

Pseudoscientific Aspects of Fine Particulate Matter Epidemiology, 1993-2012

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Fine Particulate Matter (PM_{2.5})

PM_{2.5} is defined by particle size ($\leq 2.5 \mu\text{m}$ in diameter) and not by chemical composition, as in the case of a gaseous air pollutant like ozone. PM_{2.5} is generated mainly by combustion processes. The major sources of PM_{2.5} are forest fires, agricultural dust, industrial combustion, and diesel engines and these sources vary across the US

PM_{2.5} epidemiology has been used to set two major standards:

- 1) In 1997 US EPA established the current Annual National Ambient Air Quality Standard (NAAQS) for PM_{2.5} at $15 \mu\text{g}/\text{m}^3$
- 2) In 2002 CARB established the current Annual California Ambient Air Quality Standard (CAAQS) for PM_{2.5} at $12 \mu\text{g}/\text{m}^3$

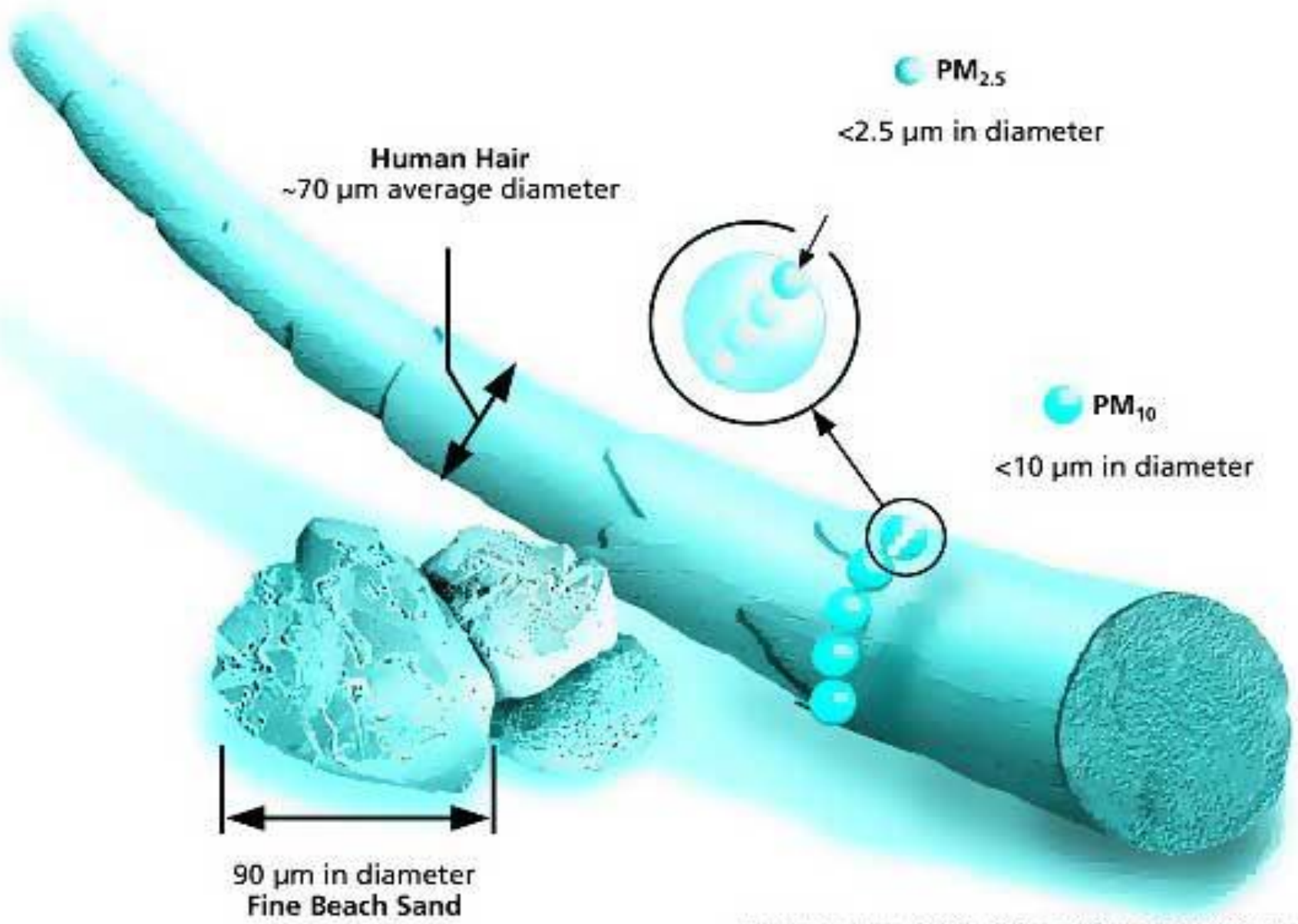


Image courtesy of EPA, Office of Research and Development

PM_{2.5} & Mortality Relationship: First Two Studies & Resulting Criticism

Dockery, Pope, et al. NEJM 1993 “An association between air pollution and mortality in six U.S. cities” (H6CS)

Pope, Thun, et al. AJRCCM 1995 “Particulate air pollution as a predictor of mortality in a prospective study of U.S. adults” (ACS)

Wall Street Journal April 7, 1997

“Pollution study sparks debate over secret data”

SCIENCE July 25, 1997 “Showdown Over Clean Air Science”
& “Researchers and Lawmakers Clash Over Access to Data”

Michael Fumento 1997 “Polluted Science” Reason & AEI Press

Robert Phalen 2002 “The Particulate Air Pollution Controversy”

“Premature Deaths” Attributed to PM_{2.5}

An increased relative risk [RR > 1.00], based on increase in total (all cause) mortality risk for 10 $\mu\text{g}/\text{m}^3$ increase in PM_{2.5} level, is interpreted by US EPA and CARB as evidence that PM_{2.5} “causes” “premature deaths”

Because EPA assigns a lifetime monetary value of about \$7-9 million to each “death,” the health benefits of preventing these “deaths” exceed the compliance costs of the EPA and CARB regulations that are designed to reduce PM_{2.5} levels and PM_{2.5}-related “premature deaths”

