

Study of Morphological Manifestations of the Effect of Acute Radiation on the Spleen of Experimental Animals

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ABSTRACT:

It is known that in the process of radiation of various manifestations, especially when exposed to acute radiation, the integrity and permeability of the membrane of the body's tissues is impaired, an increase in membrane permeability leads to the development of hydroponic dystrophy in the intracellular fluid and various micro - and Macroelements infiltration, the activation of proteins freely located in the cytoplasm, Hepatocyte hypoxia caused by venous fullness in the liver tissue leads to the development of large, medium and small-drop fatty dystrophy [4, 10].

Various researchers have found that the internal organs most sensitive to acute radiation are the organs of the immune system, the mucous membrane of the gastrointestinal tract are labile cells, the exocrine and endocrine glands, and the gonads from mixed glands. Internal organs with low sensitivity to radiation have been shown to include the heart, kidneys, liver, head and spinal cord, bone tissue, and joints [3, 9, 11].

Analysis of scientific sources showed that even if a lot of research work was carried out on this problem, it was observed that there are issues that require study, while research on the effect of acute radiation on the morphological structure of various organs, including the spleen, the degree of influence of preventive biocorrection is not enough.

The purpose of the study was to study the morphological changes in the spleen of laboratory animals and the degree of influence of preventive biocorrection on it in an experiment with the effects of acute radiation.

Material and methods. For experimental studies, 60 white non-breed rats of the male sex, weighing 160-180 g, were taken. All laboratory animals were quarantined for 21 days and monitored during these days, when the quarantine period ended, they were involved in experiments. Drawing up a standard vivarium food ration for laboratory animals in vivarium conditions, compliance with biological safety rules and ethical principles when feeding, caring for, conducting experiments Nuraliev N.A. and hammual. [5] was carried out on.

All laboratory animals were divided into the following groups:

Group 1-rats without white breed (N=15), which were in the standard vivarium ration, received one-time acute radiation in the amount of 5 grays, did not undergo preventive biocorrection;

Group 2-white non-breed rats with the addition of the biologically active additive "Lactopropolis-AWL" for the purpose of preventive biocorrection to the standard vivarium ration, receiving one-time acute radiation in the amount of 5 Gray (N=15);

Group 3-rats without intact white breed (N=30), which were in the standard vivarium ration, did not receive acute radiation, did not undergo preventive biocorrection.

In the experiment, irradiation of laboratory animals was carried out using a gamma-therapeutic apparatus "agat-R1" (Estonia), in which the source of radiation was the so-60. Research related to

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animal irradiation was carried out at the Bukhara branch of the Republican specialized scientific and practical center of oncology and radiology of the Republic of Uzbekistan.

In the conservation, lifelessness and anatomical lighting of laboratory animals, all biological safety rules and ethical principles of working with laboratory animals were strictly observed [2, 5].

Permission was obtained from the Ethics Committee of the Ministry of health of the Republic of Uzbekistan for experiments with laboratory animals (rats without white breed) (Protocol No. 4 of August 26, 2020).

To study the morphological parameters of the spleen of laboratory animals, research methods were used, which are widely used in experimental research (anatomical rupture). All biological microobjects were viewed using a trinocular microscope (Chinese) of the HL-19 model with software. The main object of the study was histological preparations made from the spleen of rats without white breed.

The preparation of histological preparations was carried out in 4 stages and carried out in traditional ways. For the preparation of preparations, a mechanical rotational microtom of the YD-315 brand (China) was used, the prepared incisions were painted with hematoxylin and eosin. To do this, the cuts were soaked in a solution of hematoxylin for 3-5 minutes, and then washed using water. When the kernels were colored purple, they were painted in eosin solution for 0.5-1.5 minutes, washed in distilled water and alcohols (from 70° to 100°) with increased levels were used for dehydration. The alcohol was placed in three parts of o-xylol in a row to remove it from the cut and make it clear and put it in a Canadian balm. Taking pictures of micropreparations was carried out in the microscope in sizes $x=4\times 10$, 10×10 , 20×10 , 40×40 , 60×10 , 80×10 [8].

For statistical processing of the results obtained, traditional methods of variational statistics were used. All checks were performed on personal computers with the use of a special program "Excel" for medical and biological examinations. The organization and conduct of research was carried out on the principles of evidence-based medicine.

