No Evidence of a Link Between Household Radon Concentrations and Lung Cancer in Cantabria, Spain

To the Editor: The relationship between household radon levels and lung cancer has been examined in a combined analysis[1] of 13 case–control studies, in which an increased risk of lung cancer of 8.4% was found for each 100 Bq/m^3. This effect meant that 9% of all deaths due to lung cancer in Europe could be attributed to household radon. The authors found no differences between models with and without a threshold dose. A study carried out in Galicia (a region of Spain with elevated radon concentrations) showed similar results.[2] The Spanish region of Cantabria is characterized by low radon activity and high rates of death due to lung cancer (75 deaths/100 000 person-years in men). To deepen our understanding of the effect of low doses of household radon on the risk of lung cancer, we carried out a hospital-based case–control study.

We selected 86 cases of incident lung cancer confirmed by histopathology. All cases had to have been diagnosed in a hospital in Cantabria between January 2002 and August 2003. Patients aged less than 35 years and those who had been living at their current address for less than 5 years were excluded from the study. For each case, 2 controls matched for age and sex were selected at random from all patients attended for emergency surgery (appendectomy, cholecystectomy, or treatment of wounds and injuries) in the same hospital as the case. They could not have been diagnosed with lung cancer and the same exclusion criteria as for the cases were applied. Household radon was measured using CR-39 detectors (Radosys Ltd, Budapest, Hungary), which were installed in the home for 6 months under standard conditions (at least 65 cm from the floor, at a distance from windows and doors). Readings were taken with the Radosys system (Radosys Ltd, Budapest, Hungary).

The odds ratios were calculated using conditioned logistic regression with each trio (1 case and its 2 controls) as 1 stratum. Exact estimation procedures were used when the maximum likelihood methods generated convergence problems. The statistical analysis was carried out using LogXact, version 6 (Cytel Software Corporation, Cambridge, Massachusetts, USA).

The controls were more often nonsmokers (controls, 42%; cases, 8%) (Table). Mean (SD) exposure to radon in the home was 46.8 (114.6) Bq/m^3 in the cases and 42.9 (108.0) Bq/m^3 in the controls; the large standard deviations were due to the high exposure in a few individuals. Exposure to radon was greater than 100 Bq/m^3 in only 5 cases and 7 controls, and 12 cases and 18 controls had exposures greater than 50 Bq/m^3.

Household radon values above 30 Bq/m^3 were not associated with lung cancer in the crude analysis or when this was adjusted for smoking (Table). Similar results were obtained for lung cancer in men (Table) and when models for adenocarcinoma, squamous cell cancer, or other histologic types were analyzed separately. Lung cancer in women was not analyzed separately owing to the small size of the subsample (9 cases and 18 controls).

In summary, we did not find a link between household radon levels and lung cancer in Cantabria. Essentially, this result could be due to the small number of individuals exposed to concentrations above the possible threshold value of 100 Bq/m^3 (5 cases and 7 controls). In any case, the characteristics of the ground in Cantabria[3] make it unlikely that the effect of radon on lung cancer in this province (if such an effect exists) is as high as that described in other areas.

Odds Ratios (OR) of Lung Cancer According to Radon Concentration and Smoking

Type of Cancer	Variable	OR (95% confidence interval)	*P*
All lung cancers	Radon >30 Bq/m^3 (reference <30 Bq/m^3)	0.95 (0.33-2.65)*	.920*
	Ex-smoker (reference: nonsmoker)	14.2 (1.48-136.8)	.021
	Active smoker (reference: nonsmoker)	15.9 (1.99-127.1)	.009
Lung cancer in men	Radon >30 Bq/m^3 (reference: <30 Bq/m^3)	0.81 (0.27-2.40)*	.706*
	Ex-smoker (reference: nonsmoker)	13.0 (1.30-130.3)	.029
	Active smoker (reference: nonsmoker)	15.0 (1.88-119.0)	.011

*Values adjusted for smoking.

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