Aircraft noise exposure increases damage from myocardial infarction, finds study

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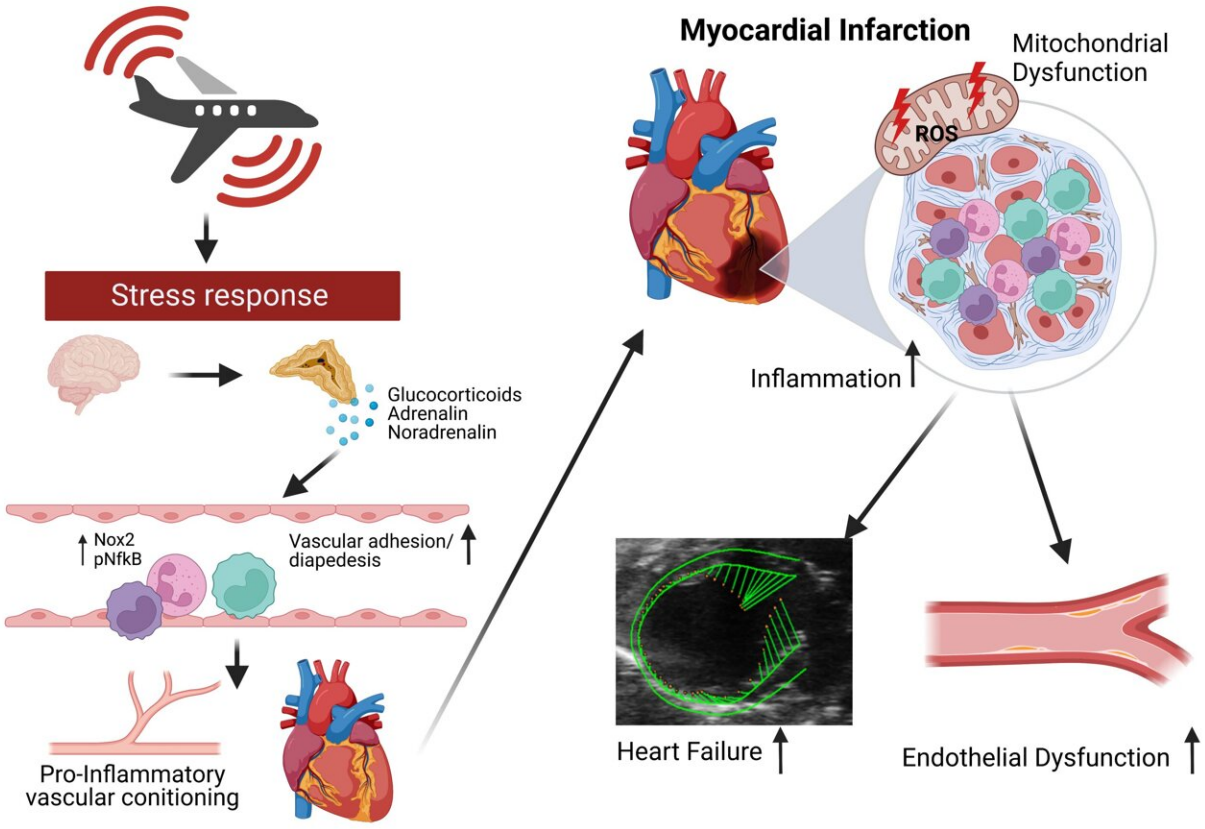

Noise-induced stress causes the release of stress hormones that trigger an inflammatory response, leading to more severe myocardial infarction, oxidative stress and endothelial dysfunction, and subsequent heart failure. Credit: Cardiovascular Research

Traffic noise may play an essential role in the development and deterioration of ischemic heart disease. Researchers from the Cardiology Department at the University Medical Center Mainz have now discovered that noise exposure (average sound pressure level 72 dB; peak level 85 dB) up to 4d resulted in pro-inflammatory aortic gene expression in mice.

Noise caused adhesion and infiltration of inflammatory cells in vascular/cardiac tissue, paralleled by an increased percentage of leukocytes with a pro-inflammatory, reactive oxygen species (ROS)-producing phenotype and expression of phagocytic NADPH oxidase/phospho-NFκB in peripheral blood.

The group used the permanent LAD ligation model to induce myocardial infarction and worsening of cardiac function. Noise exposure before MI induced more severe endothelial dysfunction and more pronounced increases in vascular ROS and signs of inflammation in animals preconditioned with noise.

Participants of the population-based Gutenberg Health Cohort Study (median follow-up:11.4y) with incident MI revealed elevated C-reactive protein (CRP) at baseline and worse LVEF after MI in case of a history of noise exposure and subsequent development of noise annoyance.

The lead and senior authors Michael Molitor and Philip Wenzel commented, "We learned from our studies that aircraft noise exposure before MI substantially amplifies subsequent cardiovascular inflammation and aggravates ischemic heart failure facilitated by pro-inflammatory vascular conditioning. Our translational results show that humans that had noise exposure in the past will have a worse outcome if they have an acute MI later in life."

The cardiologist and noise expert Thomas Münzel concluded, "This is

the first time that a translational study was performed to investigate the effects of aircraft noise on acute myocardial infarction. The results were stunning. In experimental animals and humans, aircraft noise markedly exaggerated the consequences of ischemia (left ventricular function, inflammation, and oxidative stress) in response to an acute myocardial infarction. There is no doubt anymore that transportation noise must be considered an important cardiovascular risk factor, comparable to hypercholesterolemia, hypertension, smoking, and diabetes mellitus."

The work is published in the journal *Cardiovascular Research*.

More information: M Molitor et al, Aircraft noise exposure induces pro-inflammatory vascular conditioning and amplifies vascular dysfunction and impairment of cardiac function after myocardial infarction, *Cardiovascular Research* (2023). DOI: 10.1093/cvr/cvad021

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