

# CONTRIBUTION OF RADON PROGENY TO TOTAL LUNG DOSE AND ITS RELATION WITH LUNG CANCER MORTALITY AMONG FRENCH URANIUM MINERS

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**Background and aims:** Uranium miners are exposed to radon gas and its short-lived progeny (RnP), long-lived radionuclides and external gamma rays. While the lung cancer risk related to radon exposure has been widely studied, the effect of the other ionizing radiations is not well known. The aim was to assess the risk of lung cancer death associated with lung doses due to these multiple types of radiation exposure in the French cohort of uranium miners.

**Methods:** The cohort included 3,271 exposed miners followed from 1956 through 1999. Annual exposures were assessed individually. Lung doses were calculated according to the Human Respiratory Tract Model (Publication 66 of the International Commission on Radiological Protection). Exposure-risk relations were estimated by a linear excess relative risk (ERR) model and Poisson regression was used to fit the model.

**Results:** Mean alpha and non-alpha absorbed doses were equal to 78 and 56 milliGray (mGy), respectively. RnP accounted for 97% of the alpha absorbed dose. A significant ERR of lung cancer death was associated with the total absorbed lung dose (ERR/Gy [95%CI] = 2.9 [0.8-7.5]), the alpha absorbed dose (4.58 [1.3-10.9]) and RnP (4.6 [1.3-11.2]). Assuming a value of 20 for the relative biological effectiveness of alpha particles in lung cancer induction, the ERR/Gy-equivalent for the total-weighted lung dose was 0.2[0.1-0.5], similar to that for the alpha-weighted and RnP-weighted lung dose.

**Conclusions:** These first results about lung doses from the European Alpha-Risk project, with regard to the lung dose distribution, support the major role of RnP in the risk of lung cancer death.