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Influence of Xenobitics on Organisms and Methods of their Detoxification

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Abstract: *As a result of human economic activity, a large number of various xenobiotics, alien to humans and animals, circulate in the biosphere, many of which have extremely high toxicity [1].*

Keywords: *xenobiotics, carcinogenic properties, mutation, bacterial endotoxins, toxicoinfection, toxic chemicals, negative effect, correction.*

Materials and Methods

According to the authors' calculations, at present, the natural environment contains from 7 to 8.6 million chemicals, and their arsenal is annually replenished with another 250 thousand new compounds. Many chemicals have carcinogenic and mutagenic properties, among which 200 items are especially dangerous (list compiled by UNESCO experts). For example, benzene, asbestos, pesticides, heavy metals, various dyes and food additives. In the composition of food, undoubtedly, harmful components are isolated, which are combined by the term xenobiotics [2].

Xenobiotics (from the Greek xenos - alien and bios - life) - compounds alien to organisms (industrial pollution, pesticides, household chemicals, medicines). Entering the environment in significant quantities, xenobiotics can affect the genetic apparatus of organisms, cause their death, and disrupt the balance of natural processes in the biosphere [3,4].

Xenobiotics include foreign chemicals and biological agents that enter the human body with food or other routes that do not perform any of the nutritional functions and having an adverse effect on health under certain conditions. The most general classification provides for their distribution into bioxenobiotics, chemoxenobiotics and radioxenobiotics. Among bioxenobiotics, mycoxenobiotics are distinguished - toxins produced by molds (microscopic lower fungi), as well as those contained in poisonous species of higher fungi. Bioxenobiotics include toxins of some plants (phytoxenobiotics), toxic substances present in the organs and tissues of certain species of fish and other aquatic organisms (zooxenobiotics), as well as endo and exotoxins produced by a number of microorganisms.

The main representatives of chemoxenobiotics are pesticides, nitrosamines, salts of heavy metals (lead, copper, mercury, zinc, cadmium, etc.) released from polymeric materials used in the food industry, some hormones and hormone-like substances used in animal husbandry.

Radioxenobiotics include radionuclides of artificial origin that enter the biosphere as a result of nuclear weapons tests, as well as as a result of accidents at nuclear fuel cycle enterprises. Among bioxenobiotics, a special place is occupied by toxins produced by various microbes, which, under favorable conditions, are capable of multiply and accumulate in large quantities in food. Bacterial endotoxins are formed in the human body after eating food containing a large number of living microorganisms, and cause food poisoning in the form of a toxic infection. It should be noted here that along with the designation of a certain nosological form of food poisoning of a microbial nature, the term "toxicoinfection" is used to characterize a clinical syndrome in which signs of general intoxication are combined with symptoms of acute gastroenteritis. The presence of such a syndrome is characteristic of both the majority of food poisoning of a microbial nature, and classic infectious diseases, proceeding according to the type of acute intestinal infections (dysentery, typhoid fever, paratyphoid fever).

The group of chemoxenobiotics is represented by various compounds. significantly different from each other in structure, toxic and other negative properties, routes of entry into food and the levels of accumulation in them, the rate of transformation and excretion from the body. An important characteristic of pesticides is also the severity of their cumulative properties, namely, the ability to accumulate in the body with a systematic intake in small doses. Distinguish between material cumulation, when poison accumulates in certain tissues of the body, and physiological cumulation, in which the poisonous substance itself does not stay for a long period of time in organs and tissues, but its systematic, albeit quantitatively insignificant, intake leads to an increase in toxic or other negative effect. The criterion for assessing the cumulative properties of pesticides is the cumulation coefficient (CC), which is determined from the results of an experiment on animals. CC is the quotient of dividing LD-50 chronica - the total amount of the assessed toxic chemical causing the death of 50% of experimental animals under chronic exposure (repeated administration of low doses) to LD-50 acuta.

