AIR POLLUTION AND HEART DISEASE

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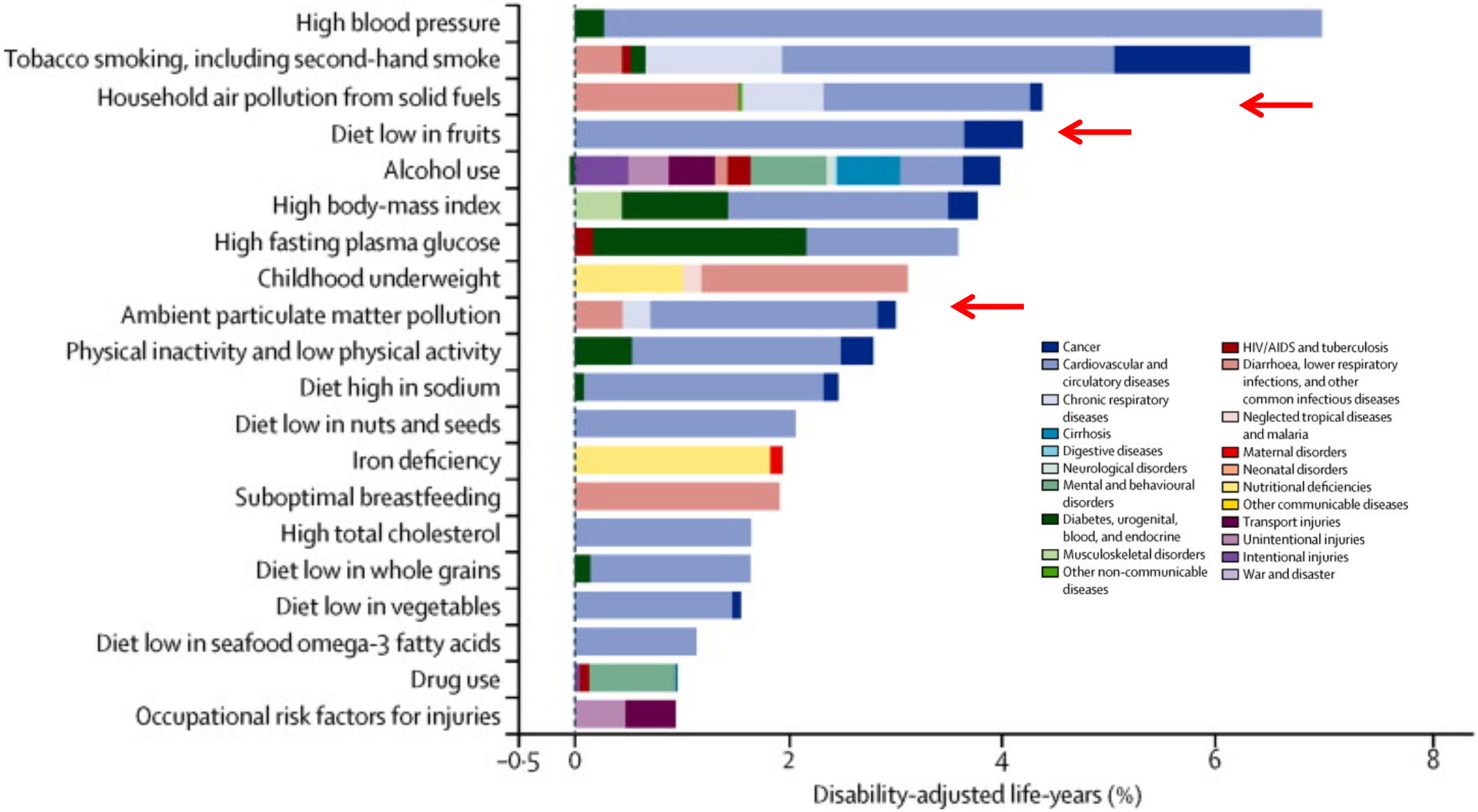
POLLUTION

