TRAFFIC-RELATED AIR POLLUTION AND ACUTE CHANGES IN HEART RATE VARIABILITY AND RESPIRATORY FUNCTION IN URBAN CYCLISTS

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Background and Aims: Few studies have examined the acute health effects of air pollution exposures experienced while cycling in traffic. The aim of this study was to examine the relationship between traffic-related air pollutants and acute changes in heart rate variability, lung function, and exhaled NO in healthy cyclists.
Methods: Forty-two healthy adults (19 to 58 years of age) cycled for 1-hour on high and low-traffic routes as well as indoors. Ultrafine particles (UFPs) (<0.1 um), PM2.5, black carbon, and volatile organic compounds were measured along each cycling route and ambient NO2, SO2, and O3 levels were recorded from a fixed-site monitor. Mixed-effects models were used to examine the relationship between air pollution exposures and changes in baseline health measures adjusted for potential confounders.
Results: An inter-quartile range increase in UFP levels was associated with a 220 ms decrease (95% confidence interval: -386, -53) (approximately 35 %) in high frequency power 4-hours after the start of cycling. Significant inverse relationships were also observed between NO2 and the ratio of low-frequency to high-frequency power and between O3, root mean square of successive differences in adjacent NN intervals (RMSSD), and percentage of adjacent NN intervals differing by more than 50 ms (pNN50). Acute changes in respiratory outcomes were not consistently associated with air pollution levels.
Conclusions: Exposure to traffic-related air pollution may contribute to decreased parasympathetic modulation of the heart in the hours immediately following cycling.