

# **Air Pollution Issues Relevant to USC Preventive Medicine**

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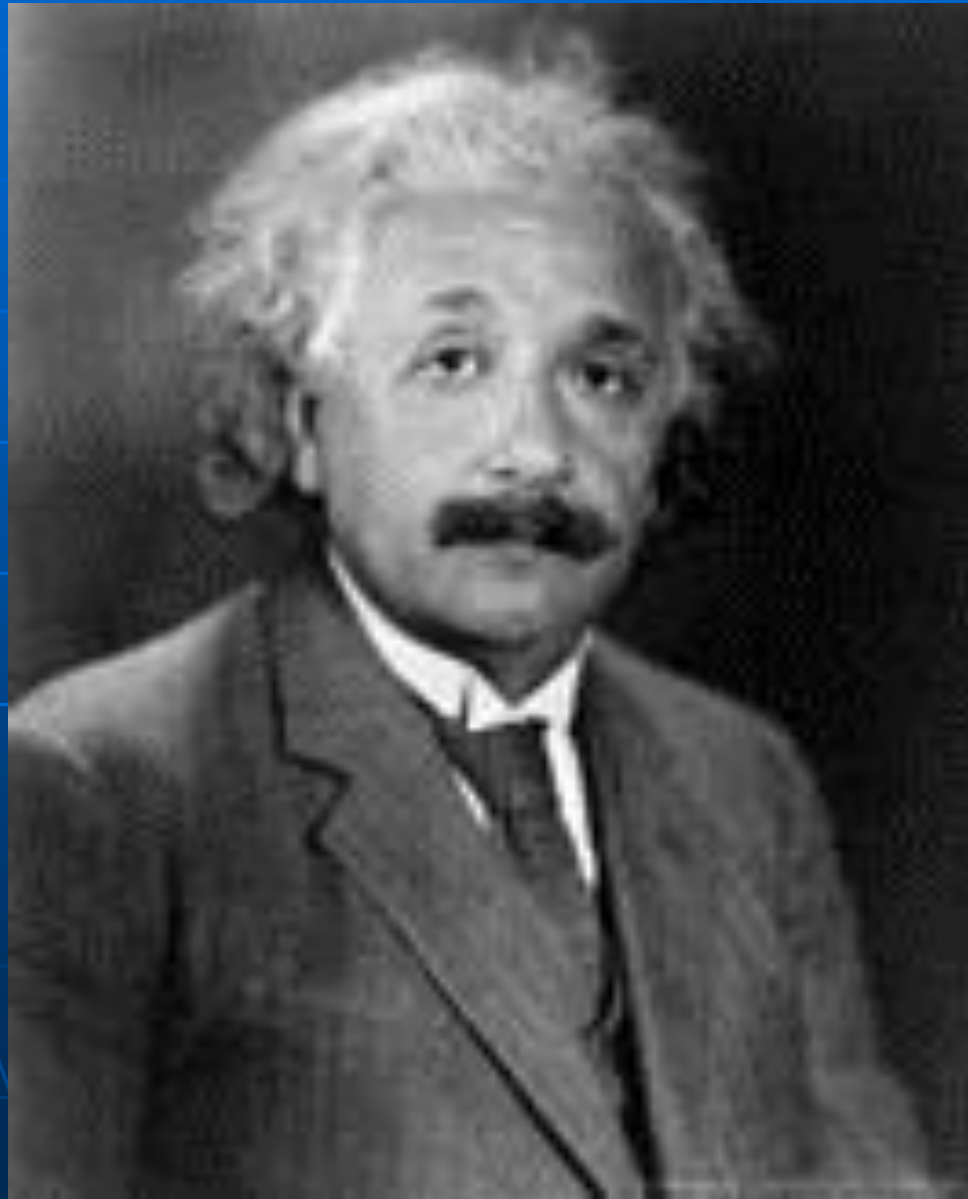




# Objectives of Talk

- 1. Honest Science v. Pseudoscience**
- 2. Enstrom: Physicist & Epidemiologist**
- 3. PM<sub>2.5</sub> & No Premature Deaths in CA**
- 4. PM<sub>10</sub> & Massive Water Waste in CA**
- 5. Combating CA Environmental Extremism**

