

Residential Radon and Lung Cancer: Results from an Ecologic Study in the Swiss Alps

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Introduction. Radon is a radioactive gas presents in the earth crust that emerges from soils and rocks. Outdoor concentrations of radon generally are low. The main concern is the concentration of radon inside buildings, which may vary depending of the concentration of radon in the soil, the permeability of the ground, construction, building material, and ventilation of the house. Indoor concentration of radon is of concern in the development of lung cancer and known to be responsible of 8% of lung cancer cases in Switzerland. The purpose of this study was to investigate if communes more exposed to residential radon had higher incidence rates of lung cancer in the canton of Valais, Switzerland.

Methods. We performed an ecological study using as aggregation level all 160 communes from the canton of Valais. Lung cancer (International Classification of Disease 9th revision code 162) cases were identified by the Tumor Registry of canton of Valais. Between 1989 and 2000, 1083 cases in men and 320 in women were recorded. Residential radon exposure was measured by the Cantonal Laboratory of the canton of Valais between 1991 and 2004 in 2106 dwelling, including 1969 houses with measures in living room or bed room, 662 in basement or rooms where people do not live. Dwellings were chosen over the communes' territory to be geographically representative of the entire commune.

Results. The median radon by communes ranged from 21 to 374 Bq/m³. Thirteen communes were considered having a high risk with a mean radon levels ≥ 200 Bq/m³, and 43 communes a high or medium risk with a mean ≥ 100 Bq/m³. For these data aggregated at the commune level, the standardized rate ratio for lung cancer in men was 1.19 (95% confidence interval (CI) 1.05-1.36) for communes with mean radon levels ≥ 100 Bq/m³ and 1.31 (95% CI 1.10-1.57) for communes with mean radon levels ≥ 200 Bq/m³. In women, none of the relationships were statistically significant.

Discussion and conclusions. In this ecologic study lung cancer incidence was associated with residential radon exposure. These results need to be interpreted with caution given the nature of the ecologic design, which allows only yielding hypotheses for further research. However, these findings provide important information to health authorities about the scale of the relationship between radon exposure and lung cancer in Switzerland and on the need of conducting a case-control study in order to get more precise estimate.