

EPIDEMIOLOGY

Time to ESCAPE the city? Air pollution linked to lung cancer

Living in places with high levels of particulate air pollution confers an increased risk of developing lung cancer, report the European Study of Cohorts for Air Pollution Effects (ESCAPE) investigators. “Our subanalyses identified no threshold for particulate air pollution below which there is no risk,” says Ole Raaschou-Nielsen, lead author of the study.

Results from many previous studies had shown adverse health effects a few days after episodes of high levels of air pollution. Lung cancer can, however, take many years to develop and relatively few studies have looked at the effects of long-term exposure to particulate air pollution. Here, data from 17 cohort studies across nine European countries were analysed prospectively. The study involved over 300,000 participants, with a mean follow-up of 13 years, during which time 2,095 individuals were diagnosed with lung cancer.

The investigators measured air pollution—particulate matter (PM) with diameters $<10\mu\text{m}$ (PM_{10}), $2.5\text{--}10.0\mu\text{m}$ ($\text{PM}_{\text{coarse}}$), $<2.5\mu\text{m}$ ($\text{PM}_{2.5}$), soot, nitrogen oxides and traffic indicators—and used these measurements to develop models to calculate air pollution at each of the cohort members’ addresses. “We took advantage of this estimation of air pollution at each participant’s address, thus investigating the risk of lung cancer in association with intra-area differences in air pollution levels, which is in contrast to several previous studies using exposure contrasts between areas,” explains Raaschou-Nielsen. “By using within-area air pollution contrasts in the analyses, we compared

individuals in much more homogeneous populations.”

Notably, the meta-analyses revealed an association between PM_{10} and lung cancer (hazard ratio 1.22, 95% CI 1.03–1.45 per $10\mu\text{g}/\text{m}^3$). The association was stronger for adenocarcinomas.

Importantly, the results suggest an effect even below current European Union air quality limits ($40\mu\text{g}/\text{m}^3$ for PM_{10} and $25\mu\text{g}/\text{m}^3$ for $\text{PM}_{2.5}$). Although the relative risk of developing lung cancer associated with particulate air pollution is much lower than that associated with smoking, even a small increase in risk can amount to many extra cases in a population. These results suggest that further reducing the concentration of particles in the air will reduce the number of lung cancer cases.

The next step will be to determine whether specific types of particles are associated with the risk of developing lung cancer. “Particles come from many different sources and are a mixture of types and sizes with many different substances attached on their surface,” comments Raaschou-Nielsen. “If future research identifies particularly harmful types of particles, more focused action could be taken to decrease the concentration of particulate air pollution and the related negative health effect”.

Bryony Jones

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