should be considered probable that they participate in the natural regulation of the immune response. For pregnant animals, both continuous intensive production of antibodies and the formation of persistent specific areactivity, which makes the body defenseless in the case of repeated infection with the same microorganism, are equally dangerous.

4 Conclusions

Thus, extremely complex connections were revealed between immunocompetent cells of both identical and different specificity. Depending on the dose and characteristics of the antigen, the number of individual subpopulations of lymphoid cells, the degree of their differentiation, and specific conditions, the immune response is either enhanced, limited, or qualitatively modified. As a result, we observe the phenomenon of antigen competition, which consists of suppressing the immune response to a given antigen as a result of previous or simultaneous administration of another antigen.

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