

**THE DYNAMICS OF HEMATOLOGICAL PARAMETERS AT DOGS
BY ADMINISTRATION OF FOSPRENIL**

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The article shows the dynamics of the relative number of lymphocytes and their subpopulations, phagocytic activity of neutrophils, eosinophil's, platelets, monocytes, erythrocytes and hemoglobin by the administering of Fosprenil. It was establish that, after application of immunotropic drug the relative number of T-lymphocytes decreased, amount of B-lymphocytes increased conversely. The phagocytic activity of neutrophils decreased. Evaluation of hematological parameters in experimental animals showed a marked increase in the absolute number of red blood cells, hemoglobin and hematocrit levels.

Keywords: *dogs, immunity, correction, immunotropic drug, T-lymphocytes, B-lymphocytes, phagocytic activity of neutrophils, eosinophil's, platelets, monocytes, erythrocytes, hemoglobin*

The interest for the substances which have stimulating effects on the immune system has increased in the 70 years of the twentieth century.

This is due to the fact that these drugs have been effective for the treatment of tumors, chronic infectious and autoimmune diseases. The population of domestic pets has increased in recent years. The dysfunction of immune system has increased in these pets also. Therefore the screening effective immunomodulators and improvement of methods for their use are particularly relevant. Some problems has encountered during clinical use of immunomodulatory drugs. Side effects has limited indications for use of these drugs. The phenomenon of the balance wheel was discovering during the study and application of immunotropic drugs. This phenomenon is opposite effects on the immune system of the same product. The final result depends on the dose, timing and regimen, initial immune status, genetic characteristics of the organism and the species to which the studied object [7, 10]. It

is obligatory to determine the sensitivity of immune cells of the organism to immunotropic means under conditions where necessary for the organism to conduct the immunotherapy. The absence receptors on the T-lymphocyte surface membrane reduces the effect of the injection of immunostimulant [3, 4, 8]. Adequate immune response develops in the activation of these receptors.

There is individual susceptibility of the dog's organism to various immunotropic drugs. We have found this fact in our previous researches. About 25% of dogs have low sensitivity, 70% of dogs have high sensitivity, and only 5% of dogs have excessive individual sensitivity for the immune means. Anaphylaxis can occur if you enter a drug to which the body has excessive individual sensitivity.

There are no reports on the impact of the introduction of the recommended dose immune drugs to replace individual sensitivity of the organism, namely active surface receptor of T lymphocytes in the available researches.

Therefore we consider appropriate experimental studies that will determine the change in individual sensitivity of the organism to immunotropic drugs during their application and dynamics of hematological parameters during immune.

The aim of our study was to examine the dynamics of hematological parameters at the injection Fosprenil.

Materials and methods research. The experiment was carried out on eight purebred puppies 4 months old from the same litter. The animals were divided into two groups (control and experimental), 4 puppies in each group. The peripheral blood were taken on an empty stomach in the morning and after stabilization were establish the indicators of cellular immunity: the relative number of lymphocytes and their subpopulations, phagocytic activity of neutrophils and individual sensitivity of T lymphocytes to immunotropic drugs. The relative content of lymphocytes and their subpopulations determined in reaction of rosettecreation with sheep erythrocytes (E_{tf.r.}-RCL, E_{tf.s.}-RCL) [2], individual sensitivity to drugs immunotropic determined by the percentage of inversion "active" T-lymphocytes in the test sample (with the addition of the drug). The degree of inversion was higher than 10% compared with control samples assessed as a high degree of sensitivity. Phagocytic activity of

neutrophils investigated using baker's yeast suspension cells [2]. By phagocytic believed cell (neutrophils) that has captured one or more yeast cells. The absolute number of red blood cells, monocytes and platelets, the relative number of eosinophils determined by inpedans method; hemoglobin measured colorimetrically, hematocrit determined by automatic hematology analyzer MINDRAY "BC-2800Vet". When determining the sensitivity of T cells in experimental animals to immunotropic drugs found that it is best to fosprenil drug that is the product of phosphorylation of needles polyphenols. The dog of the experimental group prescribed the drug by intramuscular injection in doses recommended by the manufacturer for 5 days. Puppies of control group administered the same dose isotonic sodium chloride. The blood has taken again and has controlled the hematological parameters after treatment. Statistical analysis of data performed by a computer program Microsoft Excel.

