

Publication

Long-term exposure to airborne metals and risk of cancer in the French cohort Gazel

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Background The specific compounds that make ambient fine particulate matter (PM_{2.5}) carcinogen remain poorly identified. Some metals contribute to ambient PM_{2.5} and possibly to its adverse effects. But the challenge of assessing exposure to airborne metals limits epidemiological studies. **Objective** To analyze the relationships between several airborne metals and risk of cancer in a large population. **Methods** We estimated the individual exposure to 12 airborne metals of; ~; 12,000 semi-urban and rural participants of the French population-based Gazel cohort using moss biomonitoring data from a 20-year national program. We used principal component analyses (PCA) to derive groups of metals, and focused on six single carcinogenic or toxic metals (arsenic, cadmium, chromium, lead, nickel, and vanadium). We used extended Cox models with attained age as time-scale and time-varying weighted average exposures, adjusted for individual and area-level covariables, to analyze the association between each exposure and all-site combined, bladder, lung, breast, and prostate cancer incidence. **Results** We identified 2,401 cases of all-site cancer between 2001 and 2015. Over the follow-up, median exposures varied from 0.22 (interquartile range (IQR): 0.18-0.28) to 8.68 (IQR: 6.62-11.79) $\mu\text{g g}^{-1}$ of dried moss for cadmium and lead, respectively. The PCA yielded three groups identified as "anthropogenic", "crustal", and "marine". Models yielded positive associations between most single and groups of metal and all-site cancer, with e.g. hazard ratios of 1.08 (95% CI: 1.03, 1.13) for cadmium or 1.06 (95% CI: 1.02, 1.10) for lead, per interquartile range increase. These findings were consistent across supplementary analyses, albeit attenuated when accounting for total PM_{2.5}. Regarding specific site cancers, we estimated positive associations mostly for bladder, and generally with large confidence intervals. **Conclusion** Most single and groups of airborne metals, except vanadium, were associated with risk of cancer. These findings may help identify sources or components of PM_{2.5} that may be involved in its carcinogenicity.

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