Nearly 150,000 cardiovascular deaths in the US

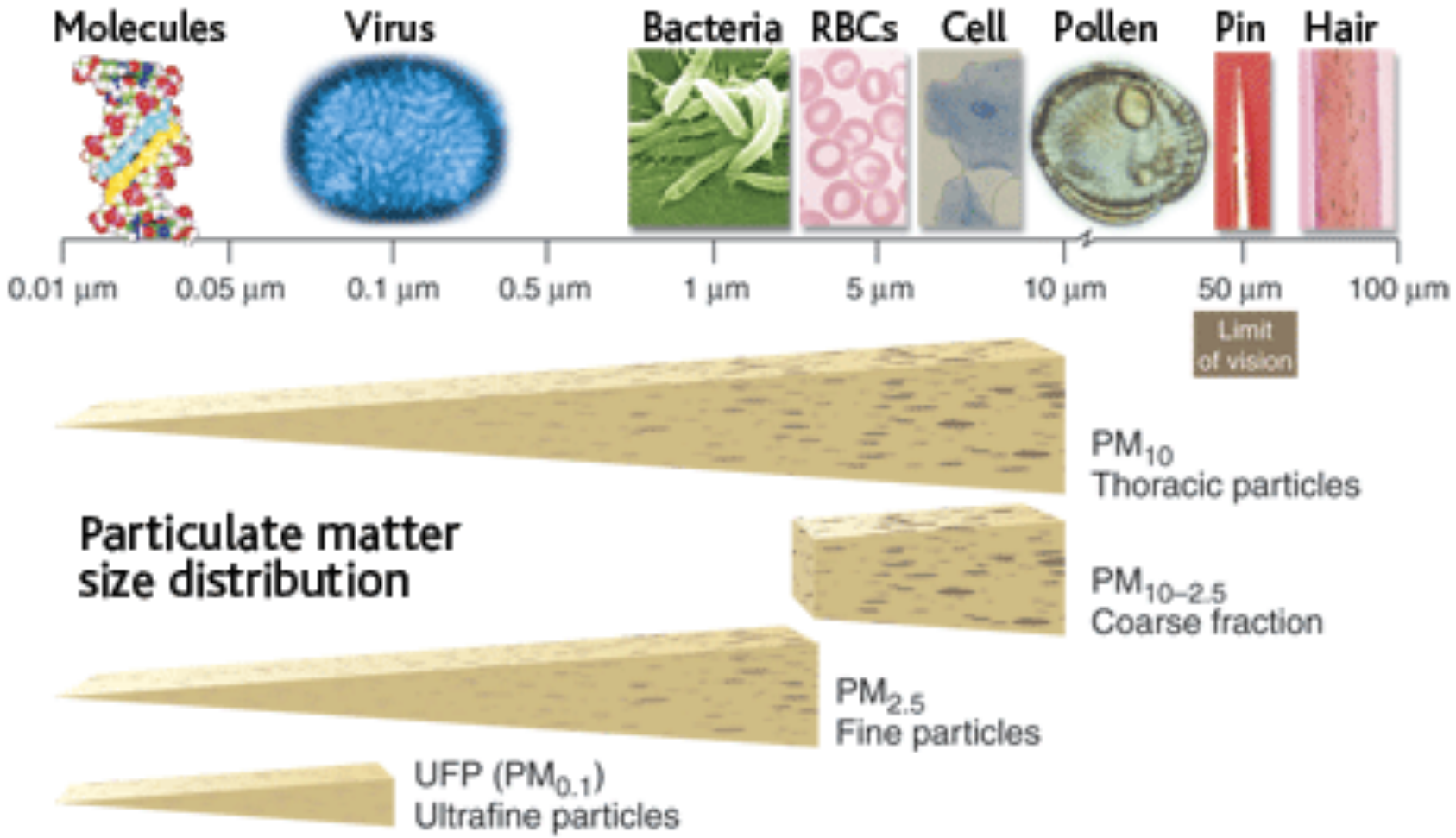

Globally, air pollution kills 7 million people annually

Global Burden of Disease

