PARTICULATE AIR POLLUTION AND INFANT MORTALITY

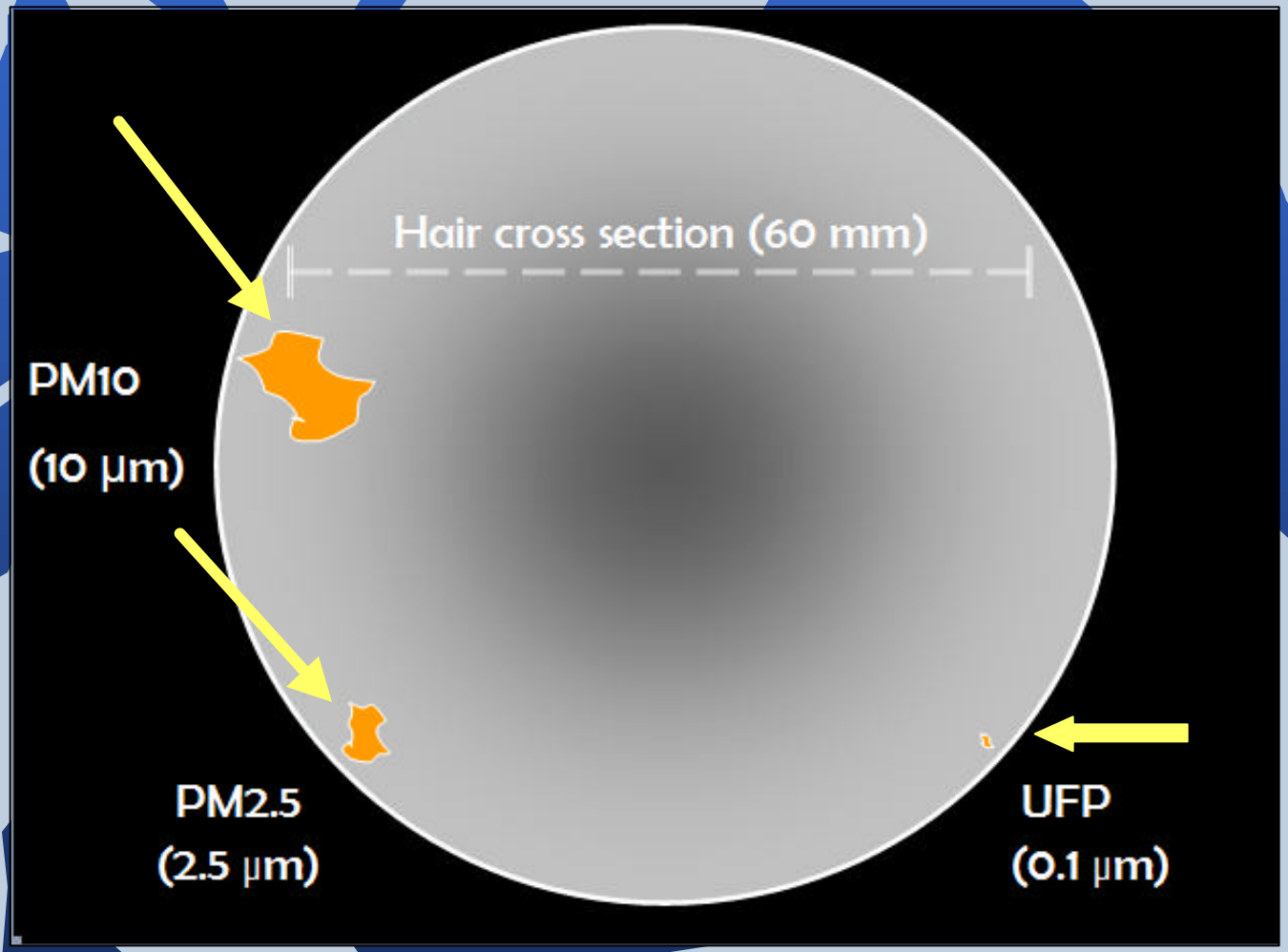
October 19, 2006

Air Resources Board

California Environmental Protection Agency

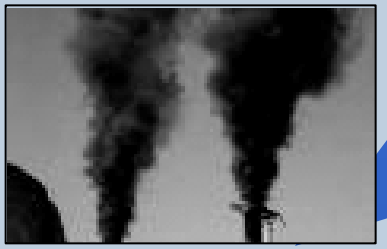
RELATIVE SIZES OF PARTICLES

PM in the air has 3 size ranges



PM10 = Coarse + Fine + Ultra-Fine PM2.5 = Fine + Ultra-Fine

WHY ARE WE CONCERNED WITH PARTICLES?