Without PM_{2.5}-related “premature deaths” the EPA and CARB regulations are not justified on a cost-benefit basis

Major Reasons for Lack of Proof that $PM_{2.5}$ “Causes” “Premature Deaths”

- 1) **Small Variable Effect:** the relative risk of death due to $PM_{2.5}$ is small (RR ~ 1.10), varies by time and place, and there is no consistent dose-response relationship
- 2) **Confounding Variables:** confounders, including other pollutants, often reduce $PM_{2.5}$ effect to zero (RR ~ 1.00)
- 3) **Ecological Fallacy:** $PM_{2.5}$ measurements made at selected monitoring stations are imputed to individuals
- 4) **Variable $PM_{2.5}$:** $PM_{2.5}$ is defined by specific particle size, but its composition varies greatly across the US
- 5) **Secret Data:** major $PM_{2.5}$ studies (H6CS & ACS) cannot be independently analyzed, violating Data Access Act

December 15, 2005 *Inhalation Toxicology* Paper by James E Enstrom

(http://www.arb.ca.gov/planning/gmerp/dec1plan/gmerp_comments/enstrom.pdf)

**Major long-term PM_{2.5} death study with null results:
49,975 elderly Californians in 11 counties followed
during 1973-2002 in California Cancer Prevention
Study (CA CPS I)**

**“For the initial period, 1973–1982, a small positive
risk was found: RR was 1.04 (1.01–1.07) for a
10- $\mu\text{g}/\text{m}^3$ increase in PM_{2.5}.**

**For the subsequent period, 1983–2002, this risk
was no longer present: RR was 1.00 (0.98–1.02).**

**For the entire follow-up period, RR was
1.01 (0.99–1.03).”**

**May 22, 2008 Draft CARB “Tran” Report
on PM_{2.5} & Premature Deaths in California**

Hien T. Tran, “Ph.D.”, Lead Author

(<http://www.scientificintegrityinstitute.org/CARBPMDraft052208.pdf>)

**June 4, 2008 Enstrom testimony at confirmation
hearing of CARB Chair Mary Nichols
because “Tran” Report ignored Enstrom 2005**

**July 11, 2008 Tran Teleconference with Enstrom and
PM_{2.5} experts Pope, Jerrett, Burnett, and others**

**July 11, 2008 148 pages of mostly critical public
comments by Enstrom and others on Draft “Tran”
Report---these comments were largely ignored**

October 24, 2008 Final CARB “Tran” Report

(<http://www.scientificintegrityinstitute.org/CARBPMFinal102408.pdf>)

Conclusions for California:

