Features of damage and recovery of rats hematopoietic system following the exposure to sublethal doses of ionizing radiation

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Background. The fate of irradiated organism, as it is known, is determined by the state of hematopoietic tissue, which is one of the critical systems upon radiation exposure. In this regard, it seems appropriate to clarify the role of hematopoietic stem and progenitor cells in the mechanisms of damage and recovery of hematopoietic function after irradiation in sublethal doses.

Aim. The aim of the current study was to determine colony-forming activity of granulocytic-macrophage and erythroid progenitor cells in non-irradiated animals and after irradiation in sublethal doses and to investigate the process of hematopoietic recovery using cell culture *in vivo*.

Methods. For the study, two groups of Wistar rats were used. The first group consisted of non-irradiated animals, the second group included rats irradiated in the dose of 6 Gy. Peripheral blood from the tail vein was obtained on day 0, 9 and 21. Along with that, bone marrow was excised from femoral bone and after preparing smears was inserted in original diffusion chambers (1×10^5 cells per chamber). Hematopoietic cells were cultivated for 7 days and examined under an inverted microscope; numbers of clusters and colonies were determined.

Results. After irradiation, deep cytopenia was detected in the peripheral blood and bone marrow smears. The study has shown that compared to non-irradiated animals whose colony-forming activity was 48.5 ± 3.2 per 1×10^5, for the irradiated animals this index equaled to 56.1 ± 1.2 colonies per diffusion chamber. It indicates that after the radiation exposure hematopoietic progenitor cells remained viable and their proliferative activity increased.

Conclusion. Thus, radiation injury of the organism is revealed in significant leucopenia in peripheral blood and bone marrow after irradiation and is followed by a significant increase in the relative proportion of proliferating bone-marrow cells, which was shown during cell cultivation. Higher proliferation of bone marrow progenitor cells will further provide the recovery of hematopoiesis, which is confirmed by peripheral blood and bone marrow indices on the 9th and 21st day of investigation.

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