

Assessment of Mesenchymal Progenitor Cells of Mice Bone Marrow Under Ionizing Radiation Influence in Cell Culture *in Vitro*

Russu Iryna¹, Bilko Nadiia¹

¹National University of Kyiv-Mohyla Academy, Kyiv, Ukraine

Background. Mesenchymal cells at present are widely investigated, particularly because of their usage in the therapy of many diseases. It is known that bone marrow is the source of mesenchymal, as well as hematopoietic cells. In case of impact by stress factors, such as chemotherapeutic agents or ionizing radiation, the earliest reaction is usually observed in bone marrow. Previously it was generally assumed that mesenchymal cells are rather radioresistant, but there is data showing presence of radiosensitive sub-populations among them.

Aim. The aim of the current study was the assessment of functional activity of mesenchymal progenitor cells of mice bone marrow under ionizing radiation influence in cell culture *in vitro*.

Methods. Investigation was performed using 30 Balb/C mice divided into three groups. The first group was acutely irradiated in the sublethal dose of 5.95 Gy. The second group was irradiated chronically during 18 months in the general dose of 1.5 Gy. The third group was the control.

To assess functional activity of mesenchymal progenitors we used cultural methods. Bone marrow was cultivated *in vitro* during 10 days with further counting of fibroblast colony-forming units (CFU). We have also studied the ability of obtained feeder layers to support hematopoiesis in cell culture *in vitro*. Bone marrow hematopoietic cells of intact mice were placed in gel diffusion chambers providing the permeation of nutrients and growth factors from medium and feeder layers. Cultivation was performed during 11 days with further evaluation of CFU number.

Results. The authors have revealed the decrease in colony-forming efficiency of mesenchymal progenitor cells in both irradiated groups compared to control. In particular, the number of CFU in the first group was 1.9 ± 0.6 , in the second – 6.1 ± 0.8 , and in control – 11.1 ± 1.8 CFU per 1×10^6 explanted cells. Besides, irradiated mesenchymal cells have shown the alteration in their ability to support hematopoiesis. Hematopoietic progenitors expressed reduced colony-forming efficiency on the irradiated feeder layers compared to control. These indices were 8.6 ± 1.3 in the first group, 17.4 ± 1.6 in the second, and 26.6 ± 1.2 CFU per 1×10^5 explanted cells in control group.

Conclusion. The performed investigations yielded conclusion that mesenchymal progenitors of mice bone marrow possess a rather high radiosensitivity, which is revealed both in case of single acute and long-term chronic irradiation. This should be taken into account when assessing the consequences of ionizing radiation action on the functioning of bone marrow and the state of the hematopoietic system in general.

Acknowledgements. The authors declare the absence of conflict of interest.