

# Air pollution and hardening of arteries

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Long term exposure to air pollution may be linked to heart attacks and strokes by speeding up atherosclerosis, or "hardening of the arteries", according to a study by U.S. researchers published in this week's *PLOS Medicine*.

The researchers, led by Sara Adar, John Searle Assistant Professor of Epidemiology, University of Michigan School of Public Health, and Joel Kaufman, Professor of Environmental and Occupational Health Sciences and Medicine, University of Washington, found that higher concentrations of fine particulate air pollution (PM2.5) were linked to a faster thickening of the inner two layers of the common carotid artery, an important blood vessel that provides blood to the head, neck, and brain. They also found that reductions of fine particulate air pollution over time were linked to slower progression of the blood vessel thickness. The thickness of this blood vessel is an indicator of how much atherosclerosis is present in the arteries throughout the body, even among people with no obvious symptoms of heart disease.

"Our findings help us to understand how it is that exposures to air pollution may cause the increases in heart attacks and strokes observed by other studies," Adar said.

The authors reached these conclusions by following 5362 people aged between 45 to 84 years old from six U.S. metropolitan areas as part of the Multi-Ethnic Study of Atherosclerosis and Air Pollution (MESA Air). The researchers were able to link [air pollution levels](#) estimated at each person's house with two ultrasound measurements of the [blood vessels](#), separated by about three years. All participants in their study were without known heart disease.

After adjusting for other factors such as smoking, the authors found that on average, the thickness of the carotid vessel increased by 14  $\mu\text{m}$  each year. The vessels of people exposed to higher levels of residential fine particulate air pollution, however,

thickened faster than others living in the same metropolitan area.

"Linking these findings with other results from the same population suggests that persons living in a more polluted part of town may have a 2 percent higher risk of stroke as compared to people in a less polluted part of the same metropolitan area," Adar said.

"If confirmed by future analyses of the full 10 years of follow-up in this cohort, these findings will help to explain associations between long-term PM2.5 concentrations and clinical cardiovascular events," the authors wrote.

In an accompanying Perspective, Nino Kuenzli from the University of Basel in Switzerland says: "the [Multi-Ethnic Study of Atherosclerosis and Air Pollution study] further supports an old request to policy makers, namely that clean air standards ought to comply at least with the science-based levels proposed by the World Health Organization."

**More information:** Adar SD, Sheppard L, Vedal S, Polak JF, Sampson PD, et al. (2013) Fine Particulate Air Pollution and the Progression of Carotid Intima-Medial Thickness: A Prospective Cohort Study from the Multi-Ethnic Study of Atherosclerosis and Air Pollution. *PLoS Med* 10(4): e1001430. [doi:10.1371/journal.pmed.1001430](https://doi.org/10.1371/journal.pmed.1001430)

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