# Albert Einstein 1979-1955

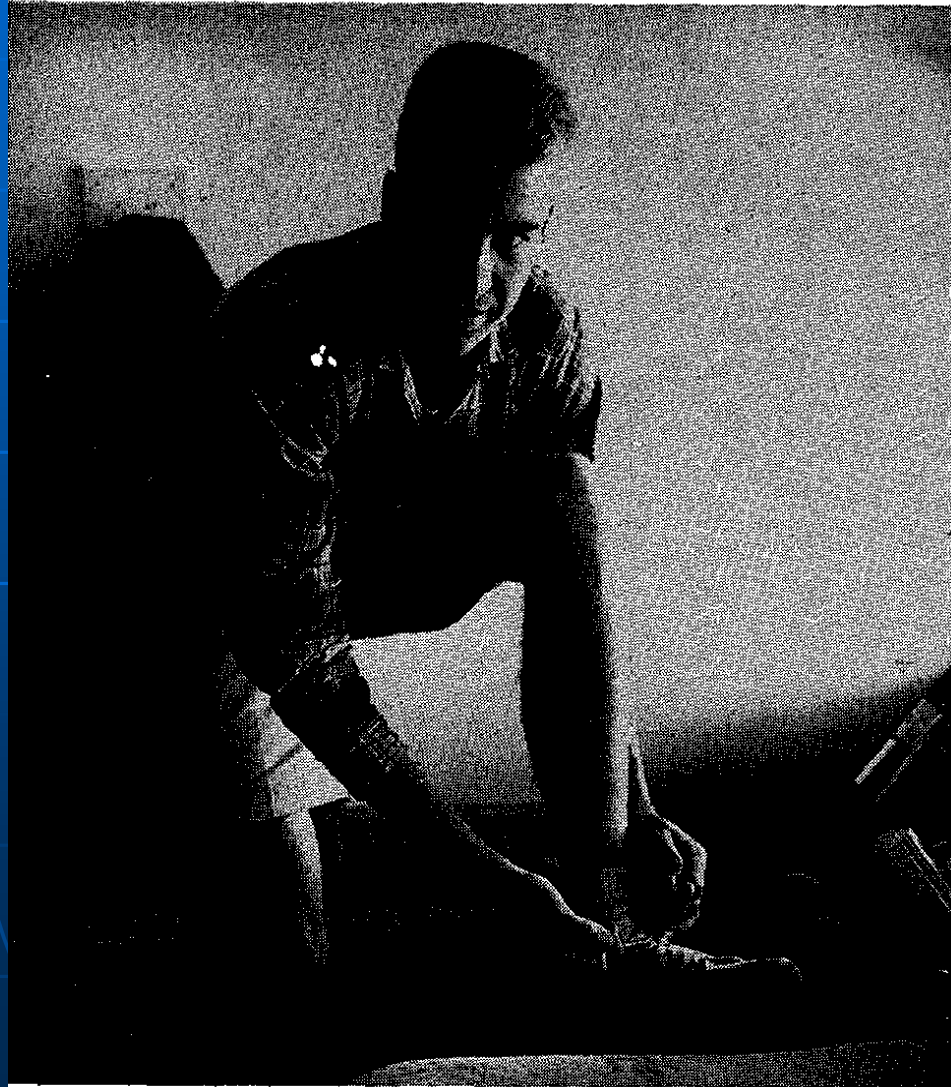


# Joseph B. Platt 1915-2012



# James E. Enstrom HMC 1965

Just time for a couple of hours of tennis before breakfast.



