

## RESEARCH AND PROSPECTS OF IMMUNOCORRECTION IN THE CONDITIONS OF THE MODERN HUMAN ENVIRONMENT

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The wide and rapid spread of viral infections, their frequent relapses and chronicization, the high incidence of chronic diseases of the bronchopulmonary system and urogenital tract are often associated with the state of viral infections characteristic of modern humans [20]. VID complicates the course of many diseases, contributes to the generalization of infection, disability, and increased mortality [11]. The current reality has made it obvious that there is a need to search for means and methods of immunocorrection. Currently, an active search and use of such means is carried out mainly from the standpoint of increasing the effectiveness of disease treatment. However, the facts cited earlier convince us that the issue should be posed more broadly - immunocorrection should be considered as the most important element of mass prevention aimed at increasing the protective properties of the body of people exposed to the negative influence of factors of the modern habitat. This direction of the problem has practically not been developed, but, apparently, its development should be based, first of all, on existing ideas about the immunotropic effect.

Currently, the use of 4 groups of drugs is proposed for the correction of immune system disorders [35, 43]:

- immunomodulators that restore, stimulate or reduce immune indicators;
- immunostimulants that enhance the immune response;
- immunosuppressants that suppress the immune response;
- immunocorrectors – agents that affect a specific part of the immune system.

The first three groups of drugs are mainly used; drugs of the fourth group are currently few in number [19]. The most frequently used drugs include immunostimulants of microbial, thymus and bone marrow origin, cytokines, analogs of drugs of endogenous origin and synthetic drugs [45].

The indicated groups of drugs are used mainly to increase the effectiveness of basic therapy, since the state of VID, characteristic of a significant portion of people in modern environmental conditions, necessitates immunocorrection for up to 30% of patients suffering from various diseases [17, 36].

The positive effect of using such drugs has been revealed in many cases. Thus, Karaulov A.V. and co-authors [13-14] showed a clearly expressed therapeutic and prophylactic effect of intranasal aerosol IRS -19 in respiratory infections. Chumakova M.M. and Tokareva L.P. [44] revealed high efficiency and safety of using licopide as an immunostimulant in children suffering from acute respiratory viral infections and intestinal dysbacteriosis. Selective immunocorrective effect (regulation of humoral immunity) in patients with bronchitis was revealed for celandine infusion [41]. In chronic bronchitis, a good effect was obtained with the use of immunofan [13-14], polyoxidonium [9], immunomodulin [22] and immunoglobulins [32, 38-39].

It is known that the action of some antiviral drugs ( megosin , gozolidone , ragosin , etc.) is based on their ability to induce interferon synthesis. A 50-70% protective effect was revealed under experimental conditions in the domestic interferon producer , the drug GLAS, created on the basis of monoammonium salt of glycyrrhizic acid [1]. Other derivatives of glycyrrhizic acid, as well as aqueous extracts of some plants (calendula, plantain, angelica, geranium) have similar properties [12].

Immunomodulators (polyoxidonium, immunomodulin and various cytokines) are successfully used for immunocorrection of the body affected by urogenital infections [23, 26-28, 47].

In the treatment of gastrointestinal diseases, which are usually accompanied by dysbacteriosis, immunomodulators are used, aimed at both normalizing the intestinal microflora and increasing the body's protective properties - eubiotics + immunomodulin [37], KIP [25], likopid [15], NK biococktail [16], imudon [6].

Entoban , a preparation of medicinal herbs ( cholarhena + barberry + quince + myrtle + oak), has a positive effect on the intestinal microflora [46]. Preparations from the root of naked licorice - glyceram and glycedirin - in a dose of 0.78-1.56  $\mu\text{g}/\text{ml}$  have a bacteriostatic and bactericidal effect on *Can . Albicaus* and *Ps . Aerugenosa* [24]. The high expediency of using immunomodulators in the treatment of chronic infections, in particular tuberculosis, has been revealed [21, 29-30].

Testing of the immunomodulator polyoxidonium *in In vitro* studies using the blood of patients with systemic lupus erythematosus showed that after 30 minutes of incubation of the system, an almost 1.5-fold increase in the number of T-lymphocytes and a decrease in the number of B-lymphocytes were detected, i.e., normalization of the immune system disorders characteristic of systemic lupus erythematosus [33-34].

Oncological diseases are also considered to be immune-dependent diseases, since various disorders of the immune system play an important role in the occurrence and progression of malignant tumors [3]. It is known that during tumor growth, the ability of T cells to synthesize cytokines, including interleukin-2 ( IL - 2), is suppressed. In experimental conditions, it was found that the introduction of tumor-bearing animals immunomodulin prevents IL -2 inhibition [5].

