

# **STUDY OF HEALTH EFFECTS OF TOXIC AIR POLLUTANTS ON ASTHMATIC CHILDREN IN HUNTINGTON PARK**

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**March 25, 2004**

**Air Resources Board**



**California Environmental Protection Agency**

Thank you Ms. Witherspoon and good morning Chairman Lloyd and members of the Board.

Today's health update will focus on the results of a study co-funded by the Air Resources Board and the South Coast Air Quality Management District to investigate respiratory health effects from exposure to toxic air pollutants on a population of Hispanic asthmatic children.

This is a study that adds needed information to our understanding of the effects of volatile organic compounds on a potentially susceptible population of asthmatic children. In addition, this study contributes to the Board's environmental justice mission in that it provides much needed data on the exposure to and health effects from air pollutants in a heavily traffic-impacted community.

## **METHODS: Health Outcomes**

- **Twenty-six Hispanic asthmatic children**
- **Daily symptom diaries**
- **Twice daily measures of airway function**
- **Breath samples**
- **November 1999 to January 2000**
- **Daily air pollution data**
- **Exposure assessment study**

Delfino RJ, et al. *Environmental Health Perspectives* 111:647-656 (2003).



Delfino RJ, et al. *Journal of Exposure Analysis and Environmental Epidemiology* 13: 348-363 (2003).

The objective of this study under the direction of Dr. Ralph Delfino of the University of California at Irvine, was to evaluate the association between health outcomes and VOCs in a group of 26 Hispanic asthmatic school children, ages 10 to 16, who resided in the Huntington Park area of East Los Angeles County. This study resulted in two peer review papers as well as a final report, which is available on our website. Subjects completed a short daily diary each evening. Information on asthma symptoms and medication use, as well as time activity diaries were collected each day. Measures of lung airway function were collected both in the morning and at night.

The children were also instructed to breathe into special canisters during asthma symptom episodes and during symptom free periods to measure VOCs in the breath.

The study period ran from November 1999 to January 2000, during which time the South Coast Air Quality Management District operated air monitoring station at two neighborhood schools. In addition to monitoring VOCs during this time, the stations also monitored criteria air pollutants.

The investigators also carried out a detailed exposure assessment study for four of the children.

## RESULTS: Exposure Assessment

- Personal and indoor VOCs highly correlated
- Breath VOCs lower than indoor VOCs
- Breath VOCs did not correlate with outdoor VOCs
  - Except benzene, *m,p*-xylene



Although the exposure assessment was completed for a very small sample of the children, the results provide a number of insights into the relationship between breath, personal, indoor and outdoor exposures to VOCs.

Personal and indoor VOCs were highly correlated, however, personal and outdoor concentrations were generally not.

Breath VOC concentrations were lower than indoor VOC concentrations. The investigators indicate that these results suggest, as other studies have found, that the VOCs were produced outside the body and that air was the predominate pathway for exposure.

For most of the target compounds, breath measurements did not correlate with outdoor measurements. However, outdoor benzene, and meta, para xylene of the previous two days appeared to be correlated with current day breath measurements. This suggests a possible outdoor source for these chemicals.

## RESULTS: Health Outcomes

- **Outdoor VOCs associated with asthma symptoms**
  - Breath benzene also significant
- **Outdoor air pollutants associated with asthma symptoms**
  - ozone, particulate matter, nitrogen dioxide, sulfur dioxide
  - organic and elemental carbon



The investigators reported significant associations between asthma symptoms and some of the VOCs measured outdoors.

In a sub analysis, breath concentrations of VOCs were not associated with asthma symptoms with the exception of breath benzene. This secondary analysis should be interpreted with caution as the sample size was very small for this analysis.

The investigators also reported significant associations between asthma symptoms and ambient levels of criteria pollutant, including ozone, PM10, nitrogen dioxide and sulfur dioxide. No significant associations were reported between carbon monoxide and asthma symptoms. Measures of organic carbon, and elemental carbon were also associated with asthma symptoms.

Although deficits in airway function measurements of the lungs were reported in relation to increases in some ambient VOCs, most of the findings were not statistically significant. PM10 was associated with significant airway function deficits in the morning, with particularly large deficits for 1-hr PM10.

## IMPLICATIONS

- Preliminary evidence of acute adverse associations of VOCs with asthma
- Pro-inflammatory nature of traffic-related pollutants associated with adverse health effects in asthmatic children
  - VOCs may be a marker of traffic emissions
- Past and ongoing motor vehicle and fuels control programs are reducing exposure to traffic emissions



An important contribution of this study is that it provides preliminary evidence of acute adverse associations of VOC with asthma in children.

These findings, along with other epidemiological evidence from the Netherlands, suggest that the pro-inflammatory and irritant nature of traffic-related pollutants can lead to adverse health effects in asthmatic children. VOCs may not be the cause, but rather a marker for general traffic emissions.

Past and future control programs including catalytic controls and fuel reformulations have reduced the toxic VOCs and criteria pollutants emitted by mobile sources. The Air Resources Board will continue to look for new emission control programs to reduce exposure to air toxics as well as criteria pollutants.

This concludes my presentation, I would be happy to answer any questions.