COARSE AND TRAFFIC-RELATED PARTICULATE MATTER AND THE HUMAN MICROVASCULATURE *IN VIVO* ASSESSED VIA RETINAL IMAGING: THE MULTI-ETHNIC STUDY OF ATHEROSCLEROSIS

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Background and Aims: Airborne particulate matter may affect cardiovascular health via underlying vascular disease. While recent evidence links fine particles ($PM_{2.5}$) to microvasculature changes, associations with larger coarse particles ($PM_{10-2.5}$) and traffic-related particles remain unknown.
Methods: Associations between retinal arteriolar diameters, a microvasculature measure, and chronic residential concentrations of $PM_{10-2.5}$ mass, $PM_{10-2.5}$ copper (an indicator of motor vehicle brake wear), and residential proximity to major roadways were examined among Chicago-based Multi-Ethnic Study of Atherosclerosis participants. Subjects aged 46 to 87 years and without clinical cardiovascular disease at enrollment (2000-2002) underwent retinal photography between 2002-2003. Participant-specific concentrations were estimated using speciated $PM_{10-2.5}$ data and a universal kriging spatial prediction model. A binary nearness to major roadways variable was also calculated. All associations were examined using linear regression models adjusted for age, sex, race/ethnicity, education, income, smoking status, alcohol use, physical activity, body mass index, family history of cardiovascular disease, diabetes, serum cholesterol, glucose, blood pressure, emphysema, C-reactive protein, and medication use. Secondary analyses included control for long-term concentrations of $PM_{2.5}$.
Results: Among 779 participants with complete data, retinal arteriolar diameters were not associated with $PM_{10-2.5}$ concentrations but were associated with traffic-related exposures. Narrower arterioles were found among persons residing near roadways (-3.0 µm, 95% CI: -5.1 to -0.8) and among persons living in areas of higher $PM_{10-2.5}$ copper concentrations (-1.2 µm per 4 ng/m^3, 95% CI: -2.7 to 0.2). Control for $PM_{2.5}$ strengthened the associations with $PM_{10-2.5}$ copper (-2.4 µm per 4 ng/m^3, 95% CI: -4.7 to -0.1), whereas associations with residential proximity to roadways were unaffected.
Conclusions: Higher exposures to traffic as assessed by residential proximity and $PM_{10-2.5}$ copper concentrations, but not $PM_{10-2.5}$ mass, were associated with narrower retinal arteriolar diameters in older individuals. This suggests that the retinal microvasculature is sensitive to traffic pollution but not coarse particulate mass.