

Air pollution linked to changes in cardiac structure



Even low levels of air pollution may cause serious changes in the structure of the heart, similar to those seen in the early stages of heart failure, according to new research partly funded by the British Heart Foundation and published in the journal *Circulation*.

Researchers led by Professor Steffen Petersen, Queen Mary University of London, examined data from around 4,000 participants in the UK Biobank study, including information on their lifestyles, health record and details on where they have lived. Participants also had blood tests and health scans. Heart MRI (magnetic resonance imaging) was used to measure the size, weight and function of the participants' hearts at fixed times.

While most participants lived outside major UK cities, there was a clear association between those who lived near loud, busy roads, and were exposed to nitrogen dioxide (NO₂) or PM_{2.5} – small particles of air pollution – and the development of larger right and left ventricles in the heart. The ventricles are important pumping chambers in the heart and, although these participants were healthy and had no symptoms, similar heart remodelling is seen in the early stages of heart failure.

Researchers noted that higher exposures to the pollutants were linked to more significant changes in the structure of the heart. For every 1 extra µg per cubic metre of PM_{2.5} and for every 10 extra µg per cubic metre of NO₂, the heart enlarges by approximately 1%.

In the study, average annual exposures to PM_{2.5} (8-12µg per cubic metre) were well within UK guidelines (25µg per cubic metre), although they were approaching or past World Health Organisation (WHO) guidelines (10µg per cubic metre). The WHO has said that there are no safe limits of PM_{2.5}. The participants' average exposure to NO₂ (10-50µg per cubic metre) was approaching and above the equal WHO and UK annual average guidelines (40µg per cubic metre).

Air pollution is now the largest environmental risk factor linked to deaths in England. Globally, coronary heart disease and stroke account for approximately six in ten (58%) deaths related to outdoor air pollution. This research could help explain exactly how and why air pollution affects the heart.

"Although our study was observational and hasn't yet shown a causal link, we saw significant changes in the heart, even at relatively low levels of air pollution exposure," said Dr. Nay Aung who led the data analysis from Queen Mary University of London. "Our future studies will include data from those living in inner cities like Central Manchester and London, using more in-depth measurements of heart function, and we would expect the findings to be even more pronounced and clinically important."

Ahead of the UK Government's consultation on their draft Clean Air Strategy closing on 14 August 2018, the British Heart Foundation (BHF) wants to ensure the public's heart and circulatory health is at the centre of discussions.

The Strategy commits to halving the number of people in the UK living in areas where PM_{2.5} levels exceed WHO guidelines (10 µg per cubic metre) by 2025, but ultimately the charity would like to see this action go further to reduce the health impacts of toxic air as quickly as possible.

"We can't expect people to move home to avoid air pollution – governments and public bodies must be acting right now to make all areas safe and protect the population from these harms," said Professor Jeremy Pearson, the BHF's Associate Medical Director. "What is particularly worrying is that the levels of air pollution, particularly PM_{2.5}, at which this study saw people with heart remodelling are not even deemed particularly high by the UK Government - this is why we are calling for the WHO guidelines to be adopted."

Source: [British Heart Foundation](#)

Image Credit: British Heart Foundation

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