# Melvin Schwartz 1932-2006

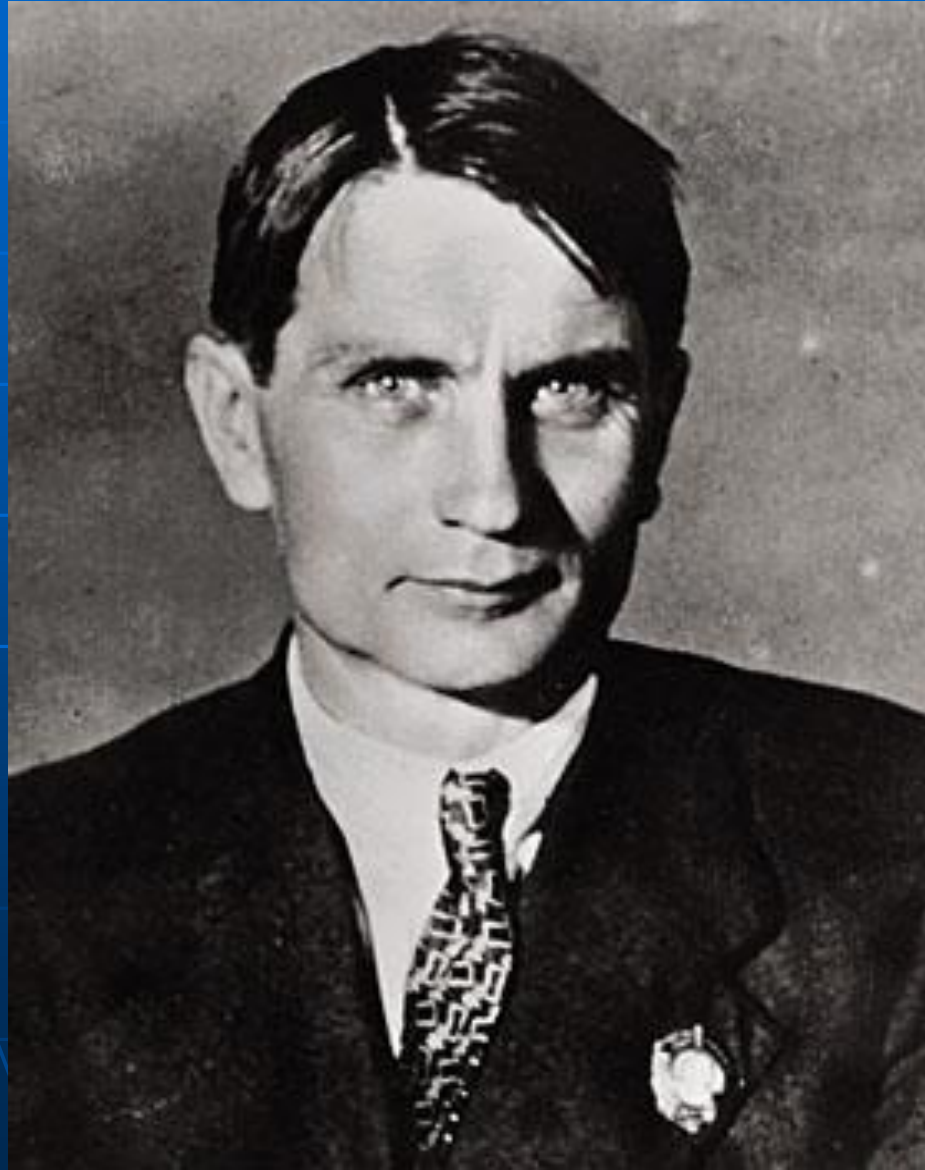




# Nikolai I. Vavilov (1887-1943)



# Trofim D. Lysenko (1898-1976)



# Physics

**Rigorous experimental science that tests specific hypotheses regarding physical phenomena. Physics findings are based on independently verified results, many worthy of a Nobel Prize.**

## Chronic Disease Epidemiology

**Public health science that measures the characteristics of human subjects, like their lifestyle and air pollution exposures, and then relates these characteristics to the development of diseases and death over long follow-up periods. Often these observational relationships are weak and inconsistent and not independently verified.**

# **Air Pollution Control Agencies That Regulate in California**

**US Environmental Protection Agency 1970  
1970 Clean Air Act & Amendments  
1997 & 2012 Particulate Matter NAAQS**

**California Air Resources Board 1967  
Mobile Sources: Cars, Trucks, Buses**

**35 CA Air Pollution Control Districts ~1976  
(South Coast Air Quality Management District)  
Stationary Sources: Manufacturing & Ports**

# Fine Particulate Matter (PM<sub>2.5</sub>)

PM<sub>2.5</sub> is defined by particle size ( $\leq 2.5 \mu\text{m}$  in diameter) and not by chemical composition. PM<sub>2.5</sub> is generated mainly by combustion processes. The major sources of PM<sub>2.5</sub> in California are forest fires, agricultural dust, industrial combustion, residential burning, diesel engines (about 5%), and China (up to 30%).

