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Title

Building the Canadian Uranium Workers Study Cohort: Integrating Seven National Databases to Advance Occupational Radiation Research in Canada

Abstract

Comprehensive long-term occupational health studies require integration of diverse administrative datasets to track exposures and outcomes over time. The Canadian Uranium Workers Study (CANUWS) cohort is a large multi-source dataset of about 80,000 individuals employed in Canada's uranium industry between 1930s and 2018, created by linking seven national health and administrative data sources into a single database. This study presents the data integration process that combines radiation exposure, cancer incidence and mortality to support research on occupational health risks in Canada.

A cohort identifier file was created by harmonizing three occupational cohorts—the Eldorado Uranium Workers Cohort, the Ontario Uranium Miners Cohort and the Northern Saskatchewan Uranium Workers Cohort—using probabilistic linkage by name, birth date, and sex. This file was then linked to six national health and administrative databases. The National Dose Registry served as the foundational dataset for identifying cohort members through employee identifiers and enabling linkage with other sources. All linkages and analyses were conducted within Statistics Canada's secure Research Data Centres.

The integration process successfully consolidated over nine decades of demographic, occupational, and health outcome information, creating one of the most comprehensive occupational radiation exposure cohorts in Canada. The resulting dataset provides longitudinal coverage of employment histories, annual radiation dose measurements, cancer incidence, mortality outcomes, and follow-up information for living cohort members. The harmonized dataset enables detailed sub-cohort analyses and supports a wide range of epidemiological studies.

Linking datasets into a single harmonized resource is a major advancement in Canada's ability to study long-term health effects of occupational radiation exposure. This framework demonstrates the feasibility and scientific value of large-scale administrative data linkage. The CANUWS dataset is a foundational resource for occupational health research, supporting analyses of cancer, mortality, and other long-term outcomes, and informing radiation protection, worker safety policies, and decision-making for radiation-exposed workers.