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STUDY AND EVALUATE THE EFFECT OF GM SOY ON THE MICROFLORA OF THE LARGE INTESTINE IN AN EXPERIMENT ON WHITE MONGREL RATS

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Annotation: Our goal was to study and evaluate the effect of GM soy on the microflora of the large intestine in an experiment on white mongrel rats. The indicators of the normal microflora of rats receiving soy without GMOs significantly differed from these animals that did not receive this product. The amount of Bifidobacterium spp was reduced by 1.28 times, Lactobacillus spp was reduced by 1.53 times, Enterobacter spp and Proteus spp increased by 4.16 and 6.25 times, respectively. The amount of Bifidobacterium spp was reduced by 1.28 times, Lactobacillus spp was reduced by 1.53 times, Enterobacter spp and Proteus spp increased by 4.16 and 6.25 times, respectively. If all 5 types of dysbiosis elements were detected in laboratory animals treated with GM soy, then they were not expressed in rats treated without GM soy. There were no signs of dysbiosis in intact laboratory animals.

Keywords: GMO soy, white mongrel rats, microbiocenosis of the large intestine, intestinal dysbiosis, dysbiosis index.

Relevence: Disruption of the normal microflora of the colon under the influence of various external and internal factors is characterized by a qualitative and quantitative imbalance of the indigenous and facultative microflora in it and is called intestinal dysbiosis. Many physical, chemical, and biological factors can be examples of factors that lead to intestinal dysbiosis.

Today, a lot of scientific work has been done on the different effects of genetically modified (GM) products on the human body, and experts are divided on this issue, along with the opinion that these products have no adverse effects on the human body [2, 3, 7,13]. Subsequent scientific studies have shown that GM products have a negative effect on the immune system [1,15], liver and pancreas [6,10,16], thymus and spleen [8,14,17], as well as hematological, biochemical changes, mutagenic and reproductive activity [4, 5,11,18], there are studies showing that it has a negative effect on bone marrow cells [9,13,19].

An analysis of many scientific literatures shows that there are few studies to determine the degree of impact of GM products on the microbiocenosis of human biotopes, including the microbiosis of the colon, and they are scattered.

The purpose of the study: To determine the degree of influence of GM soy on the microbiocenosis of the colon of a mongrel white rat in an experiment.

Материалы и методы: For this purpose, a total of 90 male white rats were involved in the study, which were divided into 3 groups: Group 1 - intact white rats with a standard vivarian diet, not fed with GM or without GM (n = 30). ; Group 2 - GM-free white rats included in the standard vivariate diet (n = 30); Group 3 - white non-GM rats fed with GM-soy in the standard vivariate diet (n = 30).

The study strictly adhered to the ethical principles and biological safety rules of working with laboratory animals [4,20].

After the colon mass of white rats was delivered to the bacteriological laboratory, bacteriological examinations were performed using Bergy's Manual Systematic Bacteriology (1997) using appropriate nutrient media (Blaurokk, SRM-4 (MRS-4), Endo, Saburo media, egg yolk agar, etc.). Microorganisms were identified and differentiated: Bifidobacterium spp, Lactobacillus spp, Escherichia coli, Enterobacter spp, Proteus spp, Staphylococcus spp, Streptococcus spp, Candida spp.

Intergenerational and interspecific identification was performed using food media from HiMedia (India).

Statistical processing of the results was carried out using traditional variational statistical methods, and the principles of evidence-based medicine were followed in organizing and conducting the research.

Results: It turns out that rats who received soy without GM intact laboratory animals in the normal microflora of the colon have a relatively different diminishing quantitative difference of Bifidobacterium spp (a decrease of 1.28 times), Lactobacillus spp (a decrease of 1.53 times), Enterobacter spp and Proteus spp (4.16 and 6.25 times increased). This did not show the full development of dysbiosis, since Escherichia coli is lactose-negative and there was no intergroup differentiation by lactose-positive strains. If all 5 types of dysbiosis elements are determined in laboratory animals that have received GM soy, then in rats that have not received them they are not clearly expressed.

There were no signs of dysbiosis in intact laboratory animals. Symptoms of dysbiosis were weakly expressed in patients receiving non-GM soy (ID I), and dysbiotic symptoms were isolated in patients receiving GM soy (ID II). In order to summarize all the results obtained, we found it necessary to compare the performance of all three groups (Table 1).

