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Air pollution and lung cancer incidence in 17 European cohorts: prospective analyses from the European Study of Cohorts for Air Pollution Effects (ESCAPE)

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Summary

Background

Ambient air pollution is suspected to cause lung cancer. We aimed to assess the association between long-term exposure to ambient air pollution and lung cancer incidence in European populations.

Methods

This prospective analysis of data obtained by the European Study of Cohorts for Air Pollution Effects used data from 17 cohort studies based in nine European countries. Baseline addresses were geocoded and we assessed air pollution by land-use regression models for particulate matter (PM) with diameter of less than 10 μm (PM₁₀), less than 2.5 μm (PM_{2.5}), and between 2.5 and 10 μm (PM_{coarse}), soot (PM_{2.5} absorbance), nitrogen oxides, and two traffic indicators. We used Cox regression models with adjustment for potential confounders for cohort-specific analyses and random effects models for meta-analyses.

Findings

The 312 944 cohort members contributed 4 013 131 person-years at risk. During follow-up (mean 12.8 years), 2095 incident lung cancer cases were diagnosed. The meta-analyses showed a statistically significant association between risk for lung cancer and PM₁₀ (hazard ratio [HR] 1.22 [95% CI 1.03–1.45] per 10 $\mu\text{g}/\text{m}^3$). For PM_{2.5} the HR was 1.18 (0.96–1.46) per 5 $\mu\text{g}/\text{m}^3$. The same increments of PM₁₀ and PM_{2.5} were associated with HRs for adenocarcinomas of the lung of 1.51 (1.10–2.08) and 1.55 (1.05–2.29), respectively. An increase in road traffic of 4000 vehicle-km per day within 100 m of the residence was associated with an HR for lung cancer of 1.09 (0.99–1.21). The results showed no association between lung cancer and nitrogen oxides concentration (HR 1.01 [0.95–1.07] per 20 $\mu\text{g}/\text{m}^3$) or traffic intensity on the nearest street (HR 1.00 [0.97–1.04] per 5000 vehicles per day).

Interpretation

Particulate matter air pollution contributes to lung cancer incidence in Europe.

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