

Innate immunity system in persons with late radiation-induced leukocytopenia

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Wide usage of the sources of ionizing radiation in different spheres of medicine, science, industry and agriculture makes the study of the effects of the chronic low dose-rate exposure

relevant. According to the point of view of the United Nations General Assembly (2011) the most important of such studies is the follow up of the Techa riverside residents who were subjected to combined chronic low dose-rate exposure (external gamma- and internal largely due to the intake of osteotropic⁹⁰Sr) in a wide range of doses as a result of the releases of liquid radioactive wastes of Mayak PA into the Techa river.

The maximal dose-rate to bone marrow in Techa riverside residents was registered in 1951 and made up 1.48 Gy/year. In subsequent years the dose-rate gradually decreased and in 1985 it did not exceed permissible levels (1 mGy/year). In late periods (after ≥50 years since the onset of exposure) in the cohort of exposed persons leukocytopenias were newly registered.

The aim of this paper is to assess the main parameters of innate immunity in persons with late radiation-induced leukocytopenia. The study group consisted of 23 exposed patients with

leukocytopenia, the comparison group comprised 70 exposed individuals without leukocytopenia. The following parameters were assessed and analyzed: absolute and relative number of neutrophils, monocytes, NK and TNK-cells in blood, the parameters of phagocytic and lysosomal activity, as well as that of intracellular oxygen-dependent metabolism of neutrophils and monocytes.

Statistically significant decrease in the lysosomal activity of the neutrophils was registered in exposed individuals with leukocytopenia.

Prolonged exposure to low dose ionizing radiation is accompanied by long-term tension of compensatory-adaptive mechanisms. In the course of time the processes of compensatory hypertrophy and hyperplasia of cellular elements in red bone marrow are gradually substituted by the processes of hypotrophy, atrophy and fibrosis. Therefore the cells produced by such red bone marrow can be functionally inadequate. Thus, the development of leukocytopenia in chronically exposed people is most probably connected with not only decrease in the production of leukocytes in red bone marrow, but also with their increased destruction in the peripheral blood, in particular following the mechanism of apoptosis.

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