18,000 Annual Premature Deaths Due to All PM_{2.5}
3,500 Annual Premature Deaths Due to Diesel PM

US Results Used, Not CA-specific Results:

- 1) Harvard Six Cities Study (Dockery 1993, Krewski 2000, Laden 2006)—KS,MA,MO,OH,TN,WI
- 2) ACS CPS II Cohort (Pope 1995 , Krewski 2000, Pope 2002, Pope 2004)—nationwide results & (Jerrett 2005)—Los Angeles basin

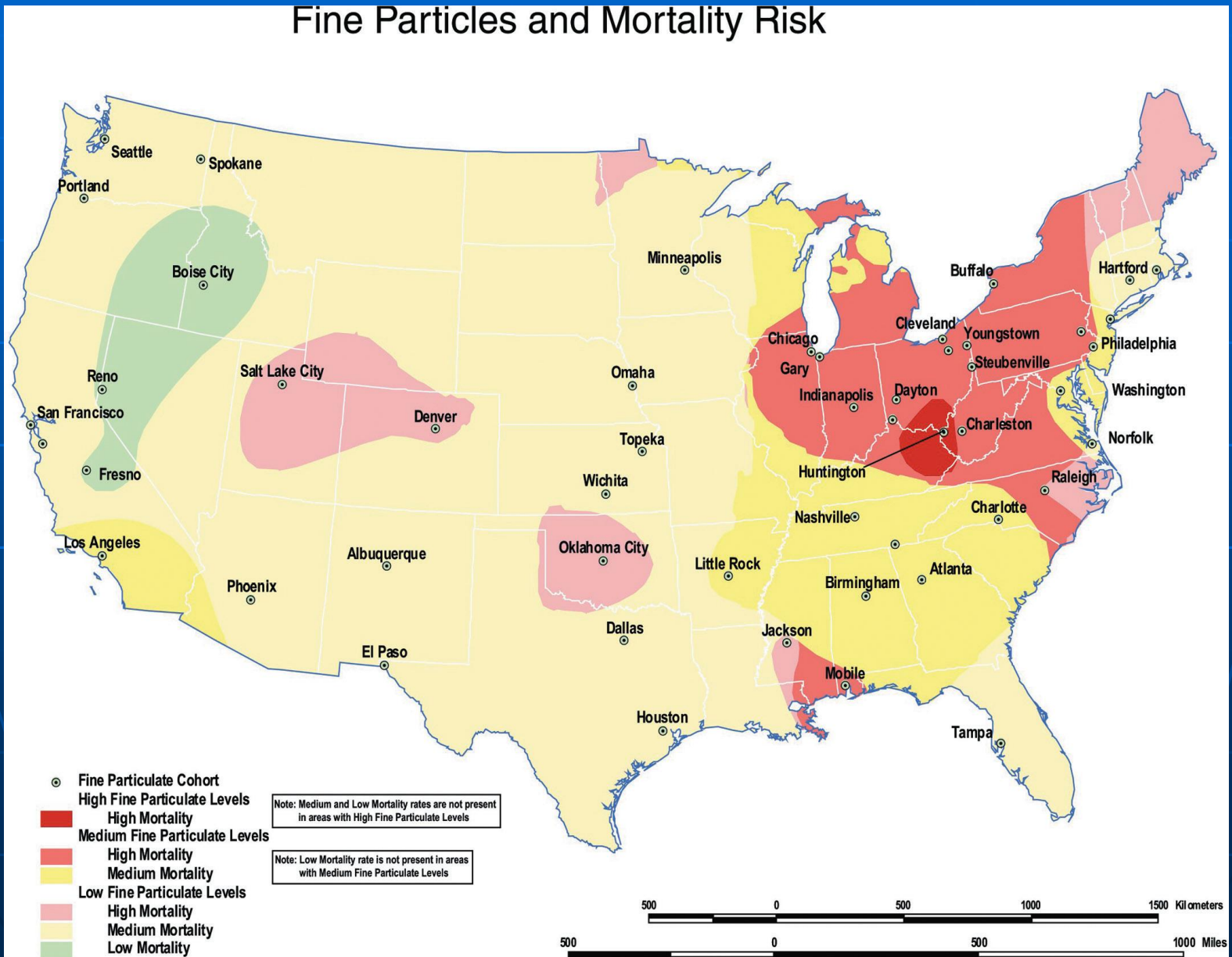
Report Rejected Because Tran had Phony “Ph.D.”

