

# Leukaemia and non-Hodgkin lymphoma risk among Chernobyl liquidators

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## Abstract

Chernobyl liquidators were workers involved in the clean-up of contaminated areas around the Chernobyl power plant following the accident on 26 April 1986. These workers form a potentially important population for evaluation of the effects of protracted low doses of ionizing radiation.

A collaborative case-control study of leukaemia and non-Hodgkin lymphoma (NHL) was set-up, nested within cohorts of Belarus, Russian and Baltic countries liquidators. The objective was to evaluate the radiation-induced risk of these diseases in this population and to study the effect of exposure protraction and radiation type on the risk of radiogenic cancer in the low to medium (0-500 mSv) radiation dose range.

The study population consisted of approximately 66,000 Belarus, 65,000 Russian and 15,000 Baltic countries liquidators who took part in the clean-up activities between 26 April 1986 and 31 December 1987. In Belarus and Russia, liquidators are followed through the Chernobyl Registries and must undergo regular health check-ups, while in the Baltic countries their migration, vital and cancer status are assessed through population, death and cancer registries. The case ascertainment period ranged from 1990 to 2000 with minor differences among the countries.

Information on study subjects was obtained through a face-to-face interview with the study subject and/or a proxy (a relative or a colleague), using a standardized questionnaire on demographic factors, time, place and

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conditions of work as a liquidator and on potential risk and confounding factors for leukaemia.

A method of analytical dose reconstruction, entitled RADRUE (Realistic Analytical Dose Reconstruction with Uncertainty Estimation), was developed within the study, validated and applied to estimate individual dose to the bone marrow and related uncertainties for each subject.

117 cases (69 leukaemia, 34 NHL and 14 other malignancies of lymphoid and haematopoietic tissue) and 481 matched controls were included in the study. The main analyses were restricted to the 70 cases (40 leukaemia, 20 NHL and 10 other) and their 287 matched controls with reliable information on work in the Chernobyl area. Most subjects received very low doses (median 13 mGy).

A significantly elevated odds ratio was seen for all haematological malignancies combined at doses of 200 mGy and above. The Excess Relative Risk per 100 mGy was 0.60 overall (90% confidence interval: -0.02, 2.35). Sensitivity analyses showed generally similar results.

Although most risk estimates are not statistically significantly elevated, they are based on small numbers of cases and they are statistically compatible with those obtained for atomic bomb survivors and recent low dose-rate studies. This study adds to the body of evidence on the effects of low dose-rate exposures to ionizing radiation.

***KEYWORDS: Epidemiology, Chernobyl liquidators, leukaemia.***

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