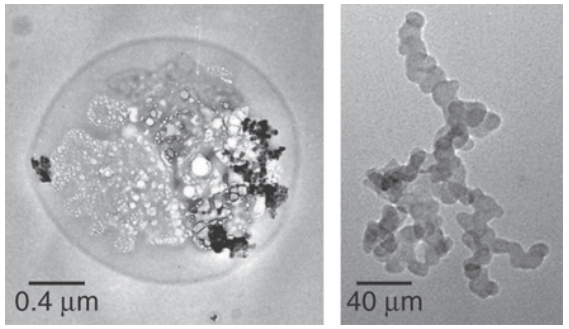


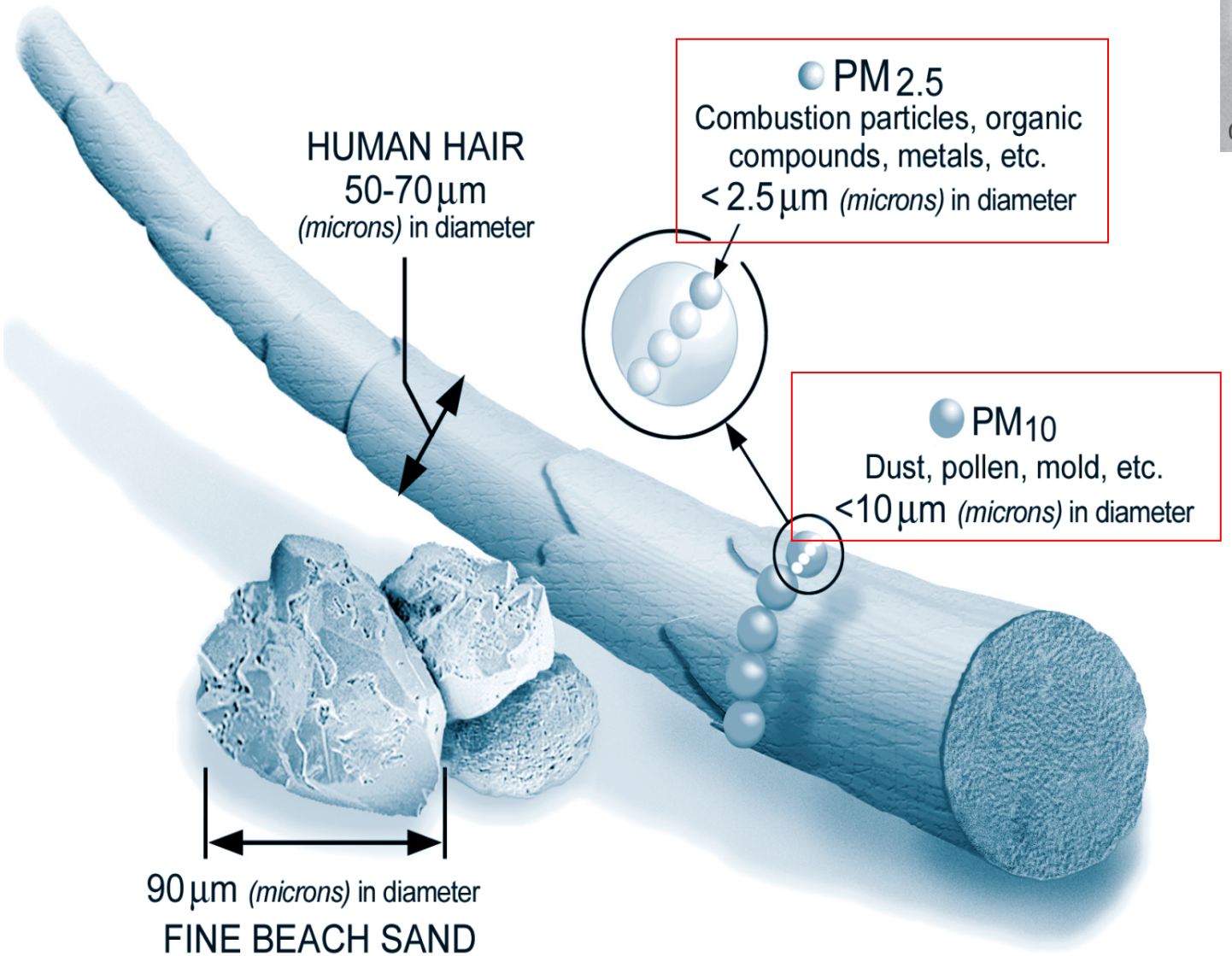
Lancet 380, 2224-60, 2012

Ambient Air Particles



Ambient Air Particles



