

Vest monitors show air pollution is dangerous indoors and out

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Indoor and outdoor pollutants can rapidly harm the heart in ways different than outdoor air pollution alone, according to a new study presented at the American Heart Association's Scientific Sessions 2008.

The Cardiovascular Sub-study of the Detroit Exposure and Aerosol Research Study (DEARS) is the first study to show that two different aspects of exposure — community wide and personal — have differing adverse health outcomes on the heart and blood vessels.

Researchers examined short-term personal exposure by fitting participants with pollution-monitoring vests. The researchers found that total personal exposure was influenced by both ambient (open air) and non-ambient (within enclosed spaces) sources and was linked to an increase in systolic blood pressure and blood vessel constriction. Such changes could play a role in promoting sudden heart attacks, strokes and heart failure.

On the other hand, community exposure, which measures pollution in a broader area from fixed monitoring stations, but cannot determine as precisely a specific individual's exposure, was associated with impaired blood vessel functioning alone.

"This study goes beyond corroborating that air pollution can adversely affect blood pressure and blood vessel health," said Robert D. Brook, M.D., the study's lead investigator and associate professor of Medicine in the Division of Cardiovascular Medicine at the University of

Michigan in Ann Arbor. "We saw health effects of personal exposure that occurred in individuals on top of those due to background pollution."

Sixty-five men and women from diverse ethnic backgrounds participated in the study. They ranged in age from 19 to 80 years, and 80 percent were women. All were nonsmokers living in nonsmoking households, in three different areas of Detroit.

For three years, researchers examined the personal and community exposure to air pollutants for five consecutive days in the summer and five consecutive days in the winter. At the end of each research day, field investigators came to each participant's home to measure the effects of pollutants on blood pressure and blood vessel function.

The vest monitors gave a continuous record of what people were exposed to through 24 hours for five consecutive days. The monitors measured what the person might be exposed to walking in and out of small micro-environments: in and out of the house, or a restaurant, walking by a freeway, a bus stop or a workplace emitting high levels of pollutants.

Researchers found that a 10 microgram per cubic meter increase in personal exposure to pollution (as measured by the level of small particulate matter):

- narrowed brachial (arm) blood vessel diameter (a potential immediate condition that could lead to heart and vascular events) by 18 percent two days after exposure; and
- led to a 1.6 millimeter of mercury (mm Hg) jump in systolic blood pressure on the day following exposure.

Furthermore, researchers found that although the participants were

nonsmokers living in nonsmoking homes and told to avoid tobacco smoke during the study, approximately 30 percent were still exposed to secondhand smoke.

"At the community level, a 10 microgram per cubic meter increase in pollution leads to a 1 percent increased chance of dying the next day," Brook said. "Within a city of 1 to 5 million, that increase would lead to about one death per day."

Globally, air pollution is the 13th leading cause of death. Air pollution blankets cities throughout the world. The cumulative yearly exposure contributes to tens of thousands of deaths in the United States and an estimated 800,000 deaths throughout the world, Brook said.

Researchers conclude that the sources and characteristics of air pollution may be important determinants of the health responses.

Source: American Heart Association

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