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INFLUENCE OF A HYPOCALORIC DIET ON THE PARAMETERS OF NONSPECIFIC HUMORAL IMMUNITY IN RATS

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Abstract. *Have been considered the role of the imbalance of regulatory cytokines in the blood in the implementation of immune responses in rats that were on a hypocaloric diet, compared with the control, where was established: a predominant increase in the content of IL-12, a decrease in IL-4 in rats, which indicates the participation of both specific (Th 1), and non-specific (macrophage), cellular immunity in the mechanisms of damage to the pancreas and the development of chronic pancreatitis in the future. The latter is probably associated with a violation of intercellular interaction due, first of all, to a decrease in the functional activity of macrophages - effector cells, modulators of the immune response, and sources of regulatory cytokines.*

Keywords: *cytokines, nonspecific immunologic reactivity, pancreas.*

Introduction.

The influence of external unfavorable factors (stress, unbalanced nutrition, etc.) causes the development of systemic and local protective reactions in response to damage. This process involves the immune and neuroendocrine systems, the interaction of which is provided by the immune system mainly by cytokines. With their help, you can trace the direction of the implementation of the immune response. Considering the disparity of literature data devoted to the study of the characteristics of nonspecific immune responses arising under the influence of damaging factors in organs and tissues, it is important to elucidate the role of the immune system in the mechanisms of damage to the structure and function of the pancreas [2].

The objective of the study is to determine the content of IL-12 and IL-4 cytokines and their ratio in the blood serum of the rat that received a hyporcaloric diet.

The volume of the study included the experiments on 30 nonlinear rats (WAG/G Sto population). The animals were divided into the groups: the rats that received a hypocaloric diet with the reduced content of proteins and carbohydrates (20 specimen) and the rats of control group (10 spesimen)

All the procedures on the animals and also the removal of the animals from the experiment by decapitation were made under anesthesia with the use of thiopental narcosis. The levels of interleukin-4 (IL-4) and interleukin-12 (IL-12) in the blood serum were determined by the immune enzymatic method using the sets of reactants of BEST Vector and the sets of reactants of (Elisa Kit). The results of the study are processed by means of the analysis package of Microsoft Excel and Biostat.exe-2008 computer program.

The results of the study and their discussion. The important regulatory role of cytokines is known. IL-4 induces the proliferation of T-helpers of the 2-nd type (Th2) which mediate the reactions of humoral immune response (stimulation of B-

lymphocytes and production of antibodies) and is also an antagonist of gamma interferon inhibiting the proliferation of T-helpers of the 1-st (Th1) type [2] while IL-12 enhances the proliferation and differentiation of T-helpers of the 1-st (Th1) type which mediate the reactions of cellular immunity and at the same time inhibit the proliferation of T-helpers of the 2-nd type (Th2) [2, 5, 6]. In rats who were on a hypocaloric diet with the reduced content of proteins and carbohydrates IL-12 content appeared to be increased almost by 2 times (Table 1), while the average level of IL-4 content in the animals of the group studied was significantly decreased (to 2,5)with regard to the control.

The degree of proportionality of changes of IL-12 and IL-4 content was determined by IL-12/IL-4 ratio and the existence of essential increase of IL-12/IL-4 ratio by 3,6 times in comparison with control was established which demonstrates the existence of cytokine imbalance in the rats of the observation group.

Table 1 - Contents of Cytokines in the Blood of Rat that were on a Hypocaloric Diet *(in % of the Standard)*

Indicators	Rat
IL-12	186,6±9,1***$(p_1<0,001)$
IL-4	45,4±6*** $(p_1<0,001)$
IL-12/IL-4	358±26,4*** $(p_1<0,001)$

*Notes. 1. ***p < 0,001, *p < 0,05 (comparison with the control group).*

The data obtained indicate the tendency, through the increase of IL-12, to stimulation first of all of the reactions of cellular type through enhancement of the proliferation and differentiation of Th1, against the background of inhibition of the humoral response that is indicated by the decrease of IL-4 and, thus, confirm the attraction first of all of nonspecific, and further an important role of a specific cellular link of the immune system in the mechanisms of the pancreas damage as a result of a long hypocaloric diet [1, 2, 3, 7].

Summary and conclusions

Were received the experimental data obtained are indicative of the fact that unbalanced nutrition of rats is the essential risk factor of the development of organic pathology of the pancreas with secretory failure.

1. In rat who were on a diet with the reduced content of proteins and carbohydrates the signs of disturbance of the immunologic reactivity in the form of imbalance of regulatory cytokines with prevalence of IL-12 content, the reduced IL-4 level were revealed that indicates the attraction of a nonspecific cellular link of immunity to a pathogenesis of the pancreas damage.

2. The imbalance of regulatory cytokines of rat indicates the attraction of a specific (Th 1) and nonspecific (macrophagic) cellular link of immunity to the pathogenesis of the pancreas damage which is possibly bound to the disturbance of intercellular interaction due to a decrease in the activity of effectors and modulators of an immune response – macrophages which are also a source of regulatory cytokines.

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