Influence of exposure assessment methods on associations between long-term exposure to outdoor fine particulate matter and risk of cancer in the French cohort Gazel

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BACKGROUND: Many studies investigated the relationship between outdoor fine particulate matter (PM2.5) and cancer. While they generally indicated positive associations, results have not been fully consistent, possibly because of the diversity of methods used to assess exposure. OBJECTIVES: To investigate how using different PM2.5 exposure assessment methods influences risk estimates in the large French general population-based Gazel cohort (20,625 participants at enrollment) with a 26-year follow-up with complete residential histories. METHODS: We focused on two cancer incidence outcomes: all-sites combined and lung. We used two distinct exposure assessment methods: a western European land use regression (LUR), and a chemistry-dispersion model (Gazel-Air) for France, each with a time series >/=20-years annual concentrations. Spearman correlation coefficient between the two estimates of PM2.5 was 0.71 across all person-years; the LUR tended to provide higher exposures. We used extended Cox models with attained age as time-scale and time-dependent cumulative exposures, adjusting for a set of confounders including sex and smoking, to derive hazard ratios (HRs) and their 95% confidence interval, implementing a 10-year lag between exposure and incidence/censoring. RESULTS: We obtained similar two-piece linear associations for all-sites cancer (3711 cases), with a first slope of HRs of 1.53 (1.24-1.88) and 1.43 (1.19-1.73) for one IQR increase of cumulative PM2.5 exposure for the LUR and the Gazel-Air models respectively, followed by a plateau at around 1.5 for both exposure assessments. For lung cancer (349 cases), the HRs from the two exposure models were less similar, with largely overlapping confidence limits. CONCLUSION: Our findings using long-term exposure estimates from two distinct exposure assessment methods corroborate the association between air pollution and cancer risk.
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