Investigation of the Radioactive Strontium-90 Influence on Hemopoietic Progenitor Cells of the Laboratory Rats

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There are several crucial factors that can cause dishemopoiesis, among which radionuclides are rather significant. The aim of this work was to investigate the influence of radioactive Strontium-90 on the functional activity of bone marrow progenitor cells in the in vivo cell culture. The investigation was performed using Wistar laboratory rats, which were exposed to internal chronic ionizing radiation by Strontium-90 during 6 months. Bone marrow cells of the rats were excluded from the femur and inserted into the gel diffusion chambers. The next step was in vivo cultivation of the cells in the chambers using CBA mice model. Mice were previously injected by cyclophosphamide, which caused the increase of colony-forming activity and suppressed immune reactivity of the recipient. Functional activity assessment of hemopoiesis consisted in the analysis of cell aggregate forming in the culture. On the 14th day of cultivation cell number in these aggregates was not maximal. Hence, they could not be accepted as colonies, they were clusters. Prolonged cultivation of the cells has shown, that on the 18th day cell number achieved the point of colony forming, i.e. it reached and even exceeded the amount of 40 cells, after which the aggregate is considered to be colony. Therefore, this duration was determined as granulocytic-macrophage colony-forming efficiency for rat bone marrow cells. The results of cultivation have shown definite depression of colony forming in the experimental group, in comparison with the normal indices. This research has shown the decrease of bone marrow cells colony-forming activity as a result of chronic exposure to ionizing radiation. It was followed by immature granulocyte growth in culture and cell destruction, which may be caused by high radiosensibility of bone marrow progenitor cells. Our observations concerning the optimal period of rat bone marrow cells cultivation allowed to conclude, that they overcome longer period of maturation in the in vivo cell culture, than human or mice bone marrow cells. In addition to that, we observed eosinophilic colony forming in the cell culture of irradiated bone marrow cells. This data is comparable with the results of human hemopoietic cells cultivation. Higher proliferative activity of eosinophilic cells can be explained by stimulating influence of radionuclides on the cytokine regulation, especially on the interleukine-5, which is known to be responsible for eosinophilic differentiation.

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