→ February 26, 2010 CARB PM Symposium

2000 Krewski Jerrett HEI Report Figure 21

1982-1989 CPS II PM_{2.5} Mortality Risk <1.0 in CA

Fine Particles and Mortality Risk



September 30, 2010 Special Analysis by Enstrom of Figures 5 and 21 in 2000 HEI Reanalysis Report

(<http://scientificintegrityinstitute.org/HEIFigure5093010.pdf>)

**Mortality Risk (MR) during 1982-1989 in 49 cities
was determined by manual analysis using
Figures 5 and 21 and Appendix D
(Original Request for MRs Made to HEI in 2002)**

**Fresno had 2nd Lowest MR of the 49 cities
Los Angeles had 5th Lowest MR of the 49 cities**

**MR (4 CA cities) ~ 90% MR (all 49 cities)
MR (4 CA cities) Not Related to PM_{2.5} Level**

August 31, 2010 Letter from Krewski to HEI President Greenbaum

(http://www.arb.ca.gov/research/health/pm-mort/HEI_Correspondence.pdf)

**Special Analysis of California Subjects
in Krewski 2009 HEI Research Report 140
(direct result of repeated requests to HEI
by Ad Hoc Trucking Group during 2010)**

RR = 0.872 (0.805 – 0.944) during 1982-1989

RR = 0.960 (0.920 – 1.002) during 1982-2000

Based on 40,408 CPS II subjects in 4 CA Metro Areas (MSAs)

Jerrett Project (Begun January 2007)

(<http://www.scientificintegrityinstitute.org/Jerrett012510.pdf>)

**Spatiotemporal Analysis of Air Pollution and Mortality in California Based on ACS CPS II Cohort
Jerrett, Burnett, Pope, Krewski, Thurston, Thun + Others
(Three-Year Budget of \$750,000 from CARB and SC AQMD)**

Major Progress Report, due July 2008, was not submitted, but June 25, 2008 CARB Quarterly Progress Report made NO mention of a relationship between PM_{2.5} & total deaths

**February 26, 2010 CARB PM Symposium Results
RR ~ 0.994 (0.965 – 1.025) during 1982-2000**

These null results should have been included in the 2008 “Tran” Report but they were delayed until 2010

June 9, 2011 Jerrett Draft Final Report

Major Results for PM_{2.5} and Total Mortality in CA (Figure 22)

RR = 1.08 (1.00-1.15) New “Conurbation” Model

RR = 1.002 (0.992-1.012) Nine Model Average

Critical Comments Submitted on June 9 by
Drs. Enstrom, Malkan, and Dunn, and Mr. Brown

CARB Research Screening Committee Tabled Draft Report
and Requested Revisions from Investigators

Additional Comments Submitted after June 9 by Drs.
Enstrom, Malkan, Dunn, Lipfert, Briggs, and Fulks

Dr. Matt Briggs Posts Three Blogs Critical of Jerrett Report
(<http://wmbriggs.com/blog/?p=4587>)

October 28, 2011 Jerrett Final Report

<http://scientificintegrityinstitute.org/JerrettCriticism102811.pdf>

Major Results for PM_{2.5} and Total Mortality in CA (Figure 22)

RR = 1.08 (1.00-1.15) New “Conurbation” Model

RR = 1.002 (0.992-1.012) Nine Model Average

CONCLUSION “We conclude that combustion-source air pollution is significantly associated with premature death in this large cohort of Californians”

Results and CONCLUSION Unchanged from June Draft & CONCLUSION Does Not Reflect Findings in the Report

CARB Research Screening Committee Approved Revised Final Report by 8-0 Vote in Spite of 53 Pages of Detailed Criticism from Six Doctoral Level Scientists

Experts Who Have Refused to Debate PM_{2.5} Epidemiology with Enstrom (Yellow = Involved with 2008 CARB “Tran” Report)

June 2011 North Am Congress of Epidemiology Symposium on PM_{2.5} Epi Ethics (Cancelled)

Burnett (Health Canada), Dockery (Harvard), Hopke (Clarkson), Jerrett (UC Berkeley), Krewski (Ottawa), Pope (BYU), Samet (USC), Schwartz (Harvard), Speizer (Harvard), Thun (ACS), Thurston (NYU);
Cohen (HEI), Lippmann (NYU), Miller (former US EPA), Pekar (US EPA), Puett (USoCar), Ross (US EPA)

