Health Effects Associated With Traffic-Related Air Pollution

March 22, 2007

Air Resources Board
California Environmental Protection Agency
Hazards of Traffic

- Toxics
- NO\textsubscript{x}
- CO
- Hydrocarbons
- PM
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 (FEV$_1$)

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

Level of lung function

Level below which symptoms may occur

Birth          10            20            30            40            50            60            70             80
Age

Normal

Reduced (projected)

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

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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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