**Title: Long-term Exposures to Air Pollutants Affect FeNO in Children: A Longitudinal Study**

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**Abstract (250 words; max: 250)**

**Background:** FractionalExhaled nitric oxide (FeNO) is a marker of airway inflammation that has been shown to be responsive to short-term air pollution exposures; however, effects of long-term exposures are uncertain. Using longitudinal assessments of FeNO and air pollutant exposures, we aimed to determine whether FeNO is a marker for chronic effects of air pollution exposures after accounting for short-term exposures effects.

**Methods:** FeNO was assessed up to six times from 2004-05 through 2011-12 in 3607 schoolchildren from 12 communities in the Southern California Children’s Health Study. Within-community long-term ambient air pollution exposures (PM2.5, PM10, NO2 and O3) were represented by differences between community-specific annual averages and the eight year average spanning the study period. Linear mixed-effect models estimated within-participant associations of annual average air pollution with current FeNO, controlling for previous FeNO, prior seven-day average pollution, potential confounders, and community-level random intercepts. We considered effect modification by sex, ethnicity, asthma, and allergy at baseline.

**Findings:** FeNO was positively associated with annual average air pollution, after accounting for short-term exposures. One standard deviation higher annual PM2.5 and NO2 exposures (PM2.5: 2.0 μg/m3; NO2: 2.7 ppb) were associated, respectively, with 4.6% (95% CI: 2.3%-6.8%) and 6.5% (95% CI: 4.1%-8.9%) higher FeNO. These associations were larger among females. We found little evidence to support association with PM10 or O3.

**Interpretation:** Annual average PM2.5 and NO2 levels were associated with FeNO in schoolchildren, adding new evidence that long-term exposure affects FeNO beyond the well-documented short-term effects. Longitudinal FeNO measurements may be useful as an early marker of chronic respiratory effects of long-term PM2.5 and NO2 exposures in children.

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