Results and their discussion. It is known that acute radiation affects different organs and tissues of the body, causing various negative changes, it is noteworthy that these changes are mainly at the cellular level. Whether these changes are reversible or irreversible, lead to complications or a lethal result depends on the dose of this radiation, the duration of the effect, the state of the irradiated organism, the optimal treatment and preventive measures taken in a timely manner.

It is known that the spleen is a parenchymal member in the abdominal cavity, the largest lymphoid in vertebrates, as well as a peripheral member of the body's immune system [1].

Since the morphological structure of the laboratory animal spleen of the control group (intact) was studied in detail and described in the form of scientific sources [7, 12] we did not find it necessary to dwell on them, we also used the results obtained to compare them with the results of the main (group 1) and comparison (group 2) groups.

Analysis of histological preparations made from the spleen of laboratory animals belonging to Group 1, which received acute radiation and did not undergo preventive biocorrection, showed that the boundaries of the red and white pulp of the spleen were clear (100.0%, $n=15$), foci of hemolysis were detected in the red pulp (66.7%, $n=10$), parenchyma cells.

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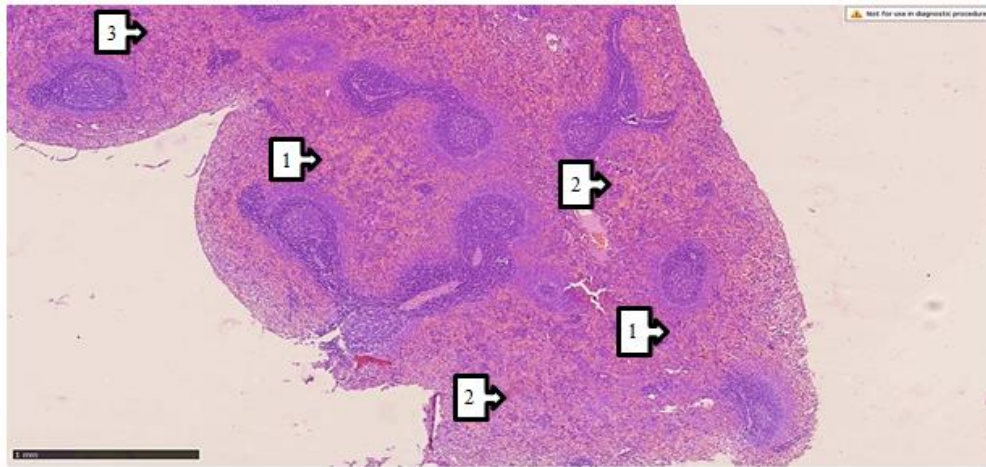


Figure 1. The morphological appearance of the spleen of a rat without a white breed, receiving acute radiation (spleen red pulp and white pulp boundaries are clear (1), most hemolysis foci in red pulp (2), in stroma it was seen that the parenchyma cells were reduced and pink (3). Hematoxylin-stained with eosin, 4x10).

In another histological preparation, the animal spleen is characterized by atrophic changes in lymphoid follicles (66.7%, n=10), around the lymphoid follicle, the ring of plasmatic cells is located unevenly, plasmatic edema in the wall of the trabecular artery (66.7%, n=10), fullness in the trabecular venous blood vessels, reticular cells (60.0%, n=9) increased in the red pulp (Figure2).