Table 1

Quantitative status of colonic microflora in GM- and GM-free rats, lg (M ± m) (CFU / ml)

Microorganisms	Group 1, n = 30	Group 2, n = 30	Group 3, n = 30
Bifidobacterium spp	5.10 ± 0.2	4.00 ± 0.1	2.10 ± 0.1 * ^ ↓
Lactobacillus spp	6.10 ± 0.2	4.00 ± 0.1	2.00 ± 0.2 * ^ ↓
Escherichia coli (lactosapositive)	5.15 ± 0.2	5.00 ± 0.2	0 ↓
Escherichia coli (lactose-negative)	0	0	5.30 ± 0.3 * ↑
Enterobacter spp	1.20 ± 0.1	5.00 ± 0.2	5.45 ± 0.2 * ^ ↑
Proteus spp	0.80 ± 0.1	5.00 ± 0.2	3.00 ± 0.1 * ^ ↑
Staphylococcus spp	4.10 ± 0.1	5.00 ± 0.2	6.15 ± 0.2 * ^ ↑

Streptococcus spp	6.30 ± 0.3	4.00 ± 0.2	4.30 ± 0.2 * ↓
Candida spp	3.60 ± 0.1	7.00 ± 0.1	7.00 ± 0.4 * ↑

Note: * - a convincing difference sign between groups 1 and 3; ^ Is a convincing difference sign between groups 2 and 3; ↑, ↓ - directions of changes; ↔ - There is no convincing difference.

Conclusions:

1. GM-free soy-fed white rats in the normal microflora of the colon compared with reliable intact laboratory animals Bifidobacterium spp (1.28-fold decrease), Lactobacillus spp (1.53-fold decrease), Enterobacter spp, and Proteus spp (4 , An increase of 16 and 6.25 times, respectively). These are the initial signs of dysbiosis and do not indicate the development of complete dysbiosis, as no group differences between lactozanegative and lactosapositive strains of Escherichia coli have been identified.

2. Quantitative indicators of Bifidobacterium spp and Lactobacillus spp in laboratory animals fed with GM-soy were significantly reduced by 2.43 and 3.05 times compared to intact rats. This decrease was an external factor negatively affecting them, and in this experiment it was interpreted as a GM-soy. This condition was interpreted as the first element of dysbiosis formed in the colon biotope.

3. In contrast to intact ones, white lactating rats fed with GM-soy did not produce lactose-negative Escherichia coli, while lactose-positive Escherichia coli did not produce flour, and vice versa. Lactation of lactosanegative strains, the absence of lactose-positive strains, has been shown to be a second element of colonic dysbiosis. In laboratory animals fed with GM-soy, Enterobacter spp and Proteus spp were found to be 4.54 and 3.75 times higher, respectively, than in the control group, proving to be the third element of colon dysbiosis.

4. No significant changes in gram-negative cocci were observed in elements 1-3 of colonic dysbiosis with obvious manifestations of this condition - Streptococcus spp in the main group decreased 1.47 times compared to intact laboratory animals, coagulazapositive Staphylococcus spp 1.50 times more reliable. increased significantly. This intergroup incompatibility was interpreted as the fourth element of colon dysbiosis.

5. The quantitative index of Candida spp in white-bred rats fed with GM-soy was significantly increased by 1.94 times compared to those not fed with this product, as the fifth element of colon dysbiosis. In laboratory animals fed GM-soy, all 5 of the cited elements of dysbiosis were present, whereas in rats consuming soy without GM, they were not evident.

6. Determination of dysbacteriosis index, indicating the I and II degrees of dysbacteriosis, gave the following results: in group 1 - 0.31 <0.1 (DI I); 0.37 <0.5 (DI II); In group 2 - 0.38 <0.1 (DI I); 0.77 <0.5 (DI II); In group 3 - 1.29 <0.1 (DI I); 3.56 <0.5 (DI II). There were no signs of dysbiosis in intact laboratory animals, the symptoms of dysbiosis were poorly developed in GM-free soy feeding (grade I), and the symptoms of dysbiosis were pronounced in GM-soy-fed animals (grade II).

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