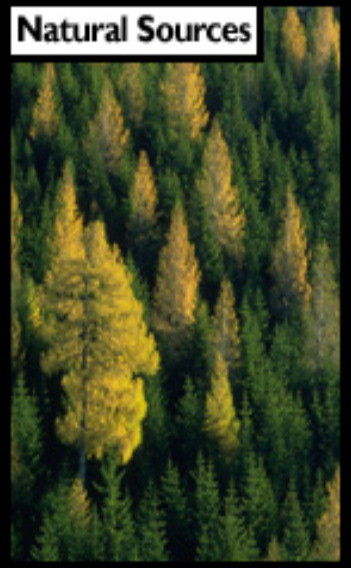


Wood-Burning Stoves

Forest Fires

Heavy Duty Diesel Engines

Natural Sources



PM is derived from many sources

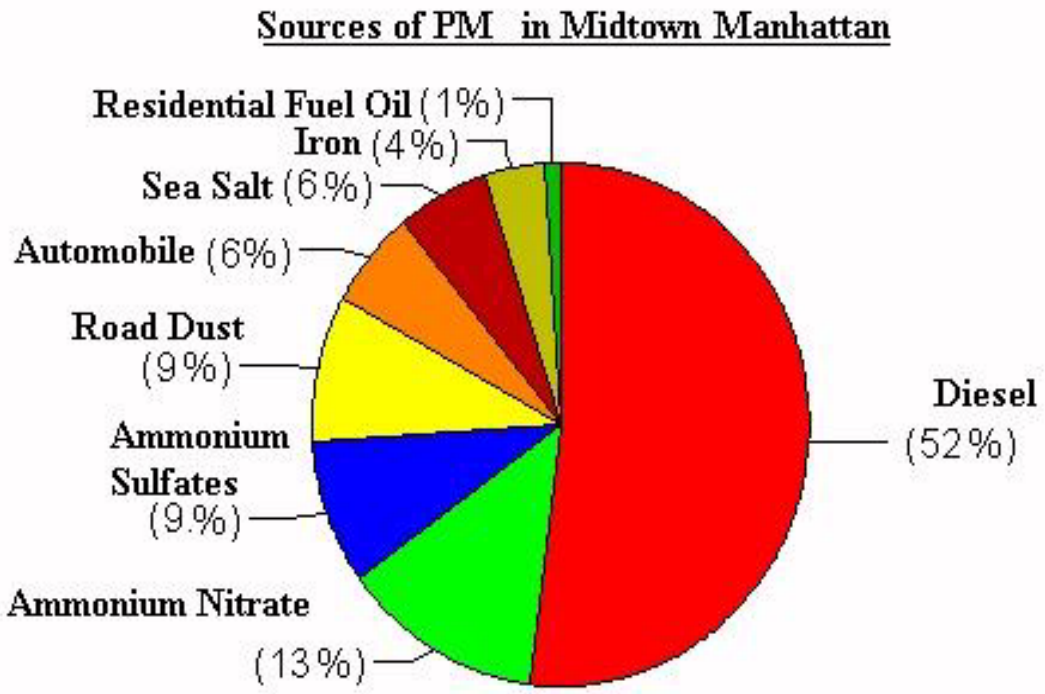