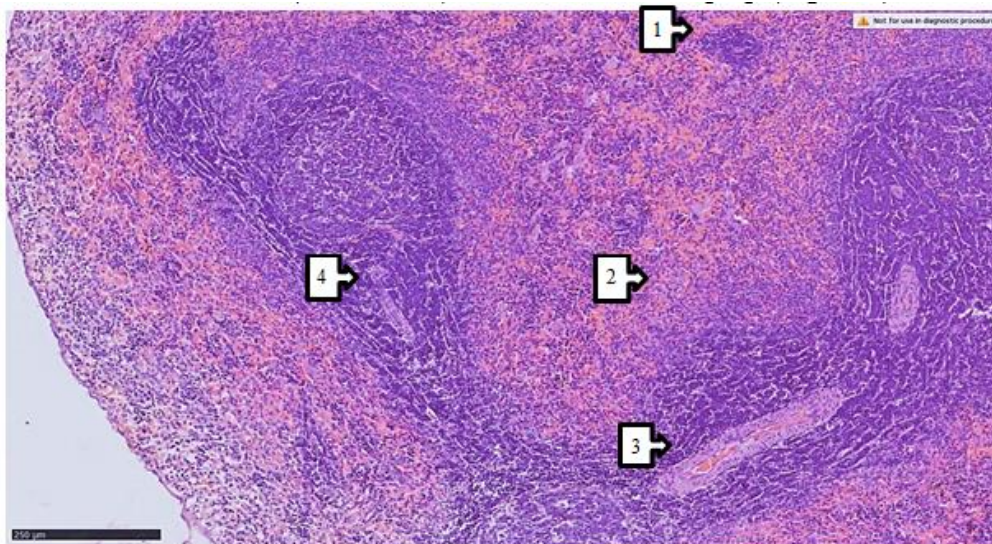


Figure 2. Morphological appearance of a rat spleen without a white brood receiving acute radiation (lymphoid follicle atrophic changes (1), around the lymphoid follicle, the ring of plasmatic cells is located unevenly (2), plasmatic swelling in the trabecular artery wall (3), fullness in the trabecular venous blood vessels, reticular cells in the red pulp (4) increased. Hematoxylin-painted with eosin, 10x10).

In another histological preparation, morphological changes were also observed, representing the negative effects of similar acute radiation, detected when microscopized with an magnification of 400 times (40x10) (Figure 3), when reticular cells were collected around the trabecular artery wall (60.0%, n=9), it was found that the pulpar veins had fullness (53.3%, n=8), as well as interstitial edema (46.7%, n=7). The obvious lack of manifestation of these morphological changes was explained by the brevity of the observation period, but their observation is a sign that the prospect of this pathological process is unpleasant.

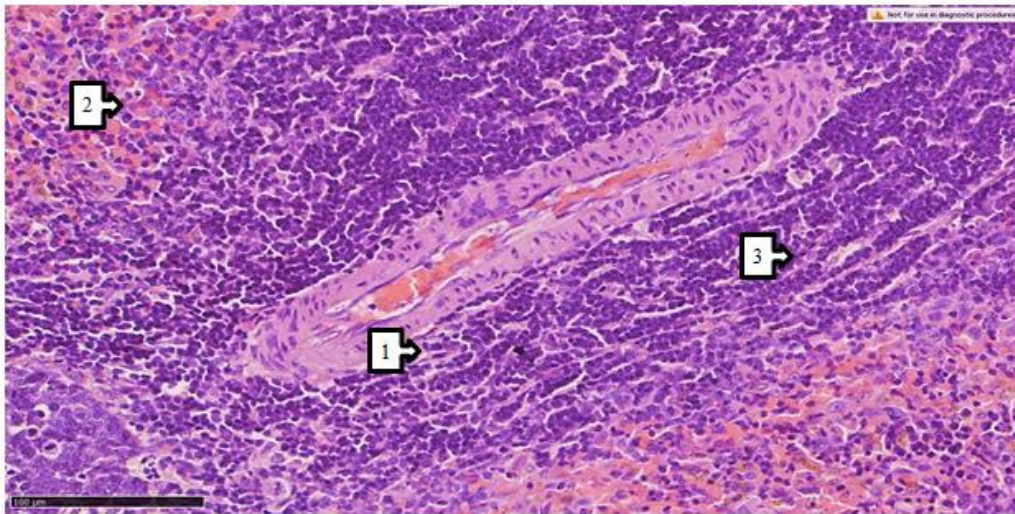


Figure 3. Morphological appearance of a rat spleen without a white breed, receiving acute radiation (reticular cells around the trabecular artery wall (1), fullness in the pulpar veins (2), interstitial edema (3) were detected. Hematoxylin-painted with eosin, 40x10).

In another histological preparation, V-lymphocytes (93.3%, n=14) were detected, destructively altered plasmatic cells (73.3%, n=11) were observed, phagocytosis (80.0%, n=12) of cell components that undergo necrosis in macrophages in the limb was detected under a microscope (Figure 4).

