

Traffic exhaust could increase blood pressure, study finds

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Even brief exposure to highway pollution could cause significant

increases in blood pressure, a new study from the University of Washington has found, adding to a growing body of work correlating vehicle exhaust with negative health outcomes.

The effects are near immediate: Two hours in Seattle's rush hour was enough to increase [blood pressure](#) by nearly 5 millimeters of mercury, a jump that would push someone with [normal levels](#) to elevated or from elevated levels to stage 1 hypertension.

The study, published in the *Annals of Internal Medicine*, was conducted by a team at the UW, led by Dr. Joel Kaufman, a university physician and professor of environmental and occupational health sciences. The increase, he said, was about what you'd expect to see in someone who switched from a low-salt to high-salt diet.

"It's a real interesting, important number that if you think of millions of people having this exposure every day, that's moving a lot of people from the normal to the high blood pressure range," Kaufman said. "That has a lot of impact on the risk of heart attacks and strokes."

At a micro level, the study suggests a need for improved filtration in vehicles; absent a HEPA filter, most cars fail to catch possibly harmful particles piped in from the outside.

On a broader level, it's another data point in a larger conversation around how the country's highway system harms those whose daily lives are shrouded in tailpipe fumes. Low-income and working-class communities, often with large populations of people of color, are disproportionately likely to live near major highways. When the highway system was built to begin with, it was often through well-established Black or Latino neighborhoods.

"The big issue here is not just about being in the car," said Kaufman.

"The big issue is that lots of people breathe traffic-related air pollution. That could be walking or biking or living, and historically these major roadways were cut right through [low-income](#) areas."

Research has already established that exposure to car fumes can lead to increased risk of stroke or heart attack. And some lab-based work has suggested blood pressure spikes may be a factor.

The UW team took the question further. To start, they tested participants in a closed setting—piping small amounts of diesel fumes into a room and measuring blood pressure. They saw a bump in blood pressure among the roughly 40 participants.

But that setting, the team concluded, was more likely to test occupational exposure to exhaust, rather than more typical ambient highway pollution.

So the team moved the experiment to the streets. Using a Dodge Caravan equipped with advance filtration and monitors, a driver carted each participant—screened to exclude most confounding factors—through Seattle's rush hour traffic for two hours on three different occasions. On two of the drives, the air was unfiltered; on one, it was filtered. The participants did not know which was which.

Researchers found that, during the unfiltered drives, the blood pressure increases were similar to those seen in the lab, of just under 5 millimeters of mercury.

This was a surprise even to the research team because the number of particles measuring 2.5 micrometers in diameter or less—which are measured to gauge air quality and are high during wildfire season—was less than in the lab setting.

However, the number of ultrafine particles measuring 0.1 micrometers

or less—which do not show up on air quality reports—was roughly the same. That suggests the tiniest particles may be closely tied to blood pressure increases.

The study, funded by the U.S. Environmental Protection Agency and National Institutes of Health, was small, a limitation noted by the *Annals of Internal Medicine*. Just 13 participants returned usable data. However, Kaufman said he's confident in the [statistical significance](#) because the study is comparing people to themselves.

As for what's happening in the body, Kaufman speculated it was a mini fight-or-flight reaction—that when the small particles entered someone's lungs or bloodstream, the body would perceive them as a threat.

What the blood pressure jump means long term, if anything, is unclear. However, after 24 hours, participants still had elevated levels.

Environmental inequities, often the result of highway placement, have received increased attention in recent years. As part of its massive infrastructure bill, the Biden administration set aside \$1 billion for communities that were upended by highway construction and whose residents still breathe the toxic results. It's a pittance when compared to the issue, but an acknowledgment that the issue is in fact real.

More information: Michael T. Young et al, Blood Pressure Effect of Traffic-Related Air Pollution, *Annals of Internal Medicine* (2023). [DOI: 10.7326/M23-1309](https://doi.org/10.7326/M23-1309)

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