

ENVIRONMENTAL RADON EXPOSURE AND CANCER INCIDENCE IN GEORGIA

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Background. Radon is a lung carcinogen exhibiting complex interrelationships with its geologic origins and potential exposure routes. Georgia (GA) has high concentrations of naturally occurring radon and no analytic studies have assessed the impact of exposure on cancer risk in the state.

Methods. A geographic information system was used to evaluate relationships between radon and cancer incidence using GA Comprehensive Cancer Registry (2000-2007) data. Lung (N=43,910), female breast (N=41,515), colorectal (N=29,251), bladder (N=5,607), leukemia (N=24,003), and kidney (N=8,143) cancer cases were obtained at the individual-level. Because it is unlikely to be related to radiation exposure, cervical cancer cases (N=2,893) were also obtained from the registry for use as controls. Radon data for GA were obtained from the University of GA Cooperative Extension and Florida Department of Health. Kriging was used to smooth exposure data. Based on the final kriging model, a predicted radon concentration was assigned to each cancer case or control based on their latitude and longitude of residence at diagnosis. Spatial and non-spatial logistic regressions were used to evaluate the relationship between log-transformed predicted radon concentrations and cancer incidence.

Results. There were 25,237 radon (mean=5.5±425 pCi/L; max=67,487 pCi/L) measurements in GA. In unadjusted models, there was a significantly increased odds of exposure to radon for bladder (odds ratio: 1.10; 95% confidence interval: 1.02, 1.18), colorectal (1.08; 1.02, 1.15), breast (1.25; 1.17, 1.32), leukemia (1.15; 1.08, 1.23), and kidney cancer (1.13; 1.05, 1.20) cases. A positive, though non-significant, relationship was detected for lung cancer (1.04; 0.98, 1.10). After adjustment for race, age at diagnosis, cancer stage, and county-level median household income, a significant relationship persisted for breast cancer (1.11; 1.04, 1.19).

Conclusions. Preliminary relationships were detected between elevated radon exposure and cancer incidence, especially breast cancer. Detailed analyses including spatial regression and cluster modeling at the individual-level are underway.

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