PM<sub>2.5</sub> epidemiology has been used to establish the following scientifically contested regulations that have had and still have multi-billion dollar economic impacts in California and the US:

- 1) 1997 & 2012 US EPA Annual National Ambient Air Quality Standard (NAAQS) for PM<sub>2.5</sub> :  $15 \mu\text{g}/\text{m}^3$  and now  $12 \mu\text{g}/\text{m}^3$
- 2) 2008 CARB Truck and Bus Regulation for Diesel Vehicles
- 3) 2003-2007-2012 SCAQMD Air Quality Management Plans

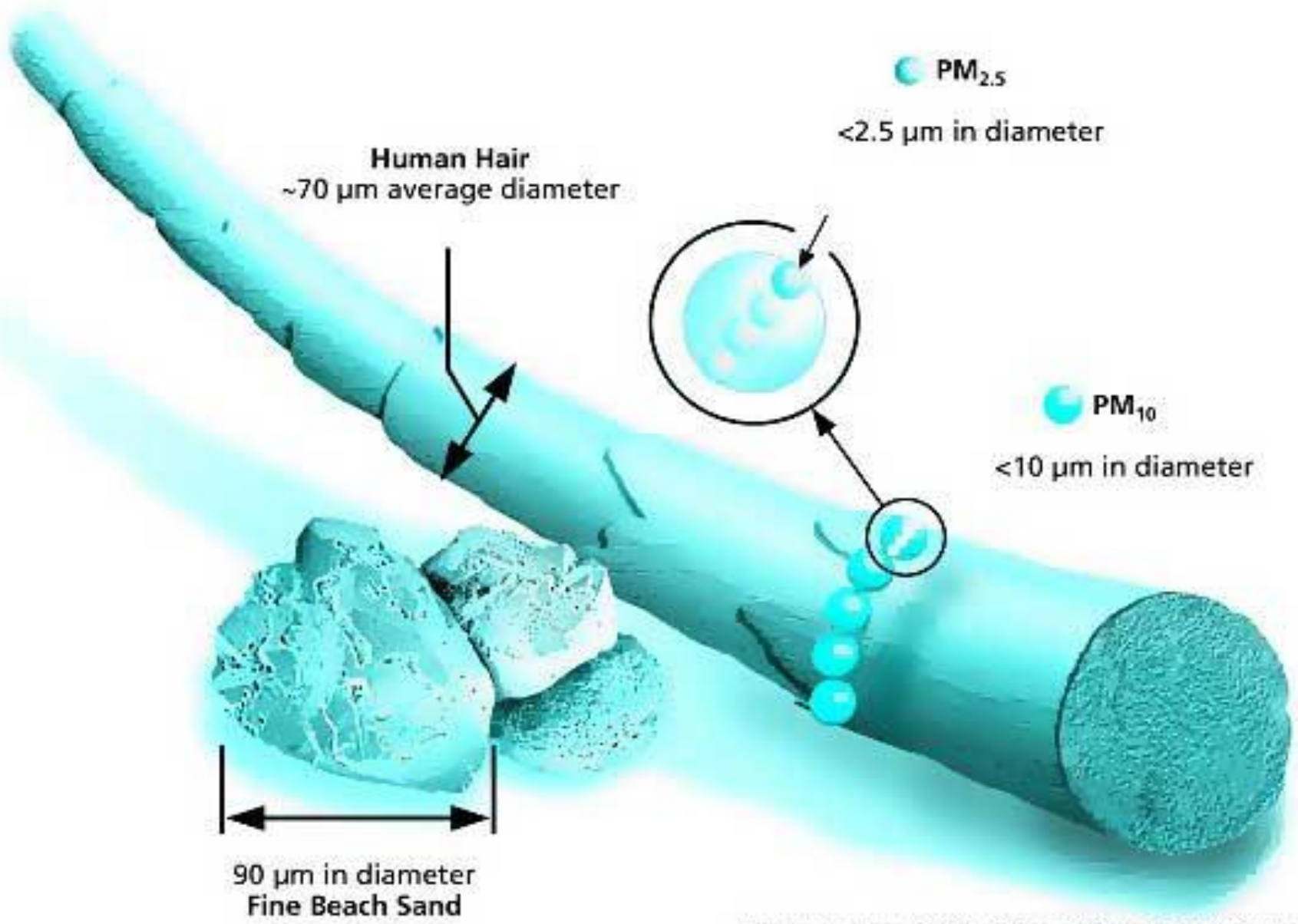


Image courtesy of EPA, Office of Research and Development

# Inhaled Particulate Matter (PM<sub>2.5</sub>&PM<sub>10</sub>)

Amount of Air Inhaled by an Adult Breathing at Rest:  
~ 10,000 liters/day = 10 m<sup>3</sup>/day ~ 292 M m<sup>3</sup>/80 years

PM<sub>2.5</sub> Inhaled at NAAQS level of 15 µg/m<sup>3</sup>:  
292 M m<sup>3</sup>/80 years x 15 µg/m<sup>3</sup> ~ 4.38 grams/80 years  
4.38 grams/80 years = 0.88 teaspoons/80 years

