

Smog exposure linked to higher risk of cardiac arrest

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Exposure to ozone, the main ingredient in smog—even at levels below

federal safety standards—may increase the risk of going into cardiac arrest, new research shows.

Researchers analyzed records of air [pollution](#) concentrations in the neighborhoods of more than 187,000 people who had cardiac arrests outside the hospital in 28 states between 2013 and 2018. They compared two types of pollution, [ozone](#) and [fine particulate matter](#), from two weeks before a person's [cardiac arrest](#) to levels on the day their [heart](#) suddenly stopped beating. They found that as ozone levels rose, so did sudden cardiac arrests.

"There's been a lot of evidence showing that air pollutants cause [cardiovascular disease](#)," said Dr. Ali Malik, a cardiology fellow at Saint Luke's Mid-America Heart Institute in Gladstone, Missouri. "We wanted to address the worst thing that can happen outside the hospital, which is to just drop dead from cardiac arrest, and how [air pollutants](#) play a role in that. We found that on days when ozone was high in ambient air, the risk of having an out-of-hospital cardiac arrest was higher."

The findings were recently presented at the American Heart Association's virtual Resuscitation Science Symposium. The study is considered preliminary until published in a peer-reviewed journal.

Air pollution [contributes to an estimated 6.7 million deaths](#) per year around the world, a large portion of which are heart-related. Pollution from fine particulates, tiny fragments measured at less than 2.5 micrograms that can be inhaled and are invisible to the naked eye, has most often been pinpointed as the culprit. But gaseous pollutants such as ozone have also been implicated in health effects of air pollution. Past studies found a link between exposure to ozone and mortality, but these links have been primarily respiratory.

Malik said he was surprised the new study found no association between

rising particulate matter levels and cardiac arrest, whereas the link between ozone and cardiac arrest occurred at unexpectedly low levels of exposure—levels below federal standards.

The Environmental Protection Agency considers ground-level ozone to be harmful to human health at levels of 70 parts per billion. In this study, researchers found a higher risk of cardiac arrest at levels as low as 36.9 parts per billion—about half the EPA's standard. For every 12 parts per billion increase in ozone, the study found, the risk of going into cardiac [arrest](#) rose 1.1%.

Malik said fine particulate matter levels may not have been high enough in his study to show any association.

The fine particulate air pollution found in smoke and haze created by forest fires, automobile emissions, power plants and other industries has been strongly linked to a higher risk of death from heart disease in numerous studies, with evidence suggesting it may be a causal risk factor for heart disease.

Two scientific statements from the AHA, one in 2004 and an update in 2010, detailed "mounting evidence" of the damage to heart health caused by exposure to fine particulate matter.

Dr. Sanjay Rajagopalan, chief of cardiovascular medicine at University Hospitals' Harrington Heart and Vascular Institute in Cleveland, co-authored the 2010 AHA report on air pollution and heart disease. He called the new findings interesting because "prior studies have not shown a link between ozone and cardiovascular mortality."

"It provides additional evidence to suggest that health effects continue below the current regulatory levels for ozone and (fine particulate matter). ... Thus, this study provides additional support to reduce fossil

fuel emissions and to switch to clean energy sources," said Rajagopalan, also director of the Cardiovascular Research Institute at Case Western University's School of Medicine. He was not part of the new study.

"What's good for the climate is good for health," he said. "This puts attention on the importance of regulation. Controlling emissions should be a priority because of the number of lives it can save."

Rajagopalan also co-authored an AHA [scientific statement](#) published in November that addresses ways people can reduce their health risks from exposure to air pollution caused by fine particulate matter, whether at home or visiting areas that may be heavily polluted.

The statement provides information on portable air cleaners, personal air-purifying respirators, automobile air filters and behavioral strategies, such as avoiding exposure to areas with high levels of pollution, staying indoors and closing windows.

Rajagopalan said some populations may be more vulnerable to ozone levels than others and future research should explore this.

More information: Ali Malik et al. Abstract 119: Association of Acute Exposure to Ambient Air Particulate Matter and Ozone with Risk of Out-of-hospital Cardiac Arrest, *Circulation* (2020). [DOI: 10.1161/circ.142.suppl_4.119](#)

Provided by American Heart Association

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