

Evidence growing of air pollution's link to heart disease, death

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The scientific evidence linking air pollution to heart attacks, strokes and cardiovascular death has "substantially strengthened," and people, particularly those at high cardiovascular risk, should limit their exposure, according to an updated American Heart Association scientific statement.

The evidence is strongest for fine particulate matter (PM_{2.5}) having a causal relationship to cardiovascular disease, said the expert panel of authors who updated the association's 2004 initial statement on [air pollution](#), also published in *Circulation: Journal of the American Heart Association*.

The major source of PM_{2.5} is fossil fuel combustion from industry, traffic, and power generation. Biomass burning, heating, cooking, indoor activities and forest fires may also be relevant sources, particularly in certain regions.

"Particulate matter appears to directly increase risk by triggering events in susceptible individuals within hours to days of an increased level of exposure, even among those who otherwise may have been healthy for years," said Robert D. Brook, M.D., lead author of the statement, which was written after review of epidemiological, molecular and toxicological studies published during the past six years.

"Growing evidence also shows that longer-term PM_{2.5} exposures, such as over a few years, can lead to an even larger increase in these health

risks. In this context, the American Heart Association said that PM2.5 should be recognized as a 'modifiable factor' that contributes to [cardiovascular morbidity](#) and mortality."

In the statement, the panel also concluded that there's a:

- "small yet consistent" association between short-term exposure to air pollution and pre-mature death;
- strong level of evidence supporting a relationship between air pollution and ischemic heart disease;
- "moderate, yet growing link" between air pollution and heart failure and ischemic stroke;
- "modest" level of evidence supporting an association between air pollution and peripheral vascular diseases, irregular heartbeats and cardiac arrest.

The elderly and those with existing heart diseases, such as [heart failure](#) or coronary artery disease, and perhaps those with diabetes appear to be at higher risk from short-term PM2.5 exposure.

"The foremost message for these high-risk groups remains that they should work to control their modifiable traditional risk factors - blood pressure, cholesterol, diabetes, smoking," said Brook, a cardiovascular medicine specialist and associate professor in the Department of Internal Medicine at the University of Michigan in Ann Arbor.

There are several ways by which PM2.5 could affect the cardiovascular system; however, one leading explanation suggests that several components of PM2.5, once inhaled, can cause inflammation and irritate

nerves in the lungs. These responses can start a cascade of changes that adversely affect the rest of the body, Brook said.

"It's possible that certain very small particles, or chemicals that travel with them, may reach the circulation and cause direct harm," Brook said.

"The lung nerve-fiber irritation can also disrupt the balance of the nervous system throughout the body. These responses can increase blood clotting and thrombosis, impair vascular function and blood flow, elevate blood pressure, and disrupt proper cardiac electrical activity which may ultimately provoke heart attacks, strokes, or even death.

"These studies also indicate that there is no 'safe' level of PM2.5 exposure," he said.

Recommendations include:

- Physicians should emphasize treatment of traditional cardiovascular risk factors, which may lessen patients' susceptibility to air pollution.
- All patients with cardiovascular disease should be educated about the risks of air pollution.
- Healthcare professionals should consider educating patients without cardiovascular disease but who are at high risk, such as the elderly, individuals with metabolic syndrome or multiple risk factors and those with diabetes.
- Based on air pollution levels, as forecasted by the Air Quality Index available in many media sources, recommendations for methods to reduce exposure and limit activity should be followed depending on the patient's level of risk.

Reducing exposure to air pollution takes effort at the population level by implementing national policies as well as at the individual level, Brook said. "People can limit their exposure as much as possible by decreasing their time outside when particle levels are high and reducing time spent in traffic - a common source of exposure in today's world."

Provided by American Heart Association

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