

## **Age at Exposure to Ionising Radiation and Cancer Mortality Among Hanford Workers: Follow up Through 1994**

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### **ABSTRACT**

**Background** Studies of workers at the plutonium production factory in Hanford, WA have led to conflicting conclusions about the role of age at exposure as a modifier of associations between ionizing radiation and cancer.

**Aims** To evaluate the influence of age at exposure on radiation risk estimates in an updated follow up of Hanford workers.

**Methods** A cohort of 26,389 workers hired between 1944 and 1978 was followed through 1994 to ascertain vital status and causes of death. External radiation dose estimates were derived from personal dosimeters. Poisson regression was used to estimate associations between mortality and cumulative external radiation dose at all ages, and in specific age ranges.

**Results** A total of 8,153 deaths were identified, 2,265 of which included cancer as an underlying or contributory cause. Estimates of the excess relative risk per Sievert (ERR/Sv) for cumulative radiation doses at all ages combined were negative for all cause and leukaemia and positive for all cancer and lung cancer. Cumulative doses accrued at ages below 35, 35-44, and 45-54 showed little association with mortality. For cumulative dose accrued at ages 55 and above (10 year lag), the estimated ERR/Sv for all cancers was 3.24 (90% CI: 0.80 to 6.17), primarily due to an association with lung cancer (ERR/Sv: 9.05, 90% CI: 2.96 to 17.92).

**Conclusions** Associations between radiation and cancer mortality in this cohort are primarily a function of doses at older ages and deaths from lung cancer. The association of older age radiation exposures and cancer mortality is similar to observations from several other occupational studies.

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