Results and Discussion

Heavy metals play a dual role in the vital processes of microorganisms. Some of them - Mo, Cu, Mn, Zn, Ni are vital in small quantities. Thus, it is generally known that metal ions are part of many biologically important macromolecules (enzymes, hormones, vitamins, respiratory pigments, lipids, etc.) and are a necessary part of them, without which their physiological function is not realized. Others - Cd, Pb, Sn, Hg, Ag, Co - do not perform biological functions, however, at high concentrations, all these elements, due to their good complexation ability, are extremely toxic to microbes. They can interact with hydroxyl, carboxyl, phosphate, sulfhydryl and amino groups, causing changes in the properties of proteins [5]. In case of acute intoxication with zinc salts, leukocytosis, a decrease in the number of erythrocytes and hemoglobin in the blood were revealed in experimental rats. The level of leukocytes significantly increased by the end of the experiment, which indicates an increase in the stress intensity of the body due to the toxic effects of heavy metal. A decrease in the number of erythrocytes and a decrease in hemoglobin in the blood of animals indicates an insufficient formation of erythrocytes in bone marrow, their excessive destruction in organs and peripheral blood in acute poisoning. The use of biological coriander achieves a positive therapeutic effect and brings the level of blood cells closer to the control values, which showed its protective property [6]. In vitro and in vivo experiments have shown that salts of heavy metals (cadmium, lead) cause OP uncoupling with the removal of the respiratory control mechanism, increase the passive permeability of the inner mitochondrial membranes. The combined administration of a mixture of cadmium and lead salts to animals (a dose of 0.6 mg of

the mixture / 100 g of weight daily) after two days leads to a decrease in ATP synthesis, as a result of inhibition of the electron transport function of the respiratory chain of rat liver mitochondria [7].

In case of improper handling of pesticides, violation of the rules of storage, transportation and use, they may get into food products, and with them into the human body, which leads to acute and chronic poisoning. At the same time, it is known that a number of toxic chemicals in the body, not intoxication, and metabolic disorders, changes in cell growth and immunobiological reactivity. The consequence of such shifts can be mutagenic, carcinogenic, blastomogenic, teratogenic, embryotropic and allergenic effects of pesticides [2,8]. Scientists have found that there are quite a few different defense mechanisms against xenobiotics in the body of animals and humans. The main ones are: 1. The system of barriers preventing the penetration of xenobiotics into the internal environment of the organism, as well as protecting especially important organs - the brain, sex glands and some other endocrine glands - from those "outsiders" who nevertheless broke into the internal environment ; 2.Special transport mechanisms for removing xenobiotics from the body; 3. Enzyme systems that convert xenobiotics into compounds that are less toxic and easier to remove from the body; 4. Tissue depots, where some xenobiotics can accumulate under arrest [9,10,11].

Unfortunately, the systems for removing xenobiotics are not omnipotent either. With a high concentration of xenobiotics in the blood, all carrier molecules in the cell membrane of a living organism (and their number, of course, is limited) will be busy and the transfer process, having reached a certain speed, will be forced to limit it. In addition, it was found that some pollutants can damage and disrupt the transport routes for the elimination of harmful substances, which can lead to the selective accumulation of harmful substances in certain tissues of a living organism. Knowledge of the capabilities of protective systems also makes it possible to establish which substances should not enter the food of humans and farm animals. Now all over the world, and in our country especially, new types of fodder protein, new compound feed are being created. At the same time, however, it is not checked which xenobiotics are contained in these new products, whether defense systems can cope with them, whether these xenobiotics themselves will disrupt the work of defense systems [12,13].

Conclusion.

Thus, at present, attempts are being made to reduce the level of environmental pollution, but we all know how slow and difficult this business is. Studying the properties of defense systems against

xenobiotics can help us gain time - to provide an opportunity to weaken the harmful effects of pollution, increasing the efficiency of defense systems. This is especially important for children - they are very sensitive to foreign chemicals, and their defense mechanisms are not yet fully developed xenobiotics can help us gain time - to provide an opportunity to weaken the harmful effects of pollution, increasing the efficiency of defense systems. This is especially important for children - they are very sensitive to foreign chemicals, and their defense mechanisms are not yet fully developed

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