

# Study provides more precise estimates of cancer risks associated with low level radiation

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More precise estimates of cancer risks associated with prolonged, low level exposure to ionising radiation among nuclear industry workers are published by *The BMJ* today.

The results suggest a linear increase in the relative rate of [cancer](#) with increasing [radiation exposure](#) and strengthen the scientific basis for current radiation protection standards.

Ionising radiation is an established cause of cancer, but information on [radiation risk](#) has come mainly from studies of people exposed to acute, high doses of ionising radiation, such as Japanese atomic bomb survivors. Research into associations between [exposure](#) to moderate or low [dose radiation](#) and risk of cancer began in the 1950s but estimates remain uncertain.

So an international team of researchers set out to investigate whether exposure to prolonged low doses of ionising radiation are associated with an increased risk of cancer.

The study involved 308,297 nuclear industry workers from France, the United Kingdom, and the United States. The workers, most of whom were men, were monitored for external radiation exposure, and were followed-up for an average of 27 years.

Risk estimates were then calculated for deaths from all cancers excluding leukemia. Factors such as age, duration of employment, and socioeconomic status were taken into account.

The estimated rate of mortality from all cancers excluding leukaemia increased with cumulative dose by 48% per gray (Gy). Similar associations were found within each country. Based on these estimates, the researchers suggest that about 209 of the 19,064 observed deaths due to cancer other than leukaemia were excess deaths associated with external radiation exposure.

The risk per unit dose was similar to estimates derived from studies of Japanese atomic bomb survivors, note the researchers, contrary to the belief that high dose rate exposures are more dangerous than low dose rate exposures.

This is an observational study in which bias cannot be ruled out, they say. For example, they cannot rule out the possibility that smoking and occupational asbestos exposure may have influenced the results.

"This study provides evidence of a linear increase in the excess relative rate of cancer mortality with increasing exposure to ionising radiation at the low dose rates typically encountered in the nuclear industries in France, the UK, and the USA," they write. The findings can also help strengthen the foundation for radiation protection standards, they conclude.

This study "adds to a growing body of evidence suggesting associations between exposure to moderate or low dose radiation and risk of cancer," writes Mark Little from the US National Cancer Institute, in an accompanying editorial.

But should we conclude, as this study does, that exposures at lower dose

rates are just as risky as those at higher dose rates, he asks?

He suggests this conclusion may be unwarranted, pointing to several uncertainties, in particular the effect of the lower (but biologically more risky) energy of radiation received by these workers than in groups exposed at high dose rates such as the Japanese [atomic bomb](#) survivors. He also highlights a few weaknesses, including the lack of information on smoking and occupational exposure to asbestos, which "could conceivably confound the association between radiation dose and [cancer risk](#)."

He argues that the excess solid cancer risks associated with [radiation](#) in this cohort are modest. "For the average worker, the lifetime risk of cancer death is likely to be increased by about 0.1% from a baseline risk of cancer death of about 25%." However, he adds, "it is equally clear that the excess risks are unlikely to be zero."

**More information:** Risk of cancer from occupational exposure to ionising radiation: retrospective cohort study of workers in France, the United Kingdom, and the United States (INWORKS) - [www.bmj.com/cgi/doi/10.1136/bmj.h5359](http://www.bmj.com/cgi/doi/10.1136/bmj.h5359)

Editorial: Ionising radiation in the workplace - [www.bmj.com/cgi/doi/10.1136/bmj.h5405](http://www.bmj.com/cgi/doi/10.1136/bmj.h5405)

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