

Adverse Environmental Conditions Affecting the Human Immune System

Khudaikulova N. I.

Bukhara State Medical Institute, Bukhara, Republic Of Uzbekistan

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ABSTRACT

the article reveals the influence of unfavorable environmental conditions on the immune system of some mammals. The important directions of immunobiology are analyzed. An important direction in immunobiology is the study of the influence of chemical and physical factors on the body's immune system, the normal functioning of which ensures homeostasis of the internal environment of the body. The immune system is very sensitive to various adverse environmental factors. Special attention is paid to physical, chemical environmental factors that can lead to negative processes in the body of experimental rats.

It is known that cellular and humoral components of the immune system perform protective functions in the human body. The functions of immunity are broad – it is a multicomponent system of protection against foreign agents and one of the ways to ensure homeostasis of the human internal environment. The immune system reacts very sensitively to various adverse environmental factors (NEF). NEF disrupt the immune system, which reduces the body's ability to resist mutagenesis and infections, and also induces the development of autoimmune and immune-dependent diseases.

An important direction in immunology is the study of the influence of chemical and physical factors on the body's immune system, the normal functioning of which is ensured by homeostasis of the internal environment of the body. Currently, it is possible to single out as an independent indicator the immunological criterion of harmfulness, which was the theoretical basis for rationing factors that affect the immune system of the body.

However, the determination of the biological significance of the body of shifts in immunological reactivity still needs serious development. It should be considered from the point of view of differences in the normal response of the body's systems in response to the exogenous effects of other patterns characteristic of alterations. This is especially important when it is necessary to evaluate reactions from the immune system, because from a "general biological point of view, allergic reactions should be considered as responses that are both destructive and protective in different proportions" [4, p. 46].

The presence of changes in the immune system is not a criterion for assessing the harmful effects. This fully applies to the determination of autoantibodies (Aat) in blood serum. A study of the effect of serums containing Au-At to the liver of rats when irradiated at a dose of 600 R on the liver function of healthy animals showed that the latter cause a decrease in the functional

ability of the liver [5, p. 213]. To differentiate adaptive sensitization and reactions underlying allergic lesions, it is possible to use the study of immunocompetent cells (lymphocytes) in double and triple rosette formation reactions. However, this approach does not allow drawing a line between protective and damaging factors of the immune system [4, p. 46].

The paper [3, p. 954] describes a method for determining the significance for immunobiology of immune reactions of the body in the aspect of exposure to adverse environmental factors, including the determination of the level of antibodies (At) and their damaging factor. At the same time, he carried out registration of post-implantation fetal death. This approach includes the determination of the level of specific At or Au-At to tissue antigen (Ah) in experimental animals and the administration of blood serum obtained from these animals to intact pregnant females on the 10th day of pregnancy, followed by an assessment of fetal embryonic development. This method may well be used to determine the significance of the observed changes in the immune status.

The methods of allergodiagnosics have established that the inhalation effect of terephthalic acid in concentrations of 0.1 mg/m³ and dimethyl terephthalate in concentrations of 0.4 - 1.0 mg/m³ contributes to the sensitization of the body of experimental animals. This process proceeds with the formation of anti-haptenAt and Au-At to the lung tissue. Administration of the Y-globulin fraction of blood serum of animals sensitized with different concentrations of dimethyl terephthalate to pregnant females leads to an increase in post-implantation fetal death. This indicates the damaging effect of protigaptenicAt and anti-pulmonary Au-At on the embryonic development of the fetus. At the same time, the absence of damaging effects of protigaptenicAt and pulmonary Au-At, which are formed by inhalation exposure to terephthalic acid, is shown. The proven method of biological evaluation of the effect of At on fetal development can be used as the basis for differentiating the normal immune response of the body, aimed at maintaining homeostasis, from the allergic one, the main feature of which is the damaging effect.

The study of autoimmune reactions when irradiated with non-ionizing microwave radiation with an intensity of 50 and 500 MW / cm² for 30 days for 7 hours daily showed that anti-cerebral At formed in rats. When exposed to low-intensity microwaves, T-lymphocytes are also inhibited [3, p. 954], and this indicates a decrease in the functional activity of the thymus-dependent lymphocyte population. The damaging effect of microwave radiation is accompanied by the formation of autoimmune reactions in the body of experimental animals [5, p 213].

Such a chemical agent as nitrofen, used in agriculture as a pesticide in experiments on white rats in doses of 1/5 LD₅₀, 1/10 LD₅₀, 1/20 LD₅₀, had hemolytic activity, enhanced the formation of methemoglobin, reduced respiratory activity, had a depressing effect on the mitochondria of the liver of animals, and also had an immunosuppressive effect, reduced the number of T cells and macrophages, led to the formation of autoimmune reactions in the body of rats. Nitrofen at a dose of 1/5 LD₅₀ had the maximum effect in experimental animals.

Thus, from the above material it can be concluded that both physical and chemical environmental factors can lead to negative processes in the body of experimental rats, i.e. they have a negative effect. These environmental factors lead to the formation of autoimmune reactions in the body of experimental rats. Autoimmune reactions from a general biological point of view have a damaging effect and reduce the immune resistance of the body. The search for a model that will accurately take into account the criteria for the animal organism of certain factors is a promising direction of scientific research in the field of immunobiology.

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