

LONG-TERM EXPOSURE TO AMBIENT AIR POLLUTION AND LUNG CANCER RISK IN CANADA

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Background and Aims: Previous studies have identified air pollution exposure as a risk factor for lung cancer incidence. We examine lung cancer risk in Canada from exposure to long-term ambient air pollution.

Methods: We utilize the lung cancer component of the National Enhanced Cancer Surveillance System, which includes 3280 lung cancer cases, with histology, and 5073 population controls collected between 1994 and 1998 in eight Canadian provinces. Cases were identified by provincial cancer registries and sent a research questionnaire (61.7 % response rate for contacted lung cancer cases). Questionnaires collected information on family income, education, marital status, BMI, smoking history, second-hand smoke exposure, alcohol use, dietary history, physical activity, and lifetime occupational exposures and residential histories (geocoded to 6-digit postal codes). Population controls, with an age/sex distribution similar to that of all cancer cases, received the same questionnaire (67.4% response rate for contacted controls).

A spatiotemporal modeling approach was used to estimate individual's annual air pollution exposures from 1970 to 1994 for PM_{2.5}, NO₂, and O₃. Residential postal codes within 50km's of fixed-site monitoring stations were assigned annual average concentrations. Postal codes located farther than 50km's from a monitoring station were assigned predicted annual concentrations from national spatial pollutant surfaces, created from recent satellite-based (PM_{2.5} and NO₂) and dispersion models (O₃), calibrated with historical fixed-site monitoring data.

Results: Odds ratios (95%CI) for lung cancer incidence associated with a 10-unit increase in PM_{2.5} (ug/m³), NO₂ (ppb) and O₃ (ppb) were 1.31 (1.00-1.72), 1.14 (1.04-1.26) and 0.84 (0.67-1.06), respectively, after adjustment for 17 individual and 4 geographical covariates. Differences in risk were also found by lung cancer histology.

Conclusions: Long-term exposure to PM_{2.5} and NO₂ air pollution was associated with increased lung cancer risk in Canada.