

## Doses and lung cancer risks from exposure to radon and plutonium

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*Purpose:* Epidemiological studies of the French uranium miners and the plutonium workers at the Mayak nuclear facility have provided excess relative risk (ERR) estimates per unit absorbed lung dose from alpha radiation. The aim of this paper was to review these two studies and to derive values of the relative biological effectiveness (RBE) of alpha particles for the induction of lung cancer.

*Materials and methods:* We examined and compared the dosimetry assumptions and methodology used in the epidemiological studies of uranium miners and the plutonium workers. Values of RBE were obtained by comparing risk coefficients including comparison of lifetime risks for a given population. To do this, preliminary calculations of lifetime risks following inhalation of plutonium were carried out.

*Results and conclusions:* Published values of risk per unit dose following inhalation of radon progeny and plutonium were in agreement despite the very different dose distributions within the lungs and the different ways the doses were calculated. Values of RBE around 10–20 were obtained by comparing ERR values, but with wide uncertainty ranges. Comparing lifetime risks gave similar values (10, 19 and 21). This supports the use of a radiation weighting factor of 20 for alpha particles for radiation protection purposes.

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