

High blood pressure linked to short-, long-term exposure to some air pollutants

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Both short- and long-term exposure to some air pollutants commonly associated with coal burning, vehicle exhaust, airborne dust and dirt are associated with the development of high blood pressure, according to new research in the American Heart Association's journal *Hypertension*.

"In our analysis of 17 previously-published studies we discovered a significant risk of developing [high blood pressure](#) due to exposure to air pollution," said Tao Liu, Ph.D., lead study author and deputy director and epidemiologist of the environmental health division at Guangdong Provincial Institute of Public Health in China. "People should limit their exposure on days with higher [air pollution levels](#), especially for those with high blood pressure, even very short-term exposure can aggravate their conditions."

Researchers performed a meta-analysis of available published studies in the world assessing the health effects of all air pollution on hypertension risk. Meta-analyses combine results from previous studies to estimate the overall effect of a particular variable on a result. In the first study to simultaneously estimate the effects of short-term and long-term exposure to air pollutants on hypertension by meta-analysis, researchers focused on these [air pollutants](#):

- sulfur dioxide (SO₂), which mainly comes from the burning of fossil fuel;
- nitrogen oxide (NO_x), which comes from fossil fuels burned at power plants and [vehicle exhaust](#);

- Particulate matter (PM) are particles found in the air, including dust, dirt, smoke and liquid droplets. (PM 2.5 is smaller than a speck of dust, and the most common and hazardous type of air pollution. PM10 includes both PM2.5 and PM2.5-10).

The meta-analysis found high blood pressure was significantly associated with:

- short-term exposure to SO₂, PM_{2.5} and PM₁₀; and
- long-term exposure to nitrogen dioxide (NO₂), which is produced from combustion, and PM₁₀.

For the portion of the study that assessed short-term effects of ozone and [carbon monoxide exposure](#), no significant associations were found. Researchers said ozone and carbon monoxide's links to high blood pressure requires further study.

Of the 5,687 air pollution studies initially identified, 17 were the focus of this - which involves more than 108,000 hypertension patients and 220,000 non-hypertensive controls. High blood pressure was defined as [systolic blood pressure](#) more than 140 mm Hg and/or [diastolic blood pressure](#) over 90 mm Hg or by antihypertensive drug use. Air pollution exposure was assessed by averaging data from nearest air pollution monitoring stations, or using complex dispersion models or land use regression models.

High blood pressure is a major risk factor for cardiovascular disease and stroke.

Previous studies have indicated that air pollution might be a risk factor for hypertension but the results were controversial, Liu said. The mechanism by which air pollution could contribute to the development of high blood pressure includes inflammation and oxidative stress, which

may lead to changes in the arteries.

"Next we plan to further delve into the effects of particulate matter and their sources on hypertension risk, which we hope will inform air-pollution control policy-makers," Liu said.

Provided by American Heart Association

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