

# Health Effects Associated With Traffic-Related Air Pollution



**March 22, 2007**

**Air Resources Board**



**California Environmental Protection Agency**

# Hazards of Traffic



# 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

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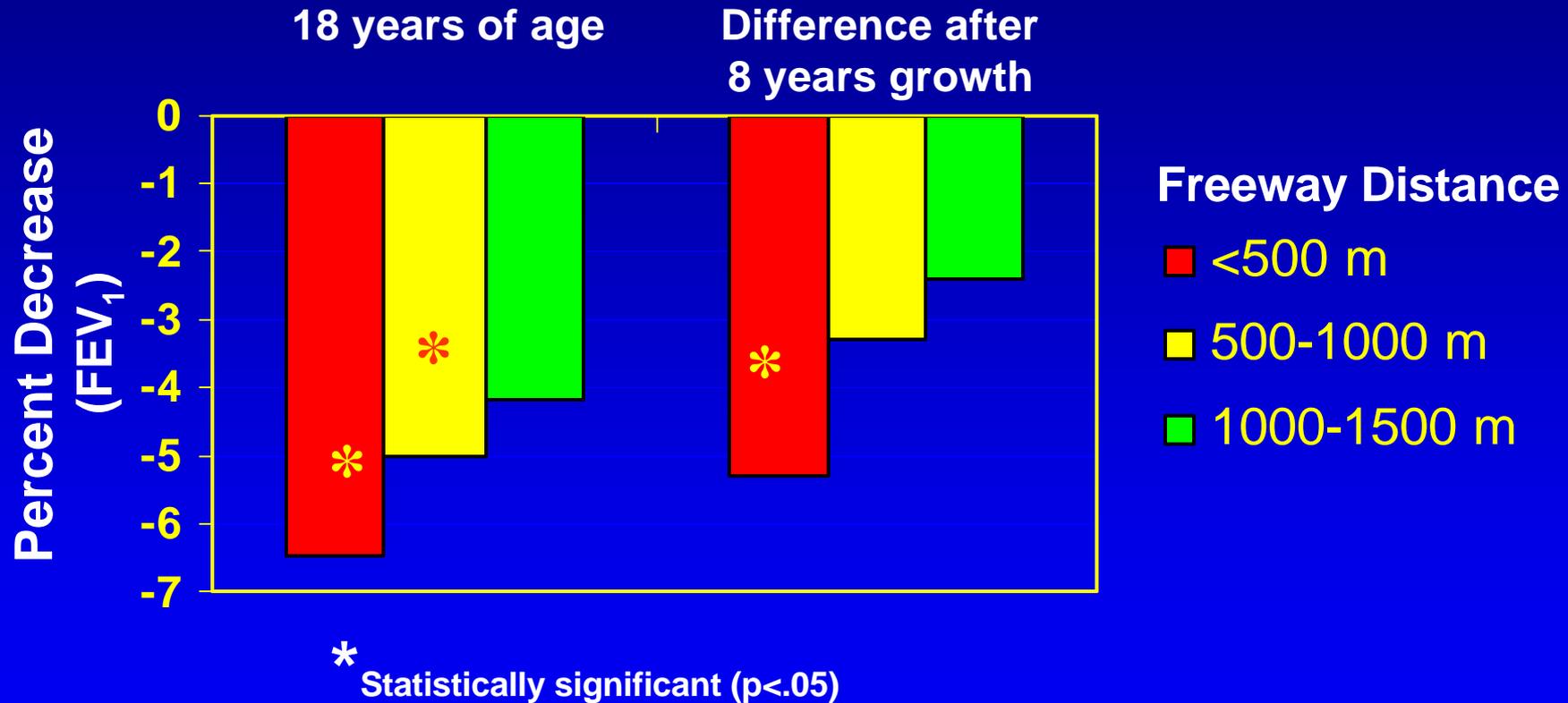
“Effect of exposure to traffic on lung development from 10 to 18 years of age: a cohort study”. Gauderman WJ et al. Lancet, February 2007; 369 (9561): 571-7.



