Cancer in Russia after the Chernobyl accident: review of radiation risks

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Abstract

The purpose of this work is to review the main results of epidemiological studies that were carried out in the system of the Russian National Radiation and Epidemiological Registry (NRER) during the 30-year period after the Chernobyl accident. The exposed contingents are mainly recovery operation workers of the Chernobyl accident (liquidators), 116 thousand persons, and population of the most contaminated territories of Bryansk, Kaluga, Oryol and Tula oblasts affected by the Chernobyl accident, 309 thousand persons. Due to the regular system of the NRER data collection, it is possible to apply cohort method of epidemiological studies both to liquidators and to members of exposed population. The statistically significant radiation risks were observed for leukaemia among liquidators (for 10-y time period after exposure), for solid cancer incidence and mortality among liquidators and for thyroid cancer incidence in exposed population. For the cohort of liquidators the excess relative risk per 1 Gy (ERR/Gy) for leukaemia was equal 4.98, for solid cancer incidence was equal 0.47 and for solid cancer mortality - 0.58. Among exposed population radiation risk of thyroid cancer incidence was found to be statistically significant only for children and adolescents (0–17 yr old) at the time of the Chernobyl accident, with average ERR/Gy = 3.22. The obtained quantitative assessments of radiation risk for leukaemia and solid cancer incidence among liquidators are close to respective assessments for the cohort of atomic bomb survivors (LSS, Japan). The assessment of radiation risk for thyroid cancer incidence in exposed population allows for an effect of screening and has some other features. About a half of lifetime-expected radiation-related cancers were realized during first 30 years after the Chernobyl accident among exposed contingents in Russia, and NRER will remain one of the most powerful data source in radiation epidemiology. NRER is supported by Russian Government.