Results and discussion. In the first phase of research identified key indicators of immunological and hematological indices animal experimental and control groups, and the degree of individual sensitivity to drugs immunotropic.

In determining the main parameters of cellular immunity found that the relative number of lymphocytes and phagocytic activity of neutrophils is in the physiological range [6]. It was noticed that the relative number of T cells in experimental animals and control groups exceed physiological limits, and the number of natural killer cells reduced. After determining individual sensitivity to immunotropic drugs (percentage of inversion T-active lymphocytes) found that it was best to drug Fosprenil (more than 10 percent of the inversion). The next step of our research was to compare the condition of the body changes of immunoreactivity immunological parameters in the experimental and control groups after 5-day of treatment (Table. 1).

1. Dynamics of the relative number of immune cells and neutrophil phagocytosis index for input Fosprenil,%, n = 4

Indicators	Before treatment		After treatment		Physiological rates*
	control	experiment	control	experiment	

Lymphocytes	26,0±12,67	30,3±9,61	26,6±3,51	26,6±1,15	19–37
T-lymphocytes	74,0±9,16	73,3±14,05	73,3±8,32	67,3±9,45	55–70
T-helpers	56,6±7,57	56,0±14,0	56,6±4,6	50,66±10,2	40–60
T-suppressors	17,34±5,0	16,6±1,15	17,66±8,3	17,3±1,15	10–20
B-lymphocytes	12,0±3,46	11,3±7,02	12,6±3,05	14,6±4,16**	6–15
Natural killers	5,0±1,73	3,3±1,15	5,0±1,0	6,6±1,52	10–20
Phagocytosis of neutrophils	46,0±12,16	44,0±5,2	49,3±7,57	54,6±11,01***	40–95

The study of cellular immunity in animals by the injection showed reduction in the number of lymphocytes in animals from experimental group. In animals from the control group, this figure has not changed.

In experimental animals observed downward trend in the number of subpopulations of T- lymphocytes related to cells with helper activity (at 5.36%) and the number of cytotoxic (suppressor) cells increased slightly (by 0.9%). Such changes subpopulations of T lymphocytes may indicate the immunoregulatory effect of study drug, which manifested by increased antiviral protection (increased T-suppressor cells). Number of T-lymphocytes in the blood of animals in the control group did not change, except for a slight increase in the subpopulation of cells with suppressor activity.

B-lymphocytes subpopulation in puppies from experimental group increased by 3.3% against 0.6% in the control. Animals from the experimental group had relative number of B-lymphocytes to 2% more than control after entering of Fosprenil ($p < 0.01$).

In animals injected Fosprenil observes a tendency to increase the number of NK-cells by an average of 3.3%. Animals in the control group, this figure has not changed. It is known that these cells provide protection against spontaneous modified own cells (including cancer), as well as participate in the destruction of virus-infected cells [9, 10].

Phagocytic activity of neutrophils in animal from experimental group after the injection compared with control increased by 6.3% ($p < 0.001$). Prior studies in animals in the control group, the figure was higher 2%.

The study of changes in the sensitivity of T- lymphocytes to immunotropic drug before and after administration showed a significant reduction in the activity of surface receptors of T- lymphocytes that revealed a decrease in the rate of inversion. Research has been shown that the percentage of inversion "active" T- lymphocytes may serve as an integral factor activity of these cells during immune responses [2], although the path immunological response in the body depend not only on the surface receptors of immune cells, but also on the nature of the antigen. However receptor activity and availability of T- lymphocytes provide adequate cascade of immune responses.

In specific immune response, which is provided mainly by macrophages and lymphocytes, a significant number of other cells and substances nonspecifically affect the usefulness and adequacy of immune responses. A number of non-specific immune response factors we studied together with immunological parameters (Table. 2).

