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CHARACTERIZING THE BRAIN-HEART-VESSEL AXIS IN AIRCRAFT NOISE-INDUCED NEUROPSYCHIATRIC AND CARDIOVASCULAR COMPLICATIONS

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The World Health Organization (WHO) estimates that noise pollution leads to the loss of 1.6 million healthy life years annually in Western Europe alone, primarily due to night-time noise exposure which disrupts sleep and triggers stress responses. This study investigates the adverse health effects of aircraft noise on the brain-heart-vessel axis, combining cardiovascular and neuropsychiatric approaches. We aim to characterize the functional and biochemical consequences of both short-term and long-term noise exposure utilizing an established mouse model. Behavioural changes in exposed mice, including cognition, anxiety, depression, and social behaviour were assessed alongside cardiovascular parameters such as blood pressure, endothelial function tests, and analyses of oxidative stress and inflammation markers. Short-term noise exposure did not lead to any significant differences in the behaviour of the noise-exposed mice, whereas long-term noise-exposure leads to reduced social interaction and working memory as behavioural markers of depression. Functional cardiovascular parameters point to hypertension and impaired endothelial function in both short-term and long-term noise exposure, as well as oxidative stress and inflammation. These findings underscore previously reported cardiovascular impact of noise exposure while adding the suspected behavioural changes and metabolic markers of the affected brain-heart axis. The observed behavioural changes and cardiovascular impairments emphasize the complex interplay between environmental stressors and health, suggesting that long-term noise exposure can have profound effects on both mental and cardiovascular health. This study provides a comprehensive framework for future research aimed at reducing the adverse effects of noise pollution on the brain-heart-vessel axis.