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Title: Ambient polycyclic aromatic hydrocarbons and pulmonary function in children

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Body: Background: Polycyclic aromatic hydrocarbons (PAHs) are a key component of traffic emissions. Exposure to PAHs has been associated with wheezing and impaired T regulatory cell function in a cohort of asthmatic children in Fresno, CA. Objective: To assess whether exposure to PAHs is associated with lower lung function in children, with and without asthma. Methods: Children age 9-18 living in Fresno were recruited (n=297; 135 with asthma, 162 without asthma) for respiratory health evaluation including pre- and post-bronchodilator spirometry. Exposure to 4, 5, and 6-member ring PAHs (PAH456) based on a previously published land-use regression model was estimated for each child. Linear regression was used to evaluate the association between annual mean PAH456 exposure in the year prior to testing and maximum post-bronchodilator FEV1. The analysis was restricted to participants with acceptable spirometry and non-missing covariates and stratified by asthma status. Results: Mean 1-year PAH456 exposure was 2.99 ng/m3 (IQR 1.03). In a model adjusted for age, sex, African-American race, height and socioeconomic status (rented or owned home), a 1 ng/m3 increase in PAH456 was associated with a 0.11 L decrease in FEV1 (95% confidence interval (CI): -0.21, -0.02) among non-asthmatic children. Among asthmatic children, a 1 ng/m3 increase in PAH456 was also associated with a 0.01 L decrease in FEV1, although this result was not statistically significant (95% CI: -0.12, 0.09). Conclusion: This is the first study to assess the effect of individual PAH exposure estimates on lung function in children or adults. Somewhat surprisingly, we found a significant effect in non-asthmatic children, but not in asthmatic children.