Air pollution exposure may raise heart disease risk

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Exposure to air pollution can worsen blood sugar levels, cholesterol and other risk factors for heart disease, particularly in people with diabetes, according to a new study published in the Endocrine Society's *Journal of Clinical Endocrinology & Metabolism*.

Cardiovascular and lipid disorders are the leading cause of death in the United States, according to the Society's Endocrine Facts and Figures

Report. As of 2011, the total cost of cardiovascular disease nationwide was $320.1 billion. The total includes direct costs of treatment as well as indirect costs such as lost productivity.

Unhealthy cholesterol levels and excess glucose in the bloodstream can put an individual at greater risk of developing heart disease, according to the Hormone Health Network, the Society's public education arm.

"While air pollution is linked with relatively small changes in cardiometabolic risk factors, the continuous nature of exposure and the number of people affected gives us cause for concern," said the study's senior author, Victor Novack, MD, PhD, of Soroka University Medical Center and Ben-Gurion University in Beer Sheva, Israel. "Even small changes in glucose levels and glycemic control can contribute to increased risk of cardiovascular disease."

The population-based retrospective cohort study examined the effects of air pollution exposure on 73,117 adults living in southern Israel, where levels of particulate matter can escalate due to its location in the global dust belt. To assess air pollution, the researchers used daily satellite data on how much sunlight was blocked by particles in the air—a measurement called aerosol optical depth. By examining this and other weather data, the scientists developed a model that allowed them to estimate daily air pollution exposure for each study participant using their address.

Researchers analyzed the results of more than 600,000 blood samples taken from the study subjects, who were insured by Clalit Health Services between 2003 and 2012. All of the study participants were known smokers or were diagnosed with diabetes, ischemic heart disease, hypertension or dyslipidemia, which occurs when levels of fats in the blood are too high or low.

The study found participants tended to have higher blood sugar levels and a poorer cholesterol profile when they were exposed to higher average levels of air particulates in the preceding three months compared to those exposed to lower levels of air pollutants. Particulate matter exposure was associated with increases in blood glucose, LDL cholesterol levels, and triglycerides, or fats in the blood. Exposure to particulate matter also was linked to lower levels of HDL, or "good," cholesterol.

The associations were stronger for people with diabetes. However, those who were taking medications other than insulin to treat diabetes experienced a protective effect. This group experienced smaller changes in blood sugar and cholesterol levels following air pollution exposure.

Although air pollution did not have an immediate effect on blood test results taken within as little as seven days of exposure, the researchers found that cumulative exposure over the course of three months was tied to risk factors for cardiovascular disease.

"We found an association between air pollution exposure in the intermediate term and undesirable changes in cholesterol," said the study's first author, Maayan Yitshak Sade, MPH, of Ben-Gurion University and Soroka University Medical Center, both in Beer Sheva, Israel. "This suggests that cumulative exposure to air pollution over the course of a lifetime could lead to elevated risk of cardiovascular disease."

More information: *Journal of Clinical Endocrinology & Metabolism*, DOI: 10.1210/jc.2016-1378

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