Diesel PM Inhaled, Assuming 5% of total PM<sub>2.5</sub>  
0.22 grams/80 years = 0.044 teaspoons/80 years

PM<sub>2.5</sub> Inhaled from 1 Cigarette ~ 0.04 grams

PM<sub>10</sub> Inhaled at Owens Lake (Keeler) at Level of 20 µg/m<sup>3</sup>:  
292 M m<sup>3</sup>/80 years x 20 µg/m<sup>3</sup> ~ 5.84 grams/80 years

PM<sub>2.5</sub> and PM<sub>10</sub> are the only regulated air pollutants  
without chemical specification--mass is regulated

# Weaknesses of PM<sub>2.5</sub> Epidemiology

- 1) **Ecological Fallacy:** ambient PM<sub>2.5</sub> measurements from selected monitoring stations are assumed to apply to all individual subjects within defined geographical areas
- 2) **Confounding Variables:** numerous confounding variables, including other pollutants, influence the PM<sub>2.5</sub> mortality relationship in observational cohort studies
- 3) **Secret Data:** investigators controlling major PM<sub>2.5</sub> databases (ACS and Harvard) refuse to allow independent analysis of these databases, in violation of House Subpoena
- 4) **Definition of PM<sub>2.5</sub>:** PM<sub>2.5</sub> is defined as particles less than 2.5 μm in diameter, but its composition varies greatly across US, from mineral dust to coal burning to diesel soot



# **PM<sub>2.5</sub> & Total Mortality Relationship**

## **Based on Prospective Epidemiologic Cohorts**

**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 predictor of mortality in prospective study of U.S. adults” (CPS II)

**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”

**Robert F. Phalen** “The Particulate Air Pollution Controversy”  
2002 Book and 2004 Paper

**Lamar Smith Wall Street Journal July 30, 2013**

“The EPA’s Game of Secret Science”

# “Premature Deaths” Attributed to PM<sub>2.5</sub>

A relative risk greater than 1.0 [RR > 1.00] for the relationship between PM<sub>2.5</sub> and total (all cause) mortality is interpreted by US EPA and CARB as evidence that PM<sub>2.5</sub> “causes” “premature deaths.”

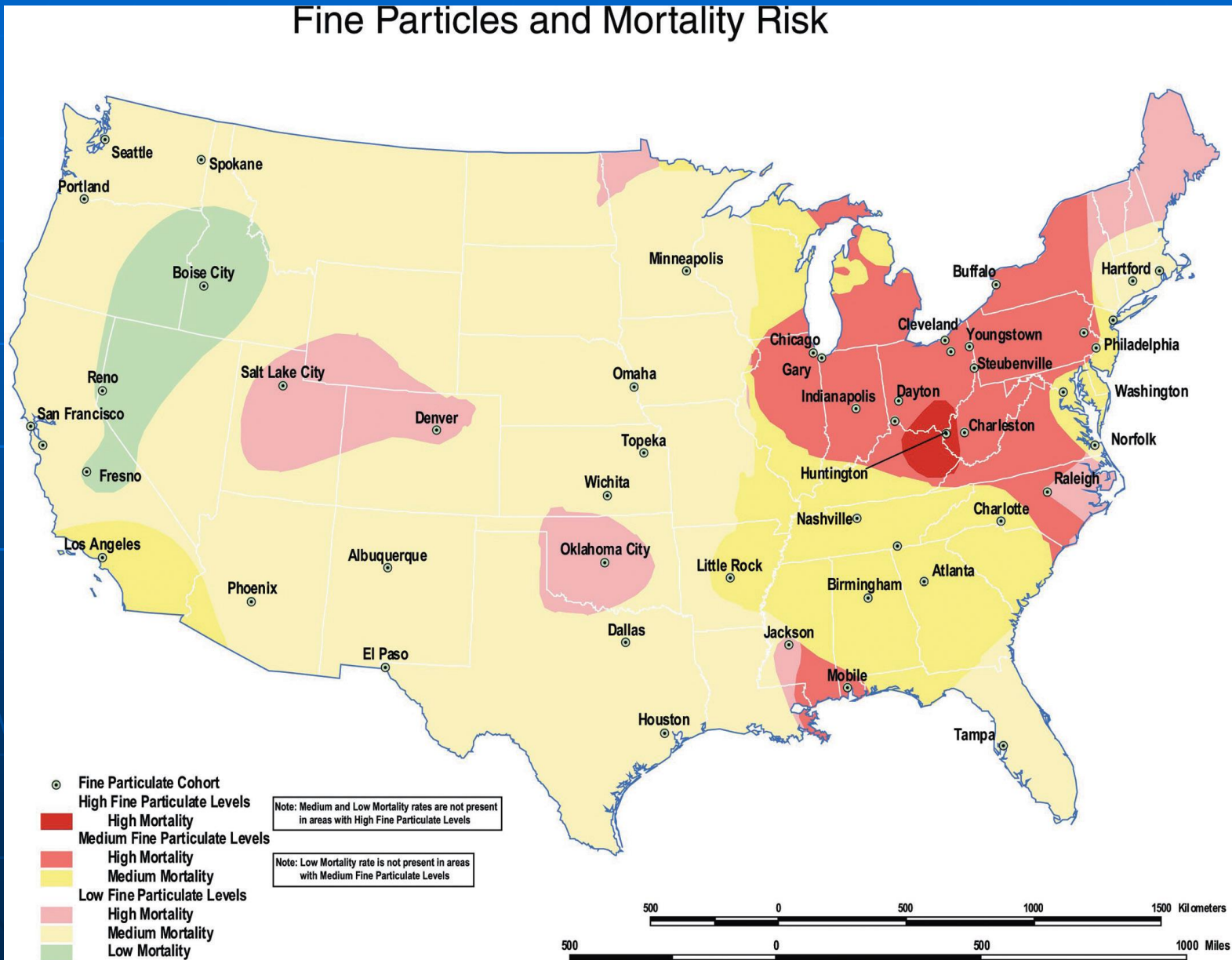
Because EPA assigns a lifetime monetary value of about \$9 million to each “death,” the health benefits of preventing these “deaths” are assumed to exceed the compliance costs of the EPA and CARB regulations that are designed to reduce PM<sub>2.5</sub> levels and PM<sub>2.5</sub>-related deaths.