Cytokines, colony-stimulating factors, polypeptides with a molecular weight of 15-70 kDa , including IL-2 and interferons, occupy an important place in tumor immunotherapy. However, therapeutic doses of these drugs cause severe side effects in patients. Therefore, the search for bioregulators with low toxicity and tropism for certain effector cells of the antitumor immune surveillance system remains an urgent task. In this regard, the hexapeptide MP-2 is of interest , which *in vitro* restores the proliferative response of human T-lymphocytes suppressed by the action of tumor toxins of HL -60 leukemia cells, increases the reduced expression of CD3 and CD4 antigens , and enhances the production of IL -2 by mouse splenocytes [42 ] . Of interest in this regard is non-toxic *subalin* , a recombinant probiotic that produces IL-2 and is capable of inducing the cytotoxic activity of macrophages [18].

Specific antitumor treatment aggravates the existing imbalance in the immune system of cancer patients, so the issue of using natural bioregulators to relieve the side effects of cytostatic therapy, as well as to activate endogenous antitumor mechanisms, has long been considered by researchers and practitioners [4]. The ability of biological reaction modifiers of various natures to increase the effectiveness of antitumor therapy has long been shown [10]. Thus, the inclusion of such a drug as glutoxim in the complex of antitumor therapy allows improving the immunological parameters of the body [31]. Phytoadaptogens such as *Eleutherococcus senticosus*, *Rhodiola rosea* are able to reduce the toxic effects of antitumor cytostatics and non-specifically increase the overall resistance of the body [4].

In many acute chemical poisonings accompanied by a decrease in NK activity, post-intoxication activation of NK in an experiment can be ensured by the introduction of T-activin at a dose of 0.5 to 5  $\mu\text{g}/\text{kg}$  body

weight, which stimulates the production of  $\gamma$ -interferon and induces the expression of IL -2 receptors on the surface of NK [8].

immunomodulin (1.4  $\mu$ g/kg) has a positive effect on the structure of the immune system organs [1], and in acute toxic hepatitis, lacto-flor [14].

The cited works indicate an increase in the effectiveness of treatment of various forms of diseases due to an increase in the protective properties of the body when using immunomodulators. Most of the described immunomodulators are pharmacological drugs intended for use in clinical practice. However, there is also information that immunotropic drugs (lacto-flor, bioginseng ) are able to increase the protective properties of the body of practically healthy people, to strengthen their post-vaccination immunity to influenza viruses [25].

Without a doubt, immunocorrection of the patient's body is an important aspect of the development and use of immunomodulators in clinical practice, but at present this issue should be considered from a broader perspective.

Significant changes in the modern human environment, in particular, environmental pollution, poor nutrition of the population with a pronounced deficiency of such important nutrients as proteins and vitamins, high mental stress, frequent emotional and other stresses have led to a number of functional disorders in the body of most people and, above all, to a decrease in its protective properties as a result of dysfunction of the immune system. Immune-dependent conditions, both in the form of immunosuppression and hyperactivation of various links of the immune system, are becoming increasingly widespread in the human population.

The immune system is a complex and very delicate mechanism that reacts to even the smallest changes in both the external world and the body itself. Restoring and strengthening the immune system, increasing the protective properties of the body of current and future populations of people is an urgent task that requires searching for and developing methods and means of immunocorrection that are acceptable for carrying out mass preventive work.

To correct immune disorders, various harmless seasonings can be used in food products, which have a mild immunocorrective effect. Among such food seasonings, some substances with a peptide structure have been studied. Thus, the peptide drug tinrostim , obtained from commercial marine mollusks, in a dose of 0.015 mg / kg of weight is able to normalize the immunological parameters of the body of animals exposed to cyclophosphamide . In this case, the drug was administered in the form of a food seasoning, which made it possible to use it to create a new product of therapeutic and prophylactic nutrition - fish pudding "Health". Immunomodulatory properties have also been found in some biologically active seasonings (BAA), created on the basis of plants [40] or selenium-containing sterulins [7].

Since the time of Hippocrates, it has been considered that the most important factor that allows you to strengthen the body and increase its protective properties is a high-quality balanced diet. But for just as long, people have been trying to strengthen the body using the healing properties of plants. In numerous reference books and scientific publications, you can find information about the general strengthening effect of fruits, seeds, or extracts from the leaves of plants such as rosemary, rose hips, mint, dandelion, Japanese pagoda tree, juniper, lemon balm, licorice, etc. [10, 48].

In the Eastern cuisine, numerous products or flavoring seasonings have been used since ancient times, which are characterized by ancient thinkers - collectors of folk experience - as food that can "strengthen the body, raise its protective properties." We were unable to find scientific publications confirming these statements of ancient scientists. However, in reference literature on medicinal plants, one can find information about the antioxidant, "healing", "strengthening", "tonic" effect of such flavoring food

seasonings as dill, coriander, cloves, cinnamon, etc. What is the basis for such a characteristic of these seasonings, do they affect the immune system or other systems of the body, is it possible, using their properties, to give recommendations for a more justified use for preventive purposes - these are the questions that we tried to answer when organizing these studies.

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