Cars andTrucks

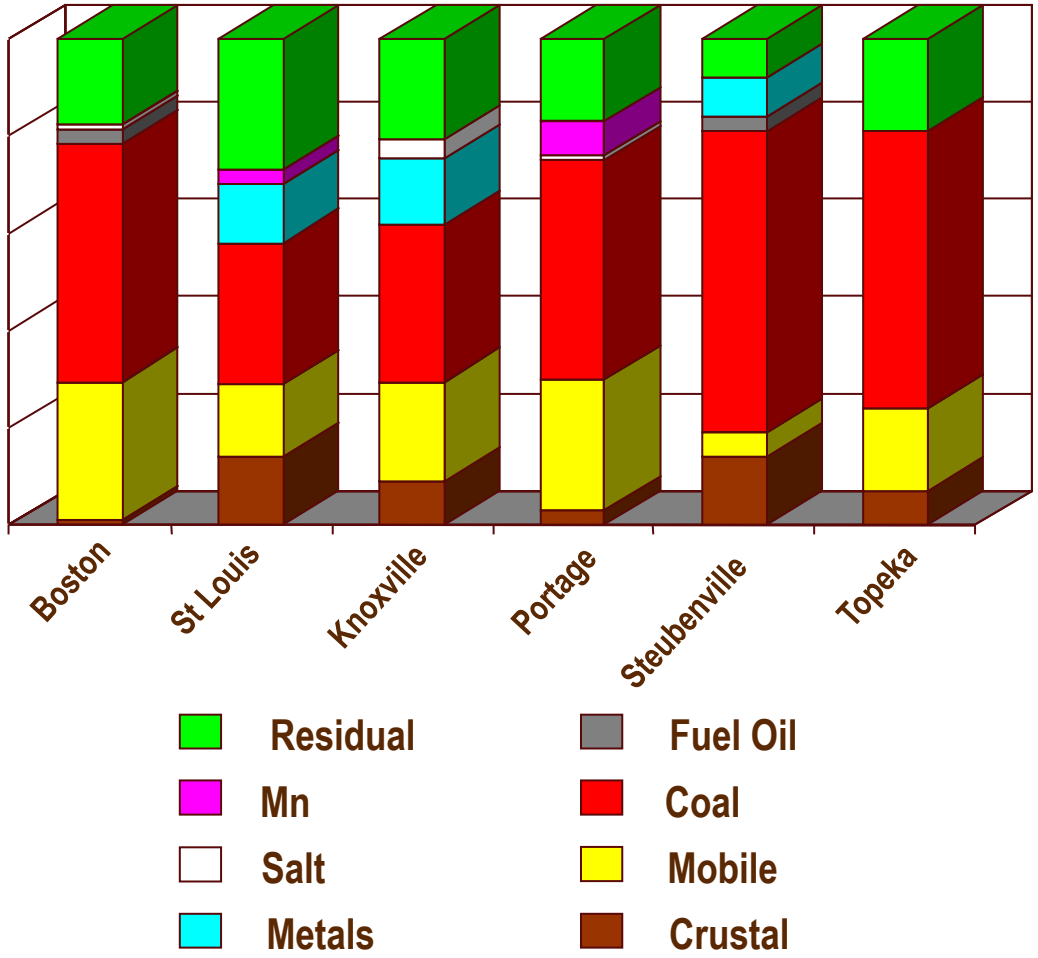
Non-Road Vehicles

Leaf Burning

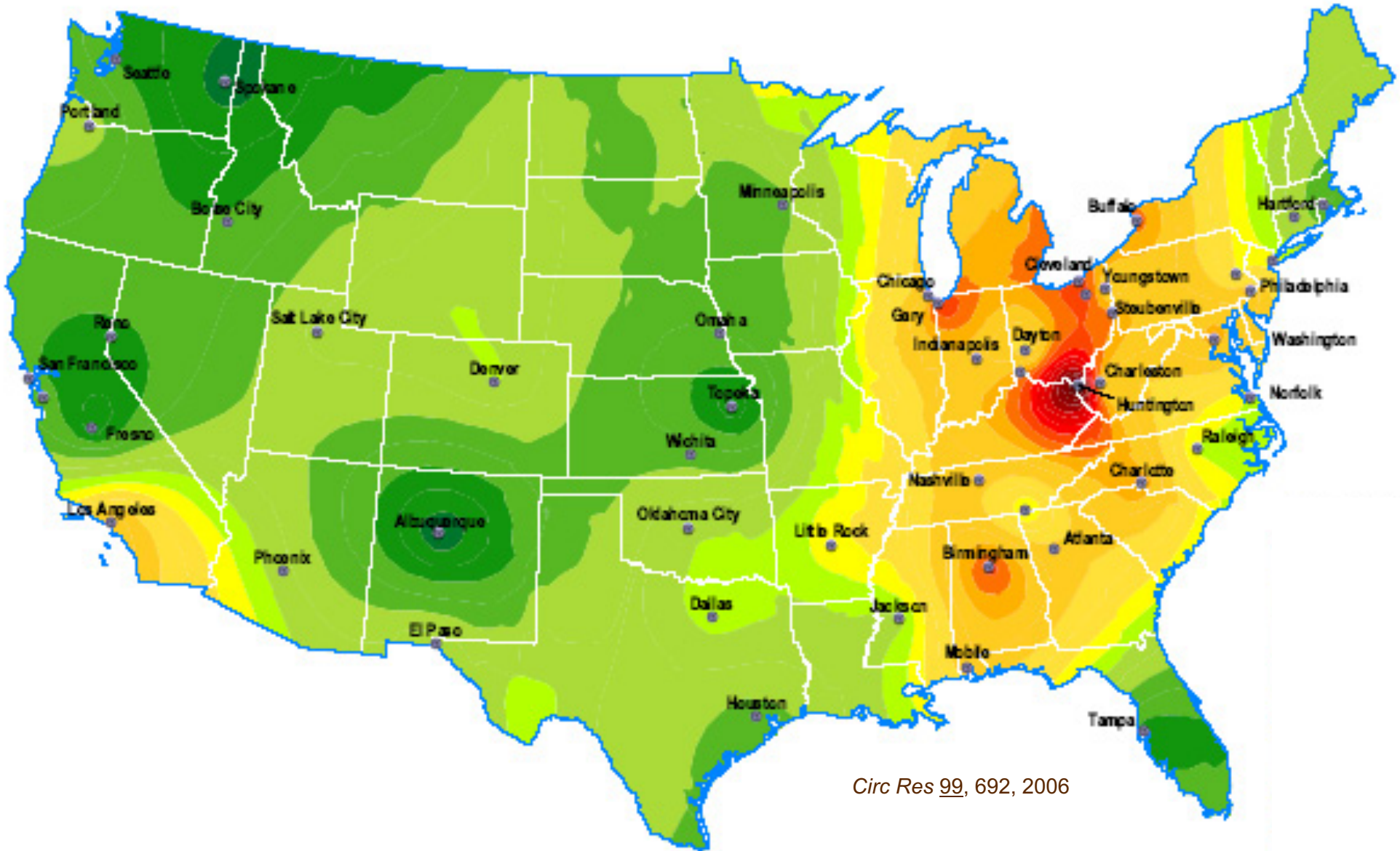
Industrial Sources

