Health Effects Associated With Traffic-Related Air Pollution

March 22, 2007

Air Resources Board
California Environmental Protection Agency
Hazards of Traffic

- CO
- NO\textsubscript{x}
- Hydrocarbons
- PM
- Toxics
Southern California Children’s Health Study

- 10+ year study followed ~ 5,500 children’s chronic exposures to air pollution – ARB funded
- Landmark study on children’s health effects
- Adverse effects on lung function growth, asthma, school attendance
- 100+ publications
Traffic and Children’s Health


- Subset of 1,500 Southern California Children
- Followed for 8 years
- Traffic exposure on Lung Function Growth
  - Residential distance to freeways
Traffic Associated Decreases in Lung Function at 18 Years and 8 Year Development

18 years of age  Difference after 8 years growth

Percent Decrease (FEV₁)

Freeway Distance
- <500 m
- 500-1000 m
- 1000-1500 m

* Statistically significant (p<.05)
Health Implications

- Adverse effects of local traffic exposure
- Effects independent of regional air quality
- Enhanced vulnerability
- Changes likely permanent
- Long-term health implications
  - Greatest effect may occur later in life
Development of Lung Function

Adapted from Strachan et al 1997; Courtesy of USC
Methods to Measure Exposure to Traffic

- Measurements of traffic-related pollutants
- Freeways/Major Road Exposure:
  - Distance
  - Traffic volume and/or type
  - Traffic-modeled exposure
- In-vehicle studies
Health Effects Seen in the Infant (Pre- and Post-Natal)

- Low birth weight: 36% increase in prevalence among those with traffic exposure and high CO \(^1\)
- Premature birth: 27% increase in prevalence among those with traffic exposure and high CO \(^1\)
- Cardiac birth defects: Up to 3X increase in risk with traffic-related pollutants \(^2\)

1. Wilhelm M, et al. 2005. Local variations in CO and particulate air pollution and adverse birth outcomes in Los Angeles County, California, USA. Environ Health Perspect. 113(9) 212-21
Health Effects Seen in Children and Adolescents

- **Asthma:** 89% increase in risk with close residence to freeway \(^1\)
- **With long-term close residence to traffic** \(^2\)
  - Ever had asthma: 85% increase in risk
  - Current treatment for asthma: ~2.5X increase in risk
  - Wheezing: ~2.7X increase in risk
- **Acute respiratory symptoms:** 5-8% increase in risk with schools close to traffic \(^3\)

Current ARB Research Studies on Traffic and Health

- Refining Estimates of Exposure for the East Bay Children’s Respiratory Health Study
- Cardiovascular Health Effects of Fine and Ultrafine Particles during Freeway Travel
- Air Pollution and Cardiovascular Disease in the California Teachers Study Cohort
- Future Studies
Mitigation

- California's Diesel Risk Reduction Plan
  - Emission standards for heavy duty vehicles
  - Carl Moyer Program
- Motor vehicle standards for cars/light trucks
- Goods Movement Emission Reduction Plan
- Land use guidelines
- No new schools within 500 feet from freeways (SB 352, Escutia, 2003)
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