Without PM<sub>2.5</sub>-related “premature deaths” the EPA and CARB regulations are not justified on a socioeconomic cost-benefit basis.

# 2000 Krewski Jerrett HEI Report Figure 21

## 1982-1989 CPS II PM<sub>2.5</sub> Mortality Risk <1.0 in CA

Fine Particles and Mortality Risk



# PM<sub>2.5</sub> & Total Mortality in California: RR (95% CI)

<http://www.scientificintegrityinstitute.org/ASAS092812.pdf>

McDonnell 2000	AHSMOG	RR ~ 1.03 (0.95-1.12)	1976-1992 (9 air sheds)
Krewski 2000	CA CPS II	RR = 0.87 (0.81-0.94)	1982-1989 (4 MSAs, reported in 2010)
Enstrom 2005	CA CPS I	RR = 1.00 (0.98-1.02)	1983-2002 (11 cos & 25 cos)
Zeger 2008	MCAPS "West"	RR = 0.99 (0.97-1.01)	2000-2005 (CA + OR + WA)
Krewski 2010	CA CPS II	RR = 0.96 (0.92-1.00)	1982-2000 (4 MSAs)
Jerrett 2010-11	CA CPS II	RR = 1.00 (0.99-1.01)	1982-2000 (Nine Model Average)
Lipsett 2011	CA Teachers	RR = 1.01 (0.95-1.09)	2000-2005
Jerrett 2013	CA CPS II	RR = 1.06 (1.00-1.12)	1982-2000 (Conurbation LUR Model Only)
Enstrom Unp	CA NIH AARP	RR ~ 1.03 (1.00-1.06)	1997-2010

# PM<sub>10</sub> & Total Mortality in California: RR (95% CI)

<http://www.scientificintegrityinstitute.org/ASAS092812.pdf>

Abbey 1999      AHSMOG    RR = 1.00 (0.97-1.04)    1977-1992  
(N=6,338; SC&SD&SF Air Basins; all natural causes)

Chen 2010      AHSMOG    RR = 1.01 (0.98-1.04)    1977-2006  
(N=4,830; SC&SD&SF Air Basins; all natural causes)

Jerrett 2011    CA CPS II    RR = 1.00 (0.99-1.02)    1982-2000  
(N=76,135;KRG Zip Model; 20 ind cov+7 eco var; Table 37)

Lipsett 2011    CA Teachers    RR = 1.01 (0.95-1.09)    2000-2005  
(N=73,489 F; California)