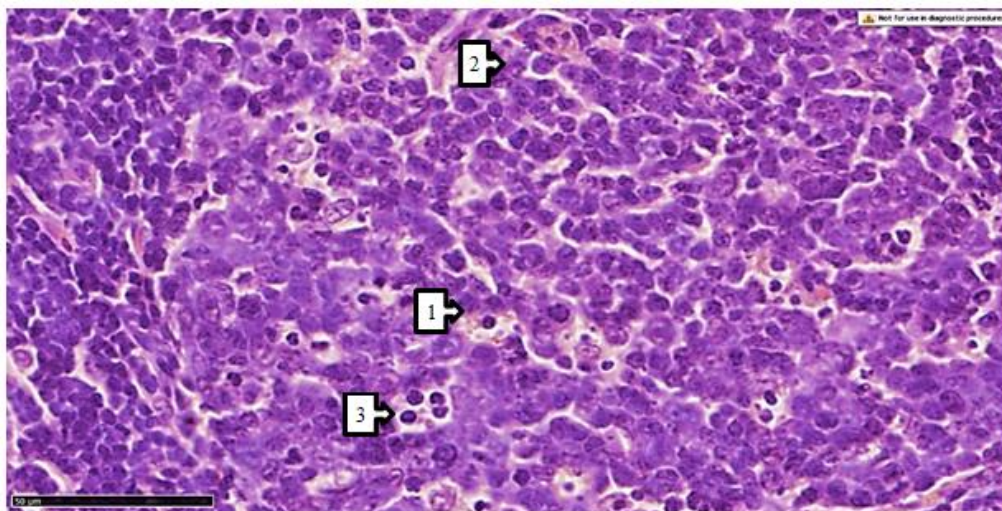


Figure 4. Morphological appearance of a rat spleen without a white breed, receiving acute radiation (V-lymphocytes (1), destructively altered plasmatic cells (2), phagocytosis of necrosis-exposed cell components (3) in macrophages, formed in the center of the lymphoid follicle, was determined. Hematoxylin-painted with eosin, 80x10).

Morphological changes shown in the analysis of histological preparations made from the spleen made it possible to determine the degree of impact on this organ of laboratory animals of acute radiation, tissue and cells that have seen many casualties. When the degree of occurrence of all detected morphological changes was compared with the parameters of intact laboratory animals, the scale of these changes was clearly visible (table), the consequences of the effects of acute radiation were obvious.

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Table. Comparative indicators of morphological changes in the spleen of laboratory animals receiving acute radiation

Morphological changes	Control group, n=30	Main group, n=15
The boundaries of the red and white pulp are clear	30 / 100,0	15 / 100,0
Foci of hemolysis in red pulp	0 / 0	10 / 66,7
Decreased parenchyma cells in stroma	1 / 3,3	14 / 93,3
Changed surroundings of lymphoid follicles	2 / 6,7	10 / 66,7
Plasmatic swelling in the wall of the trabecular artery	0 / 0	10 / 66,7
Red pulp has increased reticular cells	0 / 0	9 / 60,0
Fullness in the Pulpar veins	3 / 10,0	8 / 53,3
Interstitial edema in the limb	0 / 0	7 / 46,7
Forming V-lymphocytes	30 / 100,0	14 / 93,3
Destructively altered plasmatic cells	0 / 0	11 / 73,3
Phagocytosis of cell components subjected to necrosis in macrophages	0 / 0	12 / 80,0

Note: absolute in the photo, relative (%) numbers in the denominator.

Thus, it was proved that 9 out of 11 morphological indicators in the main group differ convincingly from the control group, pathological changes in cell morphology appear, pathophysiological signs such as fullness, edema, foci of hemolysis, plasmatic swelling are accompanied by morphological symptoms are influenced by acute radiation, an unpleasant end was shown in perspective.

Similar morphological studies were also carried out in the group of white non-breed rats (Group 2), where preventive biocorrection was carried out. Photos of the prepared histological preparations showed the appearance of morphological changes. Below we have cited some of these photos with a comparative analysis.

Belonging to Group 2 (n=15) obtained as a comparison group, biologically active additive "Lactopropolis-AWL" (biological drug) [6] in a histological preparation made from the spleen of laboratory animals undergoing preventive biocorrection with a decrease in its parenchyma, it was found that the red pulp has foci of hemolysis (66.7%, n=10), that the majority of lymphoid follicles that undergo collapse in stroma have shrunk (2), destructively altered cell components (3) have been detected in the marginal area (Figure 5).