- Attaining the State PM2.5 standard would prevent ~8,200 adult premature deaths annually in California
- Substantial evidence that PM exposure is associated with cardiovascular deaths in adults
- Evidence that PM exposure is associated with respiratory-related deaths in infants
- Californians have a disproportionate share of PM exposure

Less Known are the Effects of PM on Children Especially Infants

- *London, England 1952* - increase in infant death due to the "Great Fog"
- *Sao Paulo, Brazil* - 7% increased risk of respiratory death in children less than 5 years old due to PM10
- *Seoul, South Korea* - 102% increased risk of respiratory death in infants compared to 6.3% increased risk in those over 65 due to PM10
- *United States* - 20% increased risk of respiratory death among normal birth weight infants due to PM10
- Gaps in knowledge - Infant/Birth Outcome
  - The next two California studies help close the gap

METHODS - PM10 & Infant Death

"Air Pollution and Infant Death in Southern California, 1989–2000" by Ritz et al.

- South Coast Air Basin
- Postneonatal = infant between 28 days and 1 yr. old
- 1989 to 2000, birth and death certificates
  - 11 years of data and 19,664 deaths
- Zip codes within 16 km of a PM10 station
- PM10 averages of 2-weeks through a 6-month period
- Controlled for maternal confounding effects

RESULTS - PM10 & Infant Death

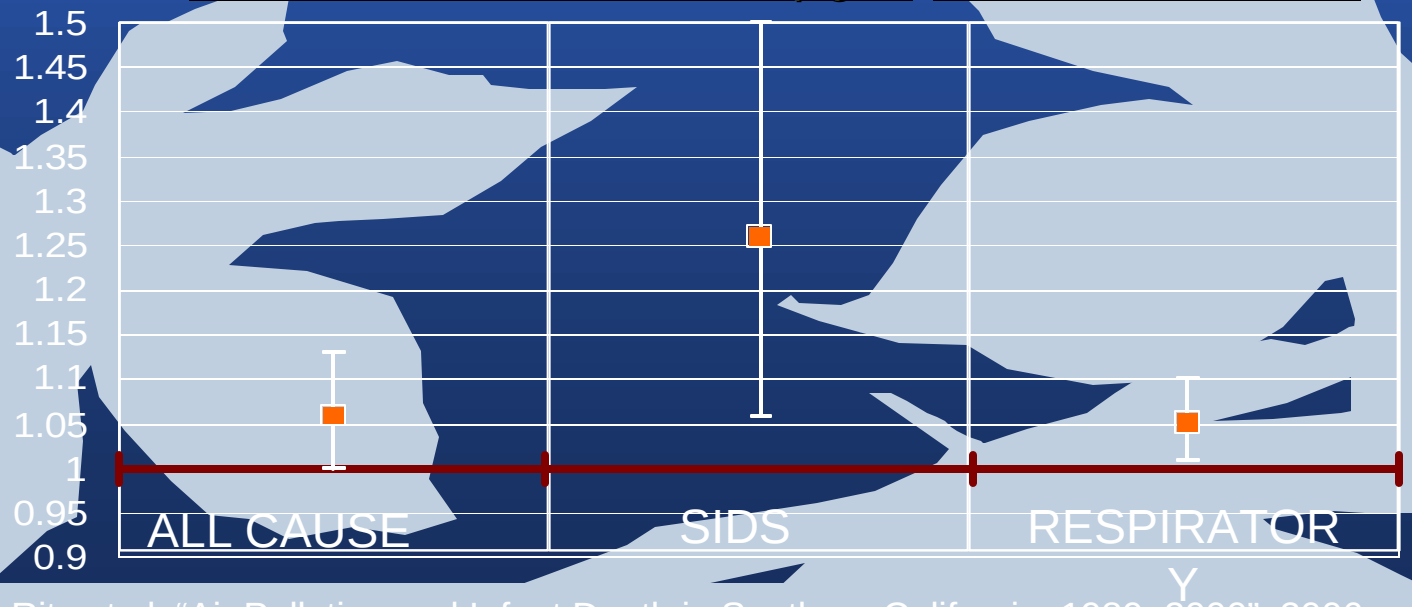
Preterm or Low Birth Weight - 2 month avg. PM10

- A 6% increased risk in all cause of death [1%–13%]
- A 26% increase risk in SIDS [6% – 50%]

Includes all infants regardless of weight - 2 week avg. PM10

- A 5% increase risk in respiratory-related death [1%–10%]

Death Associated Per 10 µg/m^3 Increase in PM10



Ritz et al, “Air Pollution and Infant Death in Southern California, 1989–2000”. 2006

