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ASSESSMENT OF THE FREQUENCY OF CHROMOSOMAL ABERRATIONS IN MAYAK WORKERS EXPOSED OCCUPATIONALLY

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Objective: Assessment of structural genome damages in Mayak workers exposed occupationally to prolonged external gamma-radiation and/or internal alpha-radiation using mFISH.

Material and Methods: Slides of 64 workers were analyzed in the study. Average age of the included individuals was 73.3 ± 0.9 years. Workers included in the study were exposed occupationally to prolonged external gamma-rays and/or internal alpha-radiation from incorporated Pu-239. Cumulative dose of external gamma-exposure to the red bone marrow (RBM) was at the range from 0 to 2.7 Gy, absorbed dose of internal alpha-exposure to the RBM from incorporated Pu-239 was from 0 to 0.8 Gy.

The analysis was performed based on the culture of peripheral blood lymphocytes. The analysis of chromosomal aberration frequency was carried out using the method of fluorescent in situ hybridization mFISH.

Results and Discussion: Both stable and unstable chromosomal aberrations were observed in the studied group. In addition, complex chromosomal aberrations, i.e. aberrations including 3 or more breaks within 2 or more chromosomes were revealed. The frequency of stable aberrations was statistically significantly higher in the group of workers with cumulative absorbed dose of external gamma-radiation to the RBM over 0.5 Gy as compared with the group of workers with cumulative absorbed dose to the RBM less than 0.5 Gy.

The frequency of stable aberrations in Mayak workers with cumulative absorbed dose of internal alpha-radiation to RBM over 0.02 Gy was statistically significantly higher as compared with the group of the workers who were exposed at lower doses.

The frequency of complexes was statistically significantly higher among the individuals with cumulative absorbed dose of internal alpha-radiation from incorporated Pu-239 over 0.02 Gy (0.87 ± 0.05 per 100 cells) as compared with the workers who were exposed at lower doses (0.13 ± 0.05 per 100 cells). Relationship between the frequency of complexes with cumulative absorbed dose of external gamma-radiation to the RBM wasn't revealed.

Conclusion: The results of the present study has shown that the frequency of stable chromosomal aberrations in Mayak workers relates both to cumulative dose of external gamma-radiation to the RBM and cumulative absorbed dose of internal alpha-radiation to the RBM from Pu-239. The frequency of complexes depended only on cumulative absorbed dose of internal alpha-radiation to the RBM from incorporated Pu-239.

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