

# IMPACT OF AIR POLLUTION ON THE RESPIRATORY HEALTH OF CHILDREN WITH SICKLE CELL ANEMIA IN ATLANTA, GEORGIA USA

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**Background and Aims:** Children with sickle cell disease (SCD) comprise a potentially susceptible, yet largely unstudied, subgroup. SCD is an inherited, autosomal recessive blood disorder and is one of the most prevalent genetic disorders in the United States. The aim of this study is to determine if elevated concentrations of exposures to air pollutants are associated with adverse respiratory health effects in children with SCD. To our knowledge, this is the first U.S. study examining these potential associations in this population.

**Methods:** We conducted a panel study of seven homozygous children with SCD in Atlanta, GA from 2008–2009. Repeated measurements of 24-hour integrated personal exposures to fine particulate matter (PM<sub>2.5</sub>) and nitrogen dioxide (NO<sub>2</sub>) were collected for two seasons. Concurrent assessments of the children's pulmonary inflammatory response and lung function were also conducted. We used a linear mixed-effects model with random intercept to examine the relationship between the children's air pollution exposures and specific health outcomes.

**Results:** The children's mean age was nine years (range: 7–12 years). Preliminary 24h median personal PM<sub>2.5</sub> and NO<sub>2</sub> exposure concentrations were 11.3 ug/m<sup>3</sup> (range: 1.3-31.9 ug/m<sup>3</sup>) and 15.0 ppb (range: 5.9 – 99.7 ppb), respectively. Exhaled nitric oxide (eNO) measurements for all children ranged from <5 to 57.5 ppb. The median percentage of predicted Forced Expiratory Volume at 1% (FEV<sub>1</sub>) was 83.7% (range: 57.9%-99.4%) and FEV<sub>25-75</sub> was 1.6% (range: 0.2%-4.1%). While not significant, a standard deviation increase in NO<sub>2</sub> was associated in a 0.54 ppb reduction in eNO after controlling for season, day of week, and demographic characteristics.

**Conclusions:** The initial findings were suggestive of an association between children's eNO levels and exposures to NO<sub>2</sub>. Other markers of airway inflammation and lung function will also be presented to help elucidate the variability and strength of this association among the children.