PM sources vary by geographic location



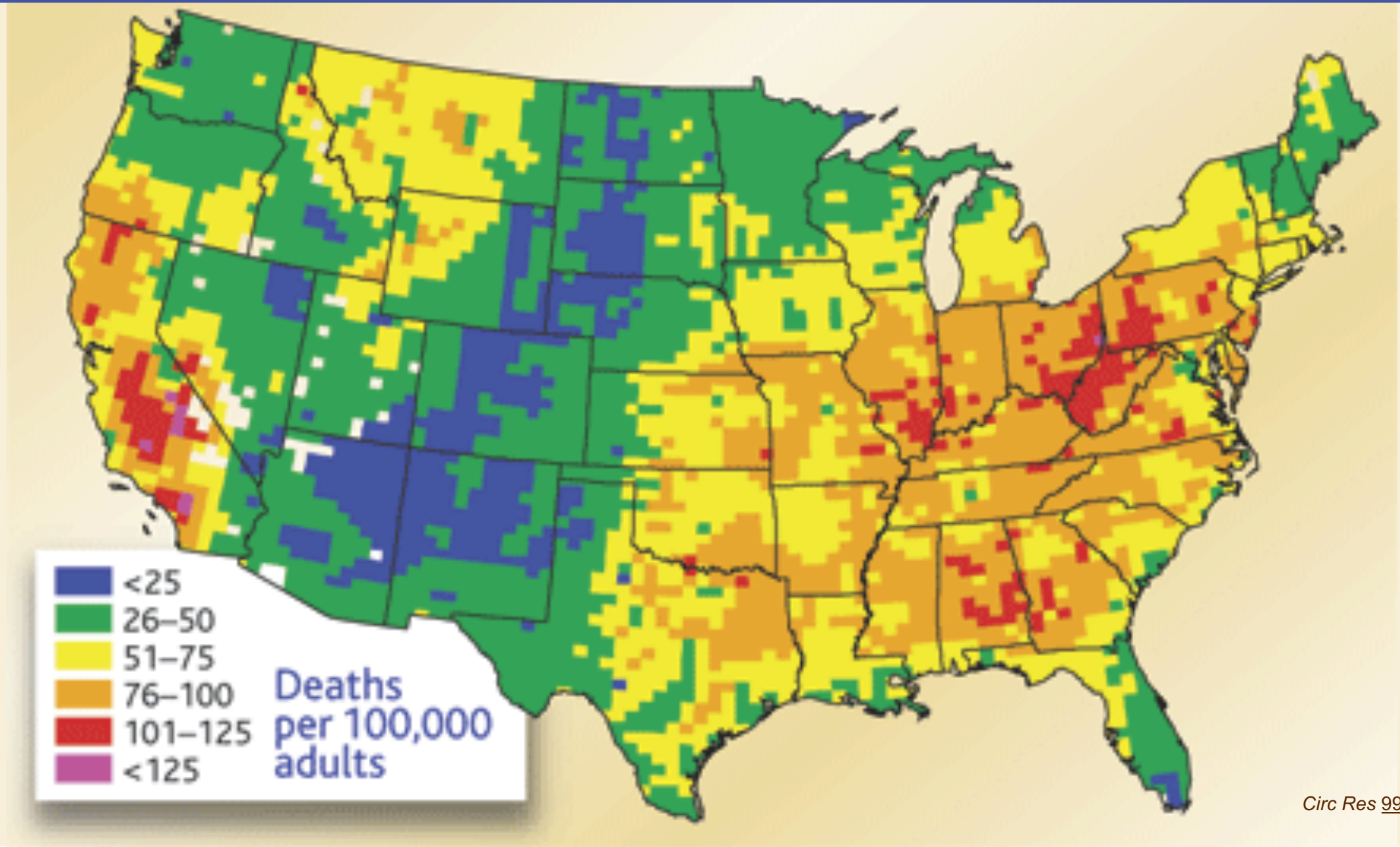


GEOGRAPHIC DISTRIBUTION OF PM



Circ Res 99, 692, 2006

Premature mortality risk attributable to PM



