

Traffic-related air pollution associated with changes in right ventricular structure and function

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Exposure to high levels of traffic-related air pollution is associated with changes in the right ventricle of the heart that may contribute to the known connection between air pollution exposure and heart disease, according to a new study.

"Although the link between traffic-related [air pollution](#) and left [ventricular hypertrophy](#), [heart failure](#), and cardiovascular death is established, the effects of traffic-related air pollution on the [right ventricle](#) have not been well studied," said lead author Peter Leary, MD, MS, of the University of Washington Medical Center in Seattle. "Using exposure to [nitrogen dioxide](#) as a surrogate for exposure to traffic-related air pollution, we were able to demonstrate for the first time that higher levels of exposure were associated with greater right ventricular mass and larger right ventricular end-diastolic volume. Greater right ventricular mass is also associated with increased risk for heart failure and [cardiovascular death](#)."

The findings were published online ahead of print publication in the American Thoracic Society's *American Journal of Respiratory and Critical Care Medicine*.

The study involved 3,896 participants who were free of clinical cardiovascular disease in the Multi-Ethnic Study of Atherosclerosis and who underwent cardiac magnetic resonance imaging (MRI). Using

estimated exposure to outdoor oxides of nitrogen at the homes of participants over the year preceding MRI, the authors found that increased exposure to nitrogen dioxide was associated with an approximately 1.0 g (5 percent) increase in right ventricular mass and a 4.1 mL (3%) increase in right ventricular end-diastolic volume.

These relationships remained after accounting for differences among participants in cardiovascular risk factors, left ventricular mass and volume, markers of inflammation, lung disease and socioeconomic status.

The authors note that this type of study can be limited in several ways. Specifically, estimates of air pollution exposure are not perfect and it remains possible that something related to air pollution, but not air pollution itself (known as confounding), was responsible for the association. For these reasons and others, this study cannot prove that traffic-related air pollution causes changes in the right heart, but does strongly suggest the relationship.

"The morphologic changes in the right ventricle of the heart that we found with increased exposure to nitrogen dioxide add to the body of evidence supporting a connection between traffic-related air pollution and cardiovascular disease," said Dr. Leary. "The many adverse effects of air pollution on human health support continued efforts to reduce this burden."

Provided by American Thoracic Society

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