2. Dynamics of hematological parameters for treatment Fosprenil, n = 4

Indicators	Before treatment		After treatment		Physiological rates
	control	experiment	control	experiment	
Eerythrocytes, T/l	5,97±0,76	5,44±0,78	6,94±0,79	7,57±1,88**	5,5–8,0
Hemoglobin, g/l	126±18,9	118±19,3	157,3±21,5	177,3±42,9***	120–180
Hematocrit, %	42,23±5,87	37,9±6,30	49,36±6,43	54,46±13,78	39–56
Monocytes, G/l	0,73±0,15	0,8±0	0,6±0,1	0,87±0,15	до 1,8
Eosinophiles, %	2,33±0,06	2,63±0,57	2,16±0,95	1,6±0,56	0–5
Plates, G/l	451,7±109,4	457,3±49,3	185,67±78,3	406,0±76,3	117–460

Evaluation of hematological parameters showed a more pronounced increase in the absolute number of red blood cells to 2.13 T / l in the experimental group of animals, while the animals in the control group it was only 0.97 T / l. Along with the

increase in the number of red blood cells in the experimental group of animals marked increase in hemoglobin. The important role of red blood cells in the immune response associated with their detoxification function, as well as supplies for pathogens fixed macrophages of the spleen and liver [9].

When analyzing the performance of absolute platelet count does not have significant changes, although it should be noted that these formed elements are active participants in immune responses. Thus, platelets carry antigens and immune complexes and have expressed cytotoxic properties.

Thus, a comparative analysis of immunological during treatment Fosprenil, which established the optimum individual sensitivity of the organism dogs showed that when applying immunotropic vehicles in recommended doses sensitivity of lymphocytes reduced. The dynamics of these changes must be considered in a course of immunotherapy for various clinical conditions in small pet clinic.

CONCLUSIONS

1. Application immunotropic drugs, which set the optimum sensitivity, increases the relative number of lymphocytes, mainly due to suppressor T- and B - lymphocytes, phagocytic activity of neutrophils and NK-cells. This activity surface receptor of T –lymphocytes reduced.

2. Immunotropic drug observed a marked increase in the absolute number of red blood cells, monocytes and hemoglobin by reducing the absolute number of eosinophils.

Prospects for further research. Planned study the effect of low doses of drugs to immunotropic immunoreactivity organism dogs given individual sensitivity to these drugs.

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ДИНАМІКА ГЕМАТОЛОГІЧНИХ ПОКАЗНИКІВ У СОБАК ЗА ВВЕДЕННЯ ФОСПРЕНІЛУ

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Показано динаміку змін відносної кількості лімфоцитів та їх субпопуляцій, фагоцитарної активності нейтрофілів, еозинофілів, тромбоцитів, моноцитів, еритроцитів та гемоглобіну за введення препарату Фоспреніл. Встановлено, що після курсу застосування імунотропного препарату

відбувається зниження відносної кількості Т-лімфоцитів за одночасного збільшення кількості В-лімфоцитів. Разом з тим відзначено зростання фагоцитарної активності нейтрофілів після використання імунотропного препарату. Оцінка гематологічних показників у дослідних тварин показала виражене збільшення абсолютної кількості еритроцитів, рівня гемоглобіну та гематокриту.

Ключові слова: *собаки, імунітет, корекція, імунотропний препарат, Т-лімфоцити, В-лімфоцити, фагоцитарна активність нейтрофілів, еозинофіли, тромбоцити, моноцити, еритроцити, гемоглобін,*

ДИНАМИКА ГЕМАТОЛОГИЧЕСКИХ ПОКАЗАТЕЛЕЙ У СОБАК ПРИ ВВЕДЕНИИ ФОСПРЕНИЛА

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Представлена динамика изменений относительного количества лимфоцитов и их субпопуляций, фагоцитарной активности нейтрофилов, эозинофилов, тромбоцитов, моноцитов, эритроцитов и гемоглобина при введении препарата фоспренил. Установлено, что после курса применения иммунотропных препаратов происходит снижение относительного количества Т-лимфоцитов. При этом количество В-лимфоцитов, наоборот, увеличивается. Вместе с тем отмечено увеличение фагоцитарной активности нейтрофилов. Оценка гематологических показателей у опытных животных показала выраженное увеличение абсолютного количества эритроцитов, уровня гемоглобина и гематокрита.

Ключевые слова: *собаки, иммунитет, коррекция, иммунотропный препарат, Т-лимфоциты, В-лимфоциты, фагоцитарная активность нейтрофилов, эозинофилы, тромбоциты, моноциты, эритроциты, гемоглобин*