April 24, 2012 Dose-Response Conference
Levy (BU), Cohen (HEI), Greenbaum (HEI)

Conclusions About $PM_{2.5}$ & Total Deaths in CA and US in ACS CPS II Cohort

Based on 2010-2011 findings and their failure to dispute my interpretation or debate me, Enstrom concludes that Pope & Thun (1995) and Krewski & Jerrett & Burnett (2000) have known since 2000 that within the ACS CPS II Cohort:

- 1) there is NO significant relationship between $PM_{2.5}$ and total mortality in California &
- 2) there is substantial geographic variation nationally (West vs East) in the dose-response relationship between $PM_{2.5}$ and total mortality ¹⁷

PM_{2.5} & Total Mortality in California: RR (95% CI)

(<http://scientificintegrityinstitute.org/Enstrom081111.pdf>)

McDonnell 2000	AHSMOG (9 air sheds)	RR ~ 1.03 (0.95-1.12)	1976-1992
Krewski 2000 (reported in 2010)	CA CPS II (4 MSAs)	RR = 0.87 (0.81-0.94)	1982-1989
Enstrom 2005	CA CPS I (11 Cos)	RR = 1.04 (1.01-1.07)	1973-1982
		RR = 1.00 (0.98-1.02)	1983-2002
Zeger 2008	MCAPS "West" (CA,OR,WA)	RR = 0.99 (0.97-1.01)	2000-2005
Krewski 2010	CA CPS II (7 MSAs)	RR = 0.97 (0.92-1.02)	1982-2000
Jerrett 2010-11	CA CPS II (54 Cos, Nine Model Average)	RR = 1.00 (0.99-1.01)	1982-2000
Lipsett 2011	CA Teachers	RR = 1.01 (0.95-1.09)	2000-2005

Key Documents Since 2000 that Misrepresent Relationship Between $PM_{2.5}$ & Total Mortality in California

2001-2003 Establishment of $PM_{2.5}$ Standard in CA

2002 Pope et al JAMA Paper on $PM_{2.5}$ Deaths in US

2004 US EPA Air Quality Criteria for $PM_{2.5}$

2008 CARB “Tran” Report on $PM_{2.5}$ Deaths in CA

2009 Krewski HEI Report 140 on $PM_{2.5}$ Deaths

2009 US EPA Science Assessment for $PM_{2.5}$

April 12, 2012 SC AQMD Retreat: PM Health Effects Talk by Ospital re 2012 Air Quality Management Plan

(<http://www.aqmd.gov/aqmp/2012aqmp/index.htm>)

Harvard Six Cities Study Update: 1974-2009 Deaths
March 28, 2012 *EHP* by Lepeule Dockery Schwartz

RR = 1.14 (1.07–1.22) All Causes

RR = 1.26 (1.14–1.40) CVD

RR = 1.37 (1.07–1.75) Lung Cancer

“Conclusion: relationship between chronic exposure to PM_{2.5} and all cause, cardiovascular and lung cancer mortality was found to be linear without a threshold.”

**Nothing on 2011AQMD Jerrett & Lipsett Studies or
2011 Enstrom Summary of PM_{2.5} & Mortality²⁰**

Overall Conclusions

There is now overwhelming evidence that PM_{2.5} does not cause “premature deaths” in California and that USEPA, CARB, and SC AQMD, are obfuscating and ignoring this evidence.

Independent investigators need to conduct new national PM_{2.5} epidemiologic studies that involve recent mortality follow-up and verifiable databases

There should be no further regulation of PM_{2.5} until there is strong evidence of a positive dose-response relationship with mortality that satisfies accepted causality criteria

Recent Letters Critical of US EPA re PM_{2.5}

June 30, 2011 Senators Vitter and Inhofe Letter to US EPA Administrator Jackson re Bad Science

August 4, 2011 Senator Inhofe Letter to US EPA re CASAC Members Conflicts of Interest

September 19, 2011 Congressman Latta Letter to President re Cost / Benefit Ratio of US EPA Regulations

September 22, 2011 Congressman Harris Letter to US EPA McCarthy re Transparency in EPA Health Data

October 18, 2011 Senators Vitter, Inhofe, Issa Letter to Science Advisor Holdren re Federal Agency Science

November 15, 2011 Congressmen Harris and Broun Letter to Sunstein re flaws in PM_{2.5} science