Circ Res 99, 692, 2006

Excessive Mortality Associated with PM Exposure

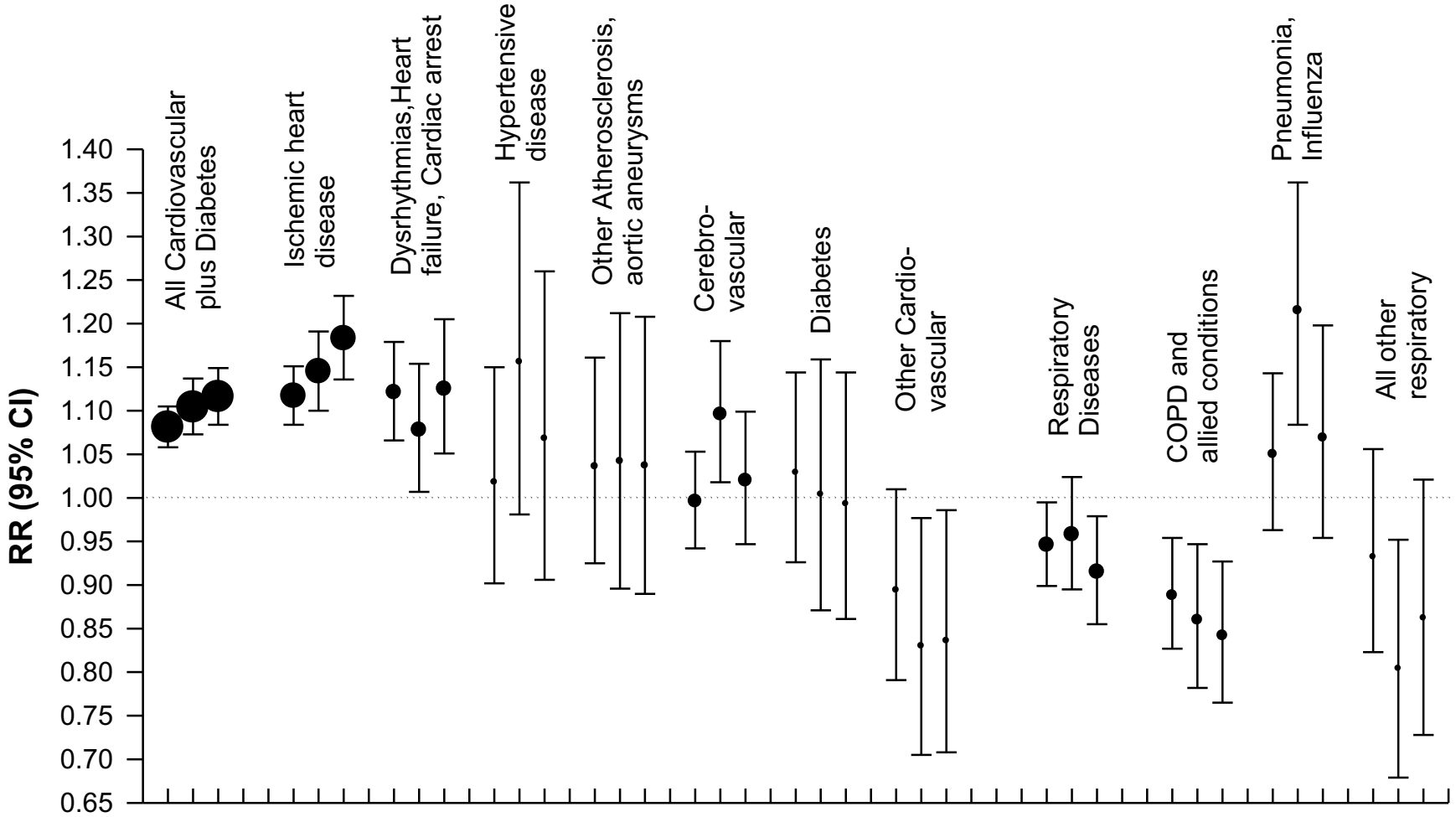
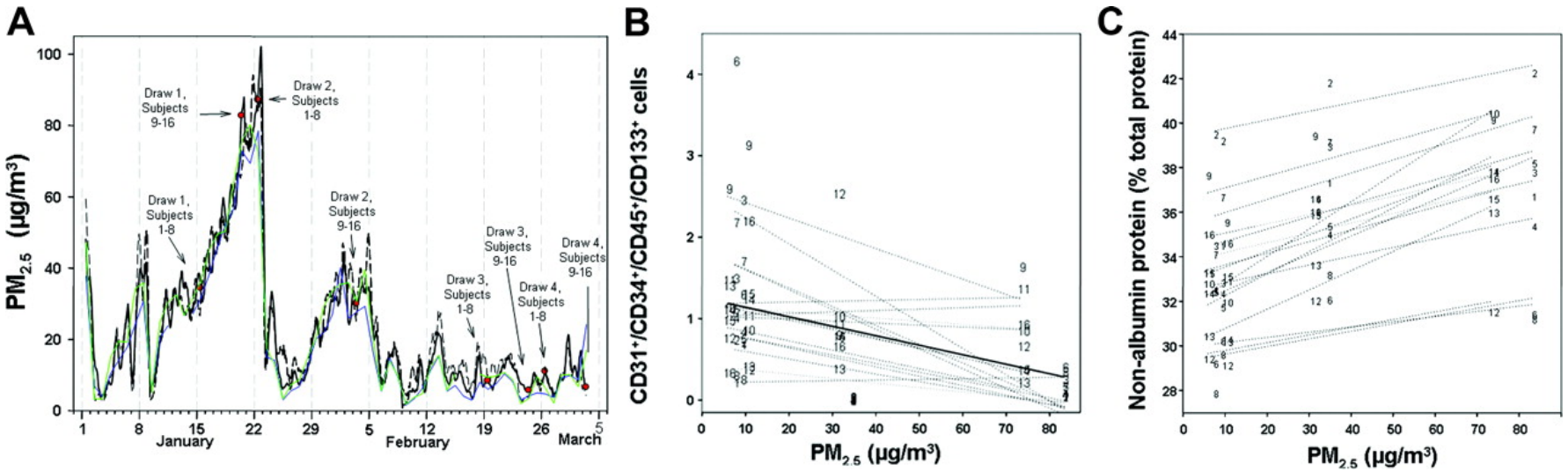


