WEB OF SCIENTIST: INTERNATIONAL SCIENTIFIC RESEARCH JOURNAL
ISSN: 2776-0979, Volume 4, Issue 3, Mar., 2023

CHANGES IN THE THYMUSE OF EXPERIMENTAL ANIMALS UNDER EXPOSUREAND GENETICALLY MODIFIED PRODUCTS

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ABSTRACT
In the experimental group of laboratory animals, a high synchronicity of quantitative changes in the cytoarchitectonics of the subcapsular, cortical and medullary substance of the thymus was revealed under the conditions of the use of GMOs. It is characterized by inter-organ linear correlations between the same-named and dissimilar types of cells and in some cases even corresponds in size to the indicators inside the organs. A genetically modified product-soy flour-negatively affects the condition of the thymus.

Keywords: genetically modified product, experimental animals, thymus, morphology.

According to the World Health Organization, one of the most important factors shaping human health is the right diet. The creation of genetically modified food sources is an inevitable way to address many nutritional and health problems [11].

Crop improvement through selective breeding was largely based on genetic diversity, which resulted from a long history of natural mutations. As demand for food increases and pressure on crop breeding continues to mount, the need to create genetic diversity through rapid mutation becomes urgent [9,10].

The term "genetically modified organisms" (GMOs) appeared recently [6, 11]. Research on the health and biological safety of GM products from potatoes, corn, soybeans, rice, cucumbers, tomatoes, sweet peppers, peas and rapeseed for the production of food and feed, conducted by independent scientists, and not by interested manufacturing companies, to date, is very small.

While transgenic technologies marked a new era in crop improvement, some problems prevented their widespread adoption [11].

McCann et al. [7] It was found that the nutrient composition of several varieties of commercial glyphosate-tolerant soybeans obtained after 3 years of breeding remained equivalent to the composition of conventional soybeans.

Kim S. H. et al. [11] It was found that the allergenicity of extracts derived from conventional types of beans and GM soybeans was identical in the adult group of

people studied. However, despite the positive results in the study of glyphosate-tolerant soy, other authors concluded that more thorough studies are needed to assess the allergenicity of GM soy and other GM foods, including a wide selection of controlled GM soy samples [2, 5, 11].

The influence of various pathogenic factors on human health leads to morphological changes in tissues, impaired function of individual organs, and in especially severe cases, the whole organism as a whole. All this makes scientists pay close attention to the organs of immunogenesis that provide the protective mechanisms of the body. The spleen, in response to exposure to various pathogenic agents, forms a generalized immune response that ensures the maintenance of immune homeostasis and the necessary level of adaptive potential of the body [1, 3, 5].

GMOs are plant or animal organisms that have been altered in an unnatural way for nature by genetic engineering to give the genotype new properties of the organism. With the help of genetic engineering, various transgenic plants (soybeans, corn, sugar beets, potatoes, cotton) with resistance to viruses, colorado beetle and other insects, as well as to pesticides, have been obtained [4, 8].

Soybeans are the number one genetically modified crop in the world. Some genetically modified soybean varieties have been modified specifically for oil production and yield three times more oleic acid than conventional varieties. GMOs increase yields, create resistance of crops to diseases, produce insecticides against pests. But mutations of viruses that cause genetic changes in plants bring diseases to animals and humans. Everything artificially created in quality is inferior to natural analogues [8, 9, 10]. Despite the abundance of numerous studies devoted to the study of the immune apparatus of the human spleen and in experimental animals, almost no attention is paid to the issues of microanatomy and the cellular composition of the lymphoid structures of this organ [7]

A detailed study of the morphogenesis of the thymus when using GMOs will allow, scientifically substantiated, to correct possible immunological lesions.

The purpose of this study was to study and evaluate the effect of the GM product on the morphological parameters of the thymus of laboratory animals in the experiment.

Materials and Methods

Commercial soybean flour was used as a GM product. Experimental studies were conducted on white mongrel rats.

