

Air Pollution May Hurt the Heart

Researchers Say Even 'Acceptable' Pollution Levels Can Cause Damage

By [Kelli Miller Stacy](#)

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Reviewed by [Elizabeth Klodas, MD, FACC](#)

Aug. 13, 2008 -- Researchers say breathing in polluted air does more than damage the lungs; it harms the heart, too.

Air pollution levels do not need to be very high to cause harm, researchers report in the Aug. 25 issue of the *Journal of the American College of Cardiology*. Air pollution -- even at levels deemed "acceptable" by the Environmental Protection Agency -- leads to short- and long-term injury to the heart and blood vessels, increases rates of heart disease-related hospitalizations, and can even cause death.

"There doesn't have to be an environmental catastrophe for air pollution to cause injury," Boris Z. Simkhovich, MD, PhD, a senior research associate at the Heart Institute of the Good Samaritan Hospital and an assistant professor of research medicine at the Keck School of Medicine, University of Southern California, says in a news release. "We're talking about very modest increases. Air pollution can be dangerous at levels that are within the accepted air quality standards."

Air quality levels in the U.S. are based on five major pollutants: ground-level ozone, particle pollution (including smoke from wildfires and emissions from vehicles and power plants), carbon monoxide, sulfur dioxide, and nitrogen dioxide. The air quality index (AQI) runs from 0 to 500. The higher the number, the more toxic the air and the greater the health concern. An AQI under 100 is generally considered acceptable.

Data documenting the ill effects of air pollution dates back more than a century. In 1872, one of the first air-pollution studies detailing the toxic components of urban air was published.

Recent studies show that the ultrafine particles found in polluted air can pass into a person's bloodstream and travel to the heart, where they can cause an inflammatory response. This may reduce the ability of the heart to pump blood effectively to the body, raise blood pressure, and diminish blood flow through coronary arteries -- the vital blood vessels which supply the heart with its oxygen and nutrient supply. Exposure to pollutants can also predispose individuals to experience irregular heartbeats.

Simkhovich and colleagues published their report after reviewing data from numerous studies regarding air pollution's dangerous health effects. The researchers write in the journal report that the evidence "unequivocally indicate[s] pollution is directly linked to the adverse cardiovascular outcomes in the general population, and effects are seen at levels at or below existing air quality standards."

Specifically, both animal and human studies have shown that breathing in bad air:

- Affects heart rate and blood pressure
- Disrupts blood vessel function
- Interferes with blood clotting
- Speeds up the development of atherosclerosis (clogged arteries)

Long-term studies involving a large group of people have linked spikes in air pollution to emergency hospital admissions due to heart attacks, chest pain, heart failure, and even heart-related death.

The elderly and people with existing heart disease or diseases that damage the blood vessels (such as diabetes) are especially vulnerable to the harmful heart-related effects of air pollution. In the U.S., air quality index levels over 100 are considered dangerous for sensitive individuals, such as those with heart or lung disease.

"Patients with cardiovascular disease shouldn't exercise outside on days with increased air pollution levels. On very polluted days, they should consider staying inside, and during the winter, they should limit exposure to fireplace smoke," Robert A. Kloner, MD, PhD, director of research at the Heart Institute of the Good Samaritan Hospital and a professor of medicine at the Keck School of Medicine, University of Southern California, says in a news release. "Of course, the real solution is to reduce air pollution."

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SOURCES:

News release, American College of Cardiology.

Simkhovich, B. *Journal of the American College of Cardiology*, Aug. 26,2008; vol 52: pp 719-726.

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