- 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



# Health Implications

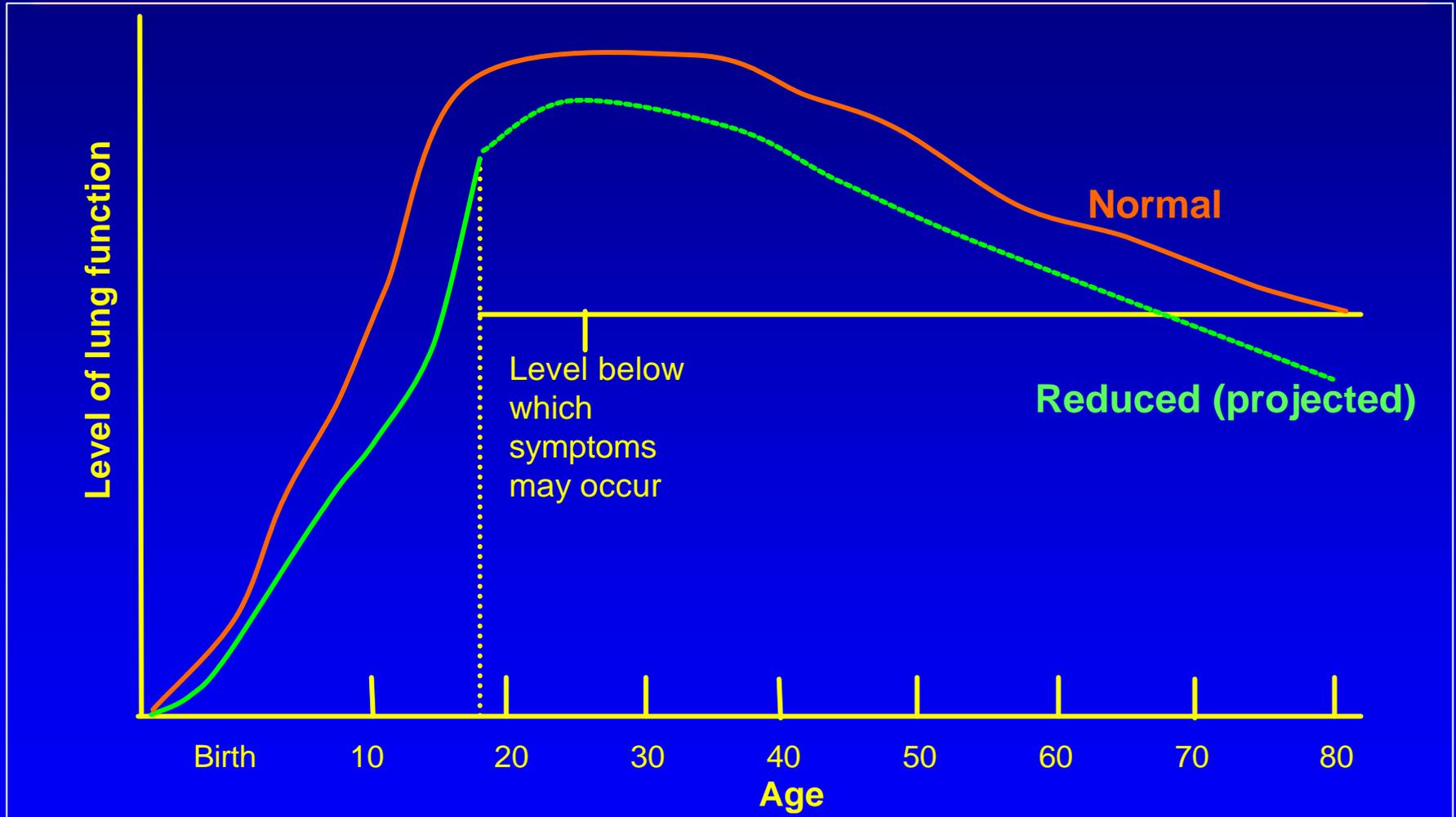
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- Adverse effects of local traffic exposure
- Effects independent of regional air quality
- Enhanced vulnerability
- Changes likely permanent
- Long-term health implications
  - Greatest effect may occur later in life



# 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)

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- **Low birth weight: 36% increase in prevalence among those with traffic exposure and high CO <sup>1</sup>**
- **Premature birth: 27% increase in prevalence among those with traffic exposure and high CO <sup>1</sup>**
- **Cardiac birth defects: Up to 3X increase in risk with traffic-related pollutants <sup>2</sup>**



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

2. Ritz B, et al. 2002 Ambient air pollution and risk of birth defects in Southern California. Am J Epidemiol, 155:17-25



# Health Effects Seen in Children and Adolescents

- **Asthma: 89% increase in risk with close residence to freeway <sup>1</sup>**
- **With long-term close residence to traffic <sup>2</sup>**
  - **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 <sup>3</sup>**



1. Gauderman WJ, et al. 2005. Childhood Asthma and Exposure to Traffic and Nitrogen Dioxide. *Epidemiology*, 16:737-743

2. McConnell R, et al. 2006. Traffic, susceptibility, and childhood asthma. *Environ Health Perspect*. 114(5):766-72

3. Kim, et al. 2004. Traffic-related Air Pollution near Busy Roads, The East Bay Children's respiratory Health Study. *Am J Respir Crit Care Med*. 170(5):520-6



# Current ARB Research Studies on Traffic and Health

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- 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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