All laboratory animals were divided into 3 groups: an experimental animal group that included soy flour in the general vivarium diet (at a dose of 0.02-0.03 g per 1 rat

weighing 130-150 g for 30 days (n = 30); control group - animals that received only a general vivarium diet, without soybean flour (n = 30). The 3rd group was intact animals (n = 30) kept under standard vivarium conditions. Soybean was used as a GM product in experiments. Using the PCR method, the presence of GM soybeans in the studied GM soybeans was revealed. the presence of a promoter 35S + FMV, which proves that the soybean under study is a GM product. In ordinary soybeans, this promoter is not available.

All the groups were formed at the same time. The laboratory animals involved in the experiment were representative of age, sex, weight, conditions of detention and feeding. After 30 days of feeding with soy flour, groups of laboratory animals were killed in a humane way, then an autopsy was performed. When killing and opening laboratory animals, biological safety rules and ethical principles for working with laboratory animals were observed [3, 6].

To study the morphological indicators of the thymus, a macroscopic method (anatomical preparation) was used. Macroscopic studies of animals were carried out on the basis of a meeting of the ethical committee of the Ministry of Health of the Republic of Uzbekistan No. 4/17-1442 of 21.09.2020 [7]. To study morphological indicators, research methods widely used in laboratory practice were used [1]. After cutting out the material, the pro was fixed in 10% buffered formalin, then washing in water and dehydration in alcohols and sealing with benzene. After that, they poured into the paraffin and prepared sections with a thickness of 4-6 μm, which were stained with hematoxylin and eosin. The sections were examined morphometrically, using an eyepiece-micrometer DN-107 T / Model CM001 CYAN cope (Belgium).

Mathematical processing was carried out directly from the general data matrix "Excel 7.0" with the involvement of the capabilities of the program "STTGRAPH 5.1" determined the indicators of standard deviation and errors of representativeness. When organizing and conducting research, the principles of evidence-based medicine were observed.

Research Results and Discussion

In the thymus, after two weeks of exposure to GMOs, there were no abrupt changes in the ratio of cortical and cerebral matter. To conclude about the peculiarities of cytoarchitectonics of individual thymus zones, a quantitative study of the cytological profiles of the subcapsular, cortical and medullary substance was carried out. The absolute content of all occurring cell types per unit area of each structural and functional zone of the thymus was calculated. Significant deviations from control in the first two groups of rats (a decrease in the number of small lymphocytes and the

total number of all cells by more than 1.3 times, P<0.01) seem to indicate an increased functional activity of this zone, manifested in the active emigration of mature differentiated forms of lymphocytes from the thymus. It should be noted that the increase in the number of mast cells found in a number of cases (2.1-3.7 times, P<0.05) also indirectly indicates a change in the intensity of migration processes, since the role of mast cells in the regulation of blood vessel permeability is well known. Pathological changes in the thymus, noted in the experimental group, indicate that this GM product negatively affects the state of these organs in experimental animals. The absence of carcinogenic action of GM soybean meal on animals of the experimental group, apparently, was due to the short period of exposure to this food product.

Findings:

The effects of GMOs cause changes in the cytoarchitectonics of the subcapsular, cortical and medullary thymus, indicating an increase in the immigration of T-lymphocyte precursors to the subcapsular zone, activation of the stages of differentiation of T-lymphocytes in the thymus and intensive emigration of medullary thymocytes against the background of a slight decrease in the level of destruction in the medullary substance of the organ. about the greater vulnerability of these structures compared to the brain substance. In all areas of the thymus, the structure of the lymphoid cell population changes most significantly, and in the subcapsular substance it is in an emergency state.

In the thymus, an increase in the correlation of cytological profile indicators (absolute values characterizing the number of cells of different types) was revealed: the maximum increase in conjugation was found in the medulla, the minimum - in the subcapsular zone, which indicates an increase in the interaction of various types of cells in this lymphoid organ under the influence of GMOs, especially in its brain substance.

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