Introduction and Objectives Radon is an established risk factor for lung cancer. Less clear is whether radon causes other diseases than lung cancer. To further investigate such risks, updated mortality data from the German uranium miner cohort study (1946–2013) were analyzed.

Methods The cohort includes 58,974 men who were employed for at least 6 months between 1946 and 1989 at the former Wismut uranium mining company in Eastern Germany. Considered endpoints were mainly cancers other than lung cancer, circulatory diseases and non-malignant respiratory diseases. Exposure to radon and its progeny and external gamma radiation was retrospectively estimated through a comprehensive job-exposure matrix. Statistical modelling was performed by internal Poisson regression for grouped data with baseline stratification by age and calendar year. Excess relative risks (ERR) per 100 WLM (Working Level Month) and 95% confidence intervals (CI) were estimated for cumulative 5-year lagged exposure to radon (mean=280, median=33, max=3,224 WLM).

Results Within the follow-up period 1946–2013, a total of 5,122 cancer deaths other than lung cancer occurred. In this group, a statistically significant association was found (ERR/100 WLM=0.014; 95% CI: 0.006, 0.021). Regarding individual cancer sites, the majority of risk estimates were positive (14 out of 18), and two of them reached borderline significance (colon and liver cancer). This holds true even after adjustment for external gamma radiation. No increased ERR/100 WLM was found for the groups of deaths from circulatory diseases (n=10,665) and from non-malignant respiratory diseases. Exposure to radon and its progeny and external gamma radiation was retrospectively estimated through a comprehensive job-exposure matrix. Statistical modelling was performed by internal Poisson regression for grouped data with baseline stratification by age and calendar year. Excess relative risks (ERR) per 100 WLM (Working Level Month) and 95% confidence intervals (CI) were estimated for cumulative 5-year lagged exposure to radon (mean=280, median=33, max=3,224 WLM).

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Conclusion Our findings provide some evidence of an increased mortality risk for cancers other than lung cancer associated with radon. Chance, confounding by unconsidered risk factors and uncertainty in exposure assessment cannot be completely ruled out. If present at all, the radon-related risk for diseases and cancers other than lung cancer is substantially lower than that for lung cancer.
recreation workers (1.8 SED) had the highest mean exposures. Job title, dosimeter placement, forecast, and hours spent outside were predictors of daily SED. At work, wearing a sleeved shirt (81% often/always) and hat (73%) were most prevalent, while seeking shade (12%) and applying sunscreen (36%) were least prevalent. Sun protection scores were higher at work than leisure. Hours spent outdoors was a strong determinant for the work and leisure models. Additional leisure model predictors were eye colour, sex, skin type, and job group.

Conclusion Outdoor workers are exposed to high solar UVR levels and use different sun protective behaviours at work and leisure. These findings can inform future monitoring studies and exposure reduction initiatives.

RADON EXPOSURE AND RISK OF DEATH FROM CIRCULATORY SYSTEM DISEASES AMONG A LARGE COHORT OF URANIUM MINERS – THE PUMA STUDY

Introduction Numerous studies highlighted the association between radon exposure and lung cancer risk. Nevertheless the question of radon-related risks for non-cancer diseases, and more specifically circulatory system diseases (CSD) have received limited investigation. Among uranium miners, only one cohort observed an association between radon exposure and CSD death, and more specifically ischemic heart disease (IHD).

Objectives To investigate the relationship between cumulative radon exposure and CSD mortality in the PUMA study (Pooled Uranium Miners Analysis), a large international pooled set of cohorts of uranium miners.

Methods The PUMA study includes seven cohorts of uranium miners from the Czechia, France, Germany, Canada and USA. Annual radon exposure has been estimated individually and expressed in Working Level Months (WLM). The relationship between cumulative radon exposure, applying a 5-years lag, and CSD death, and more specifically ischemic heart disease and cerebrovascular disease, was assessed with an internal Poisson regression model integrating a linear excess relative risk (ERR) structure, expressed per 100 WLM.

Results The PUMA study includes 119,709 male uranium miners hired between 1942 and 1996. The follow-up duration was between 30–39 years in each of the cohorts, contributing to 4.3 million person-years. The mean value of cumulative radon exposure in individual cohorts ranged between 31 and 580 WLM. At the end of follow-up, 52,450 miners were dead (44% of the cohort), and among them 17,494 deaths from CSD were recorded. The exposure-risk relationship did not show any increase in CSD risk associated with cumulative radon exposure (ERR/100 WLM=2.310–4; 95% confidence interval [-0.0033; 0.0042]). No increase in risk was observed for ischemic heart disease or cerebrovascular disease death.

Conclusion The PUMA study has a large study population and a high level of statistical power. These preliminary results did not show any increased risk for CSD mortality among uranium miners.