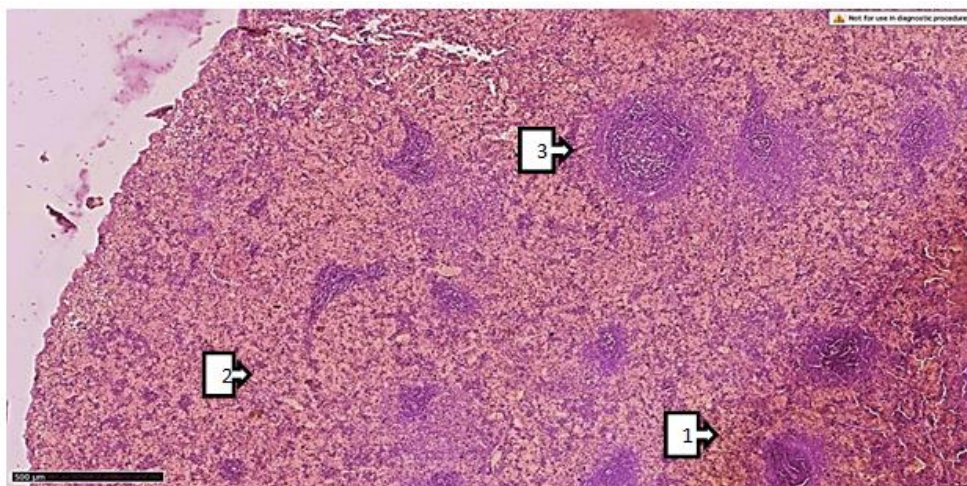


Figure 5. Morphological view of the spleen of a biocorrected White-breedless rat receiving acute radiation (decreased spleen tissue parenchyma, red pulp has hemolysis foci (1), most lymphoid follicles that undergo collapse in stroma have shrunk (2), destructively altered cell components (3) have been detected in the marginal area. Hematoxylin-stained with eosin, 4x10).

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In another histological preparation, it was found that the periarterial T-lymphocytes Halka in the spleen of laboratory animals involved in research was reduced, the proliferation of plasmatic cells around lymphoid follicles was sharply increased (93.3%, n=14), as well as the area around the follicles of V-lymphocytes and the cleft spaces in the central artery yoni region (66.7%, N=10) - Figure 6.

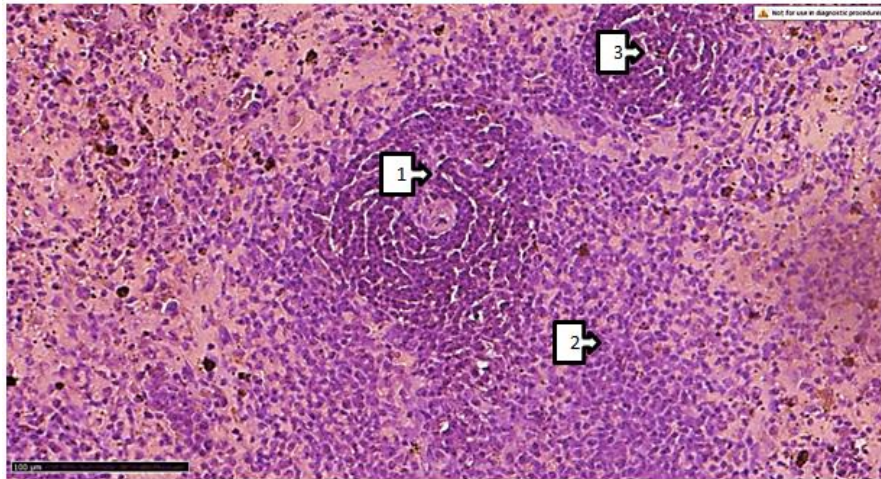


Figure 6. The morphological appearance of a biocorrected White-breedless rat spleen, which received acute radiation (periarterial T-lymphocytes Halka sharply decreased (1), the proliferation of plasmatic cells around the lymphoid follicles sharply developed (2), V-lymphocytes formed cleft gaps (3) in the area around the follicle and in the central artery yoni Khudu. Hematoxylin-painted with eosin, 20x10).

Also, in the germinative center of the lymphoid follicles of the spleen, the proliferation of V-lymphocytes increased (93.3%, n=14), it is seen that the mufta formed by plasmatic cells around the lymphoid follicles is clearly proliferated (93.3%, n=14) (fig).

In another histological preparation, many destructively altered plasmatic cells were detected in the spleen stroma (73.3%, n=11), and we also want to admit that a set of macrophages or splenocytes was detected (93.3%, n=14), under a microscope, a tumor (33.3%, n=5) was detected under the influence of the homogenous plasma fluid of the stroma (Figure8).

