

## Associations between Environmental Noise and Biomarkers of Neurodegeneration in the Chicago Health and Aging Project

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### ABSTRACT

Studies have investigated links between environmental noise and dementia risk; however, less is known regarding pre-cursors that elucidate biological mechanisms. Neuroinflammation and neurodegeneration are potential pre-cursors of cognitive decline, and these processes can be measured with biomarkers in serum, such as total tau, glial fibrillary acidic protein (GFAP), and neurofilament light chain (NfL). Therefore, this study will examine associations of aircraft and road noise with three neurodegenerative biomarkers (total tau, GFAP, and NfL) and modification on cognitive performance in the Chicago Health and Aging Project, a longitudinal cohort of older adults based in Chicago, Illinois, USA. Participants were interviewed in 3-year cycles between 1993 and 2012, in which a random sample of 1,327 provided serum for biomarker analysis. Aircraft and road noise contours of day-night average sound level (DNL) were modeled above 44 and 34 A-weighted decibels (dB(A)), respectively. Noise estimates were obtained every five years from 1995 to 2015 and linked to geocoded residential addresses. Median (interquartile range) levels of noise were 50 (6) and 58 (8) dB(A) for aircraft and road, respectively. We will assess covariate-adjusted percentage differences and trajectories in biomarker concentrations per 10 dB(A) increment in noise using linear mixed models and effect modification by stratifying noise-cognitive performance associations by levels of serum biomarker concentrations. We hypothesize that higher noise levels will be associated with higher biomarker concentrations and that noise-biomarker linkages will moderate associations between noise and cognitive performance. Understanding these relationships may provide insight into mechanisms by which noise affects cognitive performance and dementia.

Keywords: Noise, Transportation, Biomarkers, Neurodegeneration