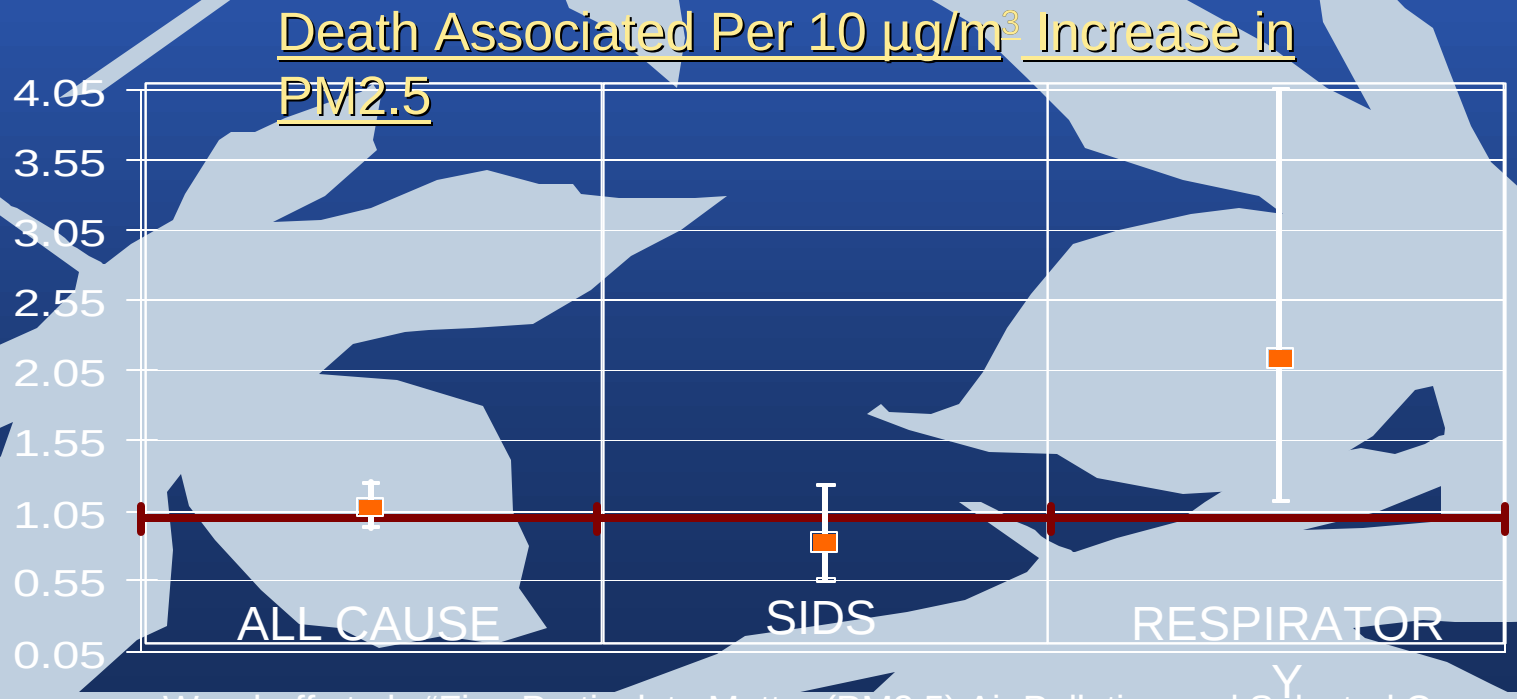
METHODS - PM 2.5 & Infant Death

"Fine Particulate Matter (PM 2.5) Air Pollution and Selected Causes of Postneonatal Infant Mortality in California" by Woodruff et al.

- All of California
- Postneonatal = infant between 28 days and 1 yr. old
- 1999 to 2000, births & death certificates
  - 2 years of data and 1,606 deaths
- Maternal addresses within 5 miles of a PM2.5 monitor
- Life Exposure = PM2.5 average (birth to death)
- Controlled for maternal confounding factors

RESULTS - PM 2.5 & Infant Death

- A 213% increase risk for respiratory-related death [1.12 - 4.05]
- A 7% increase risk for all cause of death [0.93 - 1.24] (close but not significant)
- SIDS not significant [0.55 – 1.23]



Woodruff et al., "Fine Particulate Matter (PM2.5) Air Pollution and Selected Causes of Postneonatal Infant Mortality in California", 2006

SUMMARY

- Ritz and Woodruff studies corroborate and add further evidence of a PM effect on infant death
- Not only adults but especially children and infants benefit from PM controls
- Better accounting of maternal tobacco smoke and of indoor exposure in future infant studies
- More studies are needed to fill the gap for the remaining unanswered questions