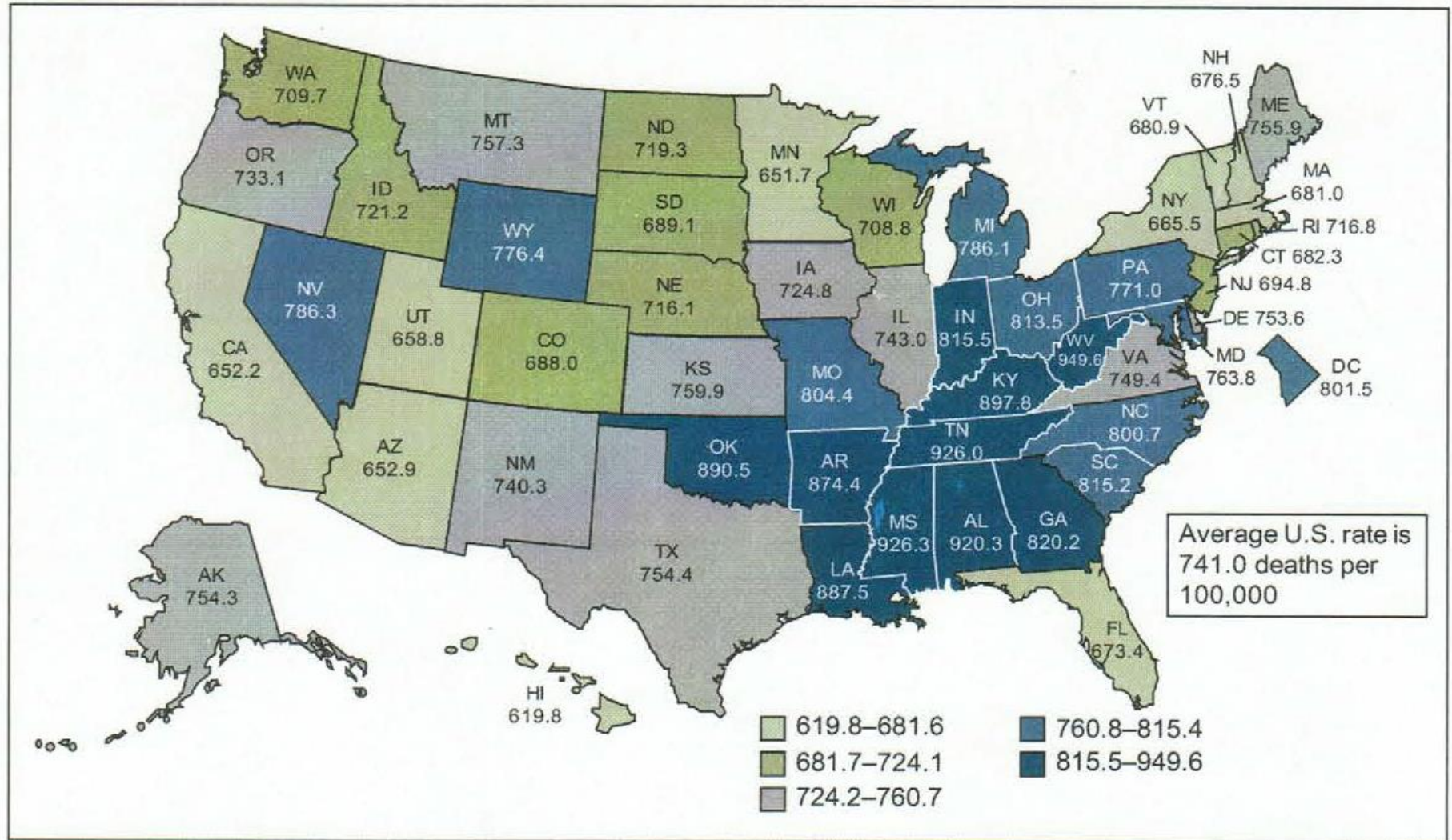
Enstrom Unpub    CA CPS I    RR ~ 1.00                    1983-2002  
(N~80,000; California)

Enstrom Unpub    NIH            RR ~ 1.00                    1995-2010  
(N~150,000; California)

# 2009 Age-Adjusted Total Death Rates by State

## NCHS (<http://www.cdc.gov/nchs/data/databriefs/db64.pdf>)

Figure 4. Age-adjusted death rates, by state and the District of Columbia: United States, preliminary 2009



SOURCE: CDC/NCHS, National Vital Statistics System, Mortality.

