

Pooled Uranium Miners Analysis (PUMA): The Setting Up of an International Occupational Cohort

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Introduction: Epidemiological studies of underground miners have highlighted the increased risk of lung cancer death associated with cumulative radon exposure. These studies contributed to the setting up of radioprotection measures in order to limit the exposure to radon and its short-lived progeny. To date, questions remain regarding the risk of lung cancer associated with chronic exposure to low levels of radon present in occupational and environmental settings. Furthermore the question is raised for the risks of cancers other than lung and for the risks of non-cancer diseases, such as circulatory system diseases. Thereby, the setting up of a large combined cohort gathering some of the most informative cohorts of uranium miners will allow us to conduct epidemiological analyses with an increased statistical power.

Methods: The Pooled Uranium Miners Analysis (PUMA) includes seven cohorts of uranium miners: three European cohorts (Czech, French and German cohort), two Canadian cohorts (Eldorado and Ontario cohort) and two American cohorts (Colorado Plateau and New Mexico cohort). Main inclusion criteria were that all of these miners must have worked in the uranium mining industry and had to be identified in a nonselective way. All members of the cohorts have an individual assessment of their annual exposures to radon. Health information such as vital status and causes of death must be complete.

Results and perspectives: To date, the PUMA study includes more than 120,000 uranium miners and contributes to more than 4.3 million of person-years at risk. Most of the uranium miners were men. Only the German and Eldorado cohort includes women, corresponding to 4% of the PUMA cohort. According to the cohorts, the mean duration of the follow-up stretches from 30 to 39 years and the mean cumulative exposure to radon

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varies from 31 to 579 Working Level Month (WLM). The total number of deaths reaches 49,000 cases and more than 7,400 of lung cancer deaths were counted. The PUMA study has been set up to strengthen the knowledge on our understanding of radon and radon progeny-related diseases. On the basis of this large cohort, the coming perspectives are to perform a mortality analysis and to assess the exposure-risk relationships.