Air pollution exposure linked to enlarged hearts

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Healthy people exposed to even low levels of air pollution over a handful of years developed enlarged heart chambers, a common precursor to heart failure, a new study indicates.

While previous research has established a firm link between air pollution and higher risks of heart disease and heart-related death, the U.K.-based study published Aug. 3 in the American Heart Association journal *Circulation* provides clues about how such damage gets started.

"What we found is that if you were well exposed to air pollution even at relatively low levels, we saw a larger size of the heart-pumping chamber. These are the types of changes we see in people who are developing heart failure," said Dr. Nay Aung, a cardiologist and the lead author of the report.

Researchers examined data from 3,920 people living within a 25-mile radius of an area in the United Kingdom with a low level of pollution that easily met international air quality standards.

The study's volunteers, aged 40 to 69, were free from any heart disease at the time of imaging assessment. Their hearts were scanned with MRI five years after the recruitment, between 2014 and 2015.

Changes in heart sizes were minimal—but significant, Aung said.

"Even at that low exposure level, you can start seeing these early, preclinical changes that may lead to worse outcomes in the long run if left untreated or uncontrolled," said Aung, a research fellow at the advanced cardiac imaging unit at Barts Health NHS Trust and Queen Mary University of London.

Researchers said two specific traffic-related pollutants—nitrogen oxide and fine particulate matter—were significantly associated with the larger size of certain heart chambers.

Although the study looked at the link between air pollution exposure and the body's physical features, it did not look at outcomes, "so we don't know what will happen to these people in five or 10 years down the line," Aung said. "That's the type of study that we would like to do in the long run to really determine a causal relationship and provide an accurate estimate of how harmful these changes are."

Dr. Robert Brook, a cardiovascular medicine specialist and professor at the University of Michigan Medical School who was not involved in the study, said the research backs up work from the past two decades that has examined the impact of air pollution on human health.

"Air pollution is actually a disease of the heart. People will think it's a lung problem or an asthma problem or a COPD (chronic obstructive pulmonary disease) problem, but what they don't see is that it really is a heart problem," said Brook, who led the

writing of an AHA scientific statement on the topic. "This study shows us that even low levels of pollution can lead to chronic, adverse structural changes in the heart."

By looking at subjects who were young and otherwise healthy, the study challenges the notion that air pollution simply accelerates health problems among the old and sick, people already predisposed to heart failure.

"This gives good evidence that there's a chronic health effect rather than just an acute development of mortality or heart failure exacerbation," Brook said.

In the United States, air pollution levels have dropped significantly since the federal government passed regulations in the 1970s to limit emissions from industrial and traffic-related sources.

"But this is a warning. It's important for us to not be lazy and rest on our laurels on the improvement we've seen and allow a degradation of air quality standards," Brook said.

The study's researchers agreed.

"Our findings add to the growing evidence of the damaging effects of ambient pollution even in the setting of relatively low levels," they wrote in their conclusion. "Efforts to reduce air pollutant emission should be prioritized accordingly in public health initiatives and legislative measures."