# Owens Lake Dust Mitigation Project

## Massive LADWP Water Waste During Major CA Drought

**2013 had Lowest Recorded Rainfall in CA History**  
**Six Largest CA Lakes are Now at 40% Capacity**

Need for OLDMP is driven by daily  $PM_{10}$  NAAQS of  $150 \mu\text{g}/\text{m}^3$ .  
In 2006 EPA revoked the annual  $PM_{10}$  NAAQS of  $50 \mu\text{g}/\text{m}^3$  because of lack of adverse health effects. EPA was prepared to waive the daily  $PM_{10}$  NAAQS for rural areas, but 2006 CA law forced continued compliance.

Total Cost for OLDMP Since 2000: \$1.5 B, headed toward \$1.9 B  
OLDMP Accounts for About 15% of Total LADWP Water Bill  
Current Annual Owens Lake water waste ~ 95 K acre-feet = 30.97 B gallons  
LA Annual Residential Water Usage = 362 K acre-feet = 117.85 B gallons  
LA Commercial/Industrial Water Usage = 119 K acre-feet = 38.66 B gallons  
2010-2011 water use per person = 123 gallons/day (lowest among big cities)  
Ranked by "Average Monthly Bill for Family of Four,"  
LA is about #25 out of 30 cities in two Circle of Blue surveys

# **August 1, 2013 US House Science Committee Subpoena of “Secret Science” Data Used by EPA for Deaths Related to PM<sub>2.5</sub> & Ozone**

**Seven Subpoened Papers Based on Original Two Papers**

1993 Dockery Pope NEJM Paper (H6CS Data—1%)

1995 Pope Thun AJRCCM Paper (ACS CPS II Data—99%)

**ACS has Refused to Comply with Subpoena: NO  
De-Identified Data That Can Be Independently Analyzed**

**ACS has Refused to Cooperate in Any Way with Highly  
Qualified Ph.D.-level PM<sub>2.5</sub> Critics, including Enstrom**

**ACS is Heavily Involved with EPA Regulatory Policy on  
an Issue Unrelated to Cancer and Will NOT Back Off**

**ACS Violated CPS II Subject Confidentiality by Allowing  
Home Addresses for Use in September 2013 AJRCCM Paper**



# **Conclusions About Air Pollution and Total Mortality in California Based on Prospective Epidemiologic Studies**

- 1) Overwhelming Evidence in CA that Premature Death is NOT Related to PM<sub>2.5</sub>, PM<sub>10</sub>, and Ozone**
- 2) ACS & Harvard Must Comply with August 2013 Subpoena of “Secret Science” Data Used by EPA**
- 3) EPA and CARB PM<sub>2.5</sub> & Ozone Regulations in CA Should be Frozen Pending Outcome of Subpoena**
- 4) Air Pollution in CA and South Coast Air Basin Must Be Put Into SES Context Given Low Total Death Rates & More PM<sub>2.5</sub> from China than Diesel**

## Lysenko Pseudoscience

Lysenko, non scientist, gained favor of Stalin  
Made false crop claims & used phony plant genetics  
Ignored genuine Mendelian plant genetics  
Purged opposing scientists, like Vavilov  
Famines resulted and Soviet citizens starved  
Soviet agriculture was set back decades

## Particulate Matter Pseudoscience

A few activist scientists publish most major papers  
Descenting scientists ignored & never funded  
ACS “secret science” findings cannot be checked  
Activists like ALA, UCS, NRDC file many lawsuits  
EPA, CARB, SCAQMD exaggerate health effects  
Draconian PM2.5 regulations adopted in healthy CA  
CA truckers, contractors & general public hurt

# **Air Pollution Epidemiology Issues Relevant to USC Preventive Medicine**

- 1) Examine 2000, 2005, 2009, 2013 Papers of former USC PM Prof Michael Jerrett re PM2.5 & Total Mortality in CA**
- 2) Ask ACS Alpa Patel (USC Epi Ph.D.) About ACS CPS II Confidentiality & Analysis of 1992 CPS II Nutrition Cohort**
- 3) Ask USC PM Chair Jonathan Samet About Zeger 2008 & New EPA Ozone NAAQS Based on Jerrett 2009 (CPS II)**
- 4) Follow “Secret Science Reform Act” (H.R. 4012) re Reform of EPA Regulations & “Secret Science” Data Use**
- 5) Follow CARB & SCAQMD Regulations That are Based on EPA “Secret Science” and Not on Actual Evidence in CA**