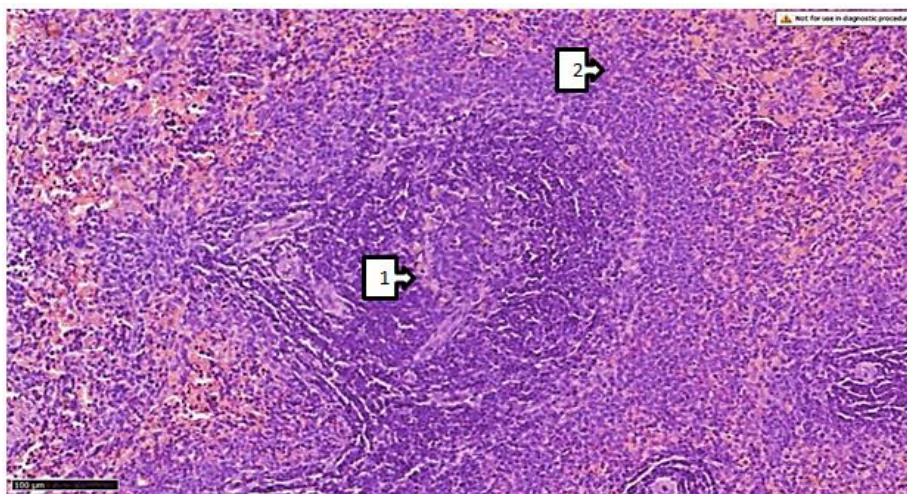


Figure 7. Morphological view of the spleen of a white brood rat with biocorrection, receiving acute radiation (increased proliferation of V-lymphocytes in the germinative center of the lymphoid follicle (1), a clutch consisting of plasmatic cells around the lymphoid follicle is clearly proliferated (2). Hematoxylin-painted with eosin, 40x10).

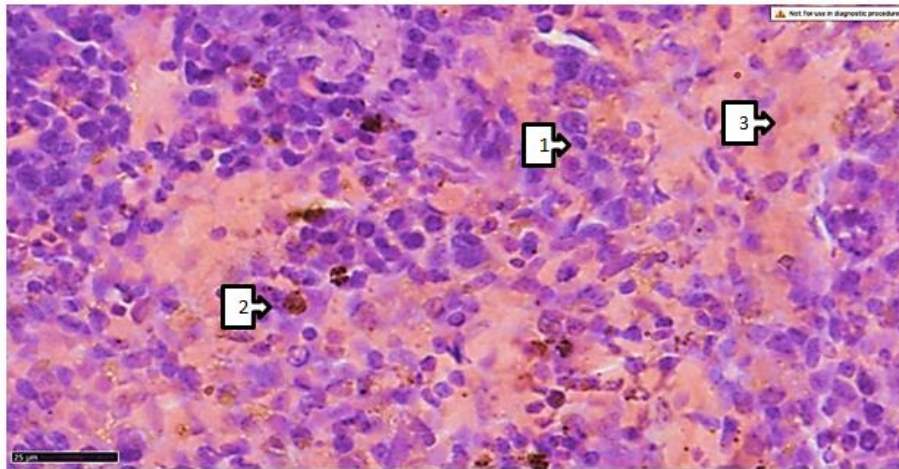


Figure 8. Morphological view of the spleen of a rat without a biocorrected white breed, which received acute radiation (in stroma, many destructively altered cells were detected (1), a set of splenocytes (2) were detected. Tumor (3) was detected under the action of stromas homogenous plasma fluid. Hematoxylin-painted with eosin, 80x10).

Thus, when the intensity of morphological changes in the spleen of laboratory animals that received acute radiation and received preventive biocorrection was compared with an uncorrected Group, a convincing, significant discrepancy between the changes was not observed, all indicators were close to each other. It was found that the results obtained did not have a positive effect on the morphological characteristics of the spleen in acute irradiation of the used biopreparation, but it should be recognized that its negative effect was not observed either.

Conclusions.

1. In a group of experimental animals that received acute radiation, but did not undergo preventive biocorrection, 9 of the 11 morphological indicators in the spleen differ convincingly from the control group, the appearance of pathological changes in cell morphology, pathophysiological signs such as fullness, edema, hemolysis foci, plasmatic swelling were proved to be accompanied by morphological symptoms, an unpleasant end was shown in
2. When the intensity of morphological changes in the spleen of laboratory animals that received acute radiation and received preventive biocorrection was compared with the non-biocorrected group, no significant, convincing differences were observed between the detected changes, all indicators were close to each other.
3. It was found that the obtained morphological results did not have a positive effect on the morphological characteristics of the spleen in acute irradiation of the biological drug used for the purpose of preventive biocorrection, but it was also recognized that its negative effects were not observed either.

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