

# Study pinpoints possible cause of noise-related blood vessel damage, heart disease

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Long-term exposure to environmental noise—think planes, trains, and automobiles—has been linked in multiple studies to adverse health effects such as poor sleep, psychiatric disorders, diabetes, and cardiovascular disease (CVD). However, the mechanisms linking noise to such diseases has not been well understood. Now, investigators at Massachusetts General Hospital (MGH) and colleagues have identified a potential mechanism through which long-term exposure to noise leads to inflammation, blood vessel damage, and heart disease.

"We observed that stress-associated brain centers, specifically the amygdala, potentially serve as the conduit by which noise triggers changes that lead to disease," says lead author Michael T. Osborne, MD, from the Cardiac Imaging Research Center and division of Cardiology at MGH.

In a study published in the *European Heart Journal*, Osborne and colleagues report that high [noise levels](#) lead to activation of the amygdala, a deep brain structure that plays a central role in processing emotions and responding to stress.

They used radiotracer-enhanced positron-emission tomography/computed tomography (18F-FDG-PET/CT) imaging to study the brains and arteries of 498 adults at study outset and followed them for 5 years to see whether higher levels of noise [exposure](#) associated with a major adverse cardiovascular event, commonly abbreviated as "MACE." MACE was defined as CVD-related death, heart attack (myocardial infarction), severe uncontrolled chest pain (unstable angina), stroke, heart failure, or need for an intervention to reopen blocked coronary or peripheral arteries (revascularization).

To determine noise exposure, they estimated average transportation noise over 24 hours at each subject's home address with United States Department of Transportation Data and adjusted

their findings for potential contributors to CVD and MACE such as air pollution (a known risk factor for heart and lung disease), socioeconomic factors, and existing CVD risk factors.

Over a median of 4 years, 40 of the 498 subjects (8%) experienced MACE, and when the investigators looked at noise exposure for these individuals, they found that every 5 decibel increase in noise predicted MACE. The association between noise levels and MACE remained strong even when they took into account other potential risk factors for CVD.

Importantly, PET-CT imaging showed that higher levels of noise exposure were associated with an increase in activity in the amygdala and an increase in inflammation of arteries, an early and critical event in the development of CVD.

"These findings suggest a need to help people who may be at risk for CVD understand that chronic noise exposure where they live may increase their risk of disease," Osborne says.

Based on their findings, the investigators plan to further study the link between [noise](#) exposure and other diseases (including diabetes and obesity) with an eye towards developing interventions to mitigate disease.

**More information:** Michael T Osborne et al, A neurobiological mechanism linking transportation noise to cardiovascular disease in humans, *European Heart Journal* (2019). [DOI: 10.1093/eurheartj/ehz820](#)

Provided by Massachusetts General Hospital

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