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RESEARCH TO PROMOTE HEART HEALTH

Studying the Links between Air Pollution and Cardiovascular Disease

In studies by EPA and others, outdoor air pollutants have been found to increase risks to heart health, triggering heart attacks and strokes.

The findings have serious implications for the health of Americans. As many as 82 million adults in the U.S., that is 1 in 3, have some type of heart or blood vessel disease and are at elevated risk due to exposure to air pollution.

Since passage of the Clean Air Act in 1970, EPA scientists have been at the forefront of air pollution research to provide the scientific foundation for the nation's air quality standards. The research has helped to save lives and improve health. One focus of that research is to better understand the effects of air pollution on the heart, nervous, and vascular systems.

A significant body of research has shown that long-term exposure to fine particulate matter, known as $PM_{2.5,}$ can impact heart disease. Particles are emitted year-round in exhaust from motor vehicles and smoke from power plants, industries, and forest fires. Particles also arise from chemical reactions in sunlight from vapor and gaseous pollutants.

Research is now focusing on ozone, a widespread pollutant that peaks during the summer. Ozone is formed when exhaust and other emissions from the same sources are exposed to sunlight.

Clinical and animal studies are indicating that ozone has similar effects as $PM_{2.5}$ on the heart, nervous and vascular systems.

Research continues on these and other air pollutants, including mixtures of pollutants.

The many pollutants in the environment may have a greater health impact than individual pollutants. For example, diesel exhaust may combine with ozone to have synergistic effects, meaning the health impact from the combination of pollutants may be greater than the impact from each separately.

Sensitive Groups

Some people may be more vulnerable to air pollution's impact on the heart. EPA scientists are studying groups and individuals who may be at increased risk due to air pollution exposure.

Genetic characteristics may be a risk factor for health problems from air pollution exposure. EPA is studying people with heart disease and looking at their exposure to sources of pollutants and the potential that their genetic makeup affected their

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response to pollutants and the development of their heart disease.

Research is also under way to study vulnerable populations who may be at increased risk of heart problems as a result of exposure to air pollution and those with underlying hypertension, diabetes or obesity.

Sources

Do some sources of air pollution pose a greater threat? What sources of pollutants are you exposed to throughout your day?

To understand the impacts of air pollution on health, including the cardiovascular system, scientists are studying sources of pollutants, where they travel and how they may impact the health of those in their path. They are assessing exposure levels of people who live near sources of pollution such as major roadways, ports, and railways to determine the link between exposure and health impacts.

Intervention Strategies

EPA is also evaluating tools and methods to control and reduce air pollution exposures that might have health impacts, including cardiovascular problems. Research found that barriers such as retainer walls reduce pollutants by 50 percent from nearby major roads.

Interventions can be achieved on an individual basis as well. One EPA study found that omega-3 fatty acids in dietary supplements block some of the effects of $PM_{2.5}$ on the cardiovascular system.

EPA's research contributed to the development of the federal government's Air Quality Index, an online tool at www.airnow.gov that can be used to reduce personal exposure to air pollutants and promote health.

Partners

EPA provides funding to universities and research organizations to further advance the science and complement research done by its own scientists.

Research at four Clean Air Research Centers (CLARCs) is investigating mixtures of pollutants and their impacts on health, including heart health.

The Multi-Ethnic Study of Atherosclerosis (MESA) Air Pollution Study, funded by EPA, is a long-term study to examine the development and progression of atherosclerosis, also known as hardening of the arteries, and other health effects in selected ethnic groups exposed long-term to $PM_{2.5}$ in different cities.

The Health Effects Institute, funded by EPA and the worldwide motor vehicle industry, is examining the health effects, including heart problems of mixtures of pollutants including freshly emitted exhaust particles from traffic known as ultrafine particles.

These and other cutting-edge studies by EPA, universities and research institutes across the country are focused on the impact of air pollution on the number one killer in America, heart disease.

The discoveries by EPA and others will be used in reviews of the National Ambient Air Quality Standards and are helping to protect the health of the American people.

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