Figure 1. Adjusted relative risk ratios for cardiovascular and respiratory mortality associated with a 10 $\mu g/m^3$ change in $PM_{2.5}$ for 1979-1983, 1999-2000, and the average of the two periods. (Relative size of the dots correspond to the relative number of deaths for each cause.)

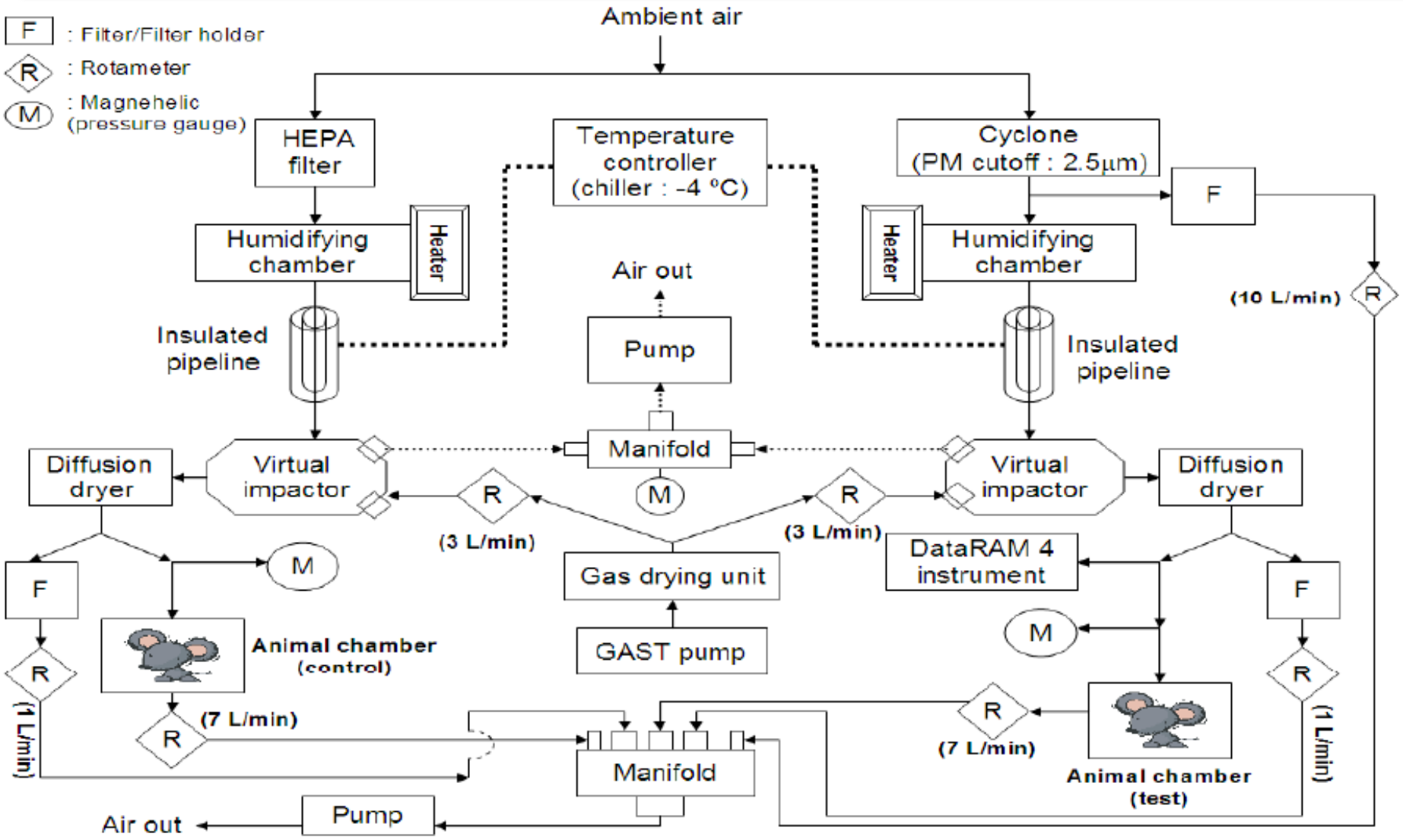
Circulation 109, 71, 2004

Episodic increase in PM decreases EPC levels

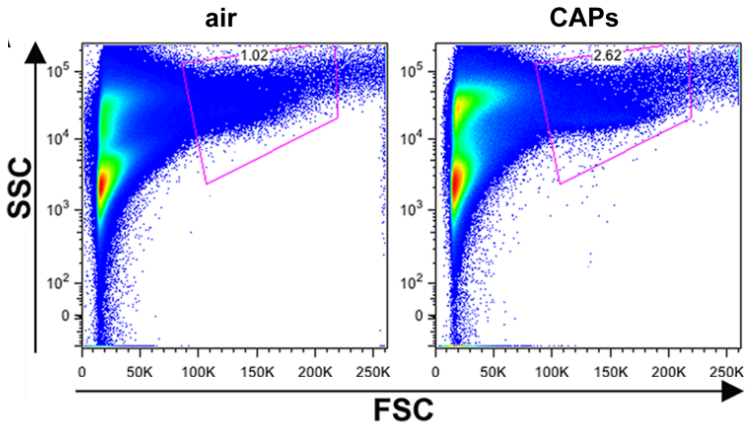


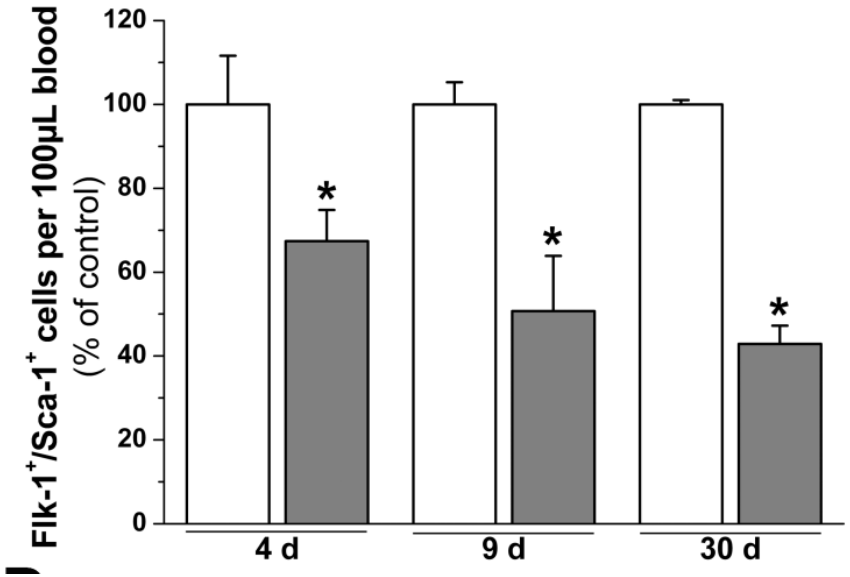
Circ Res 107, 107, 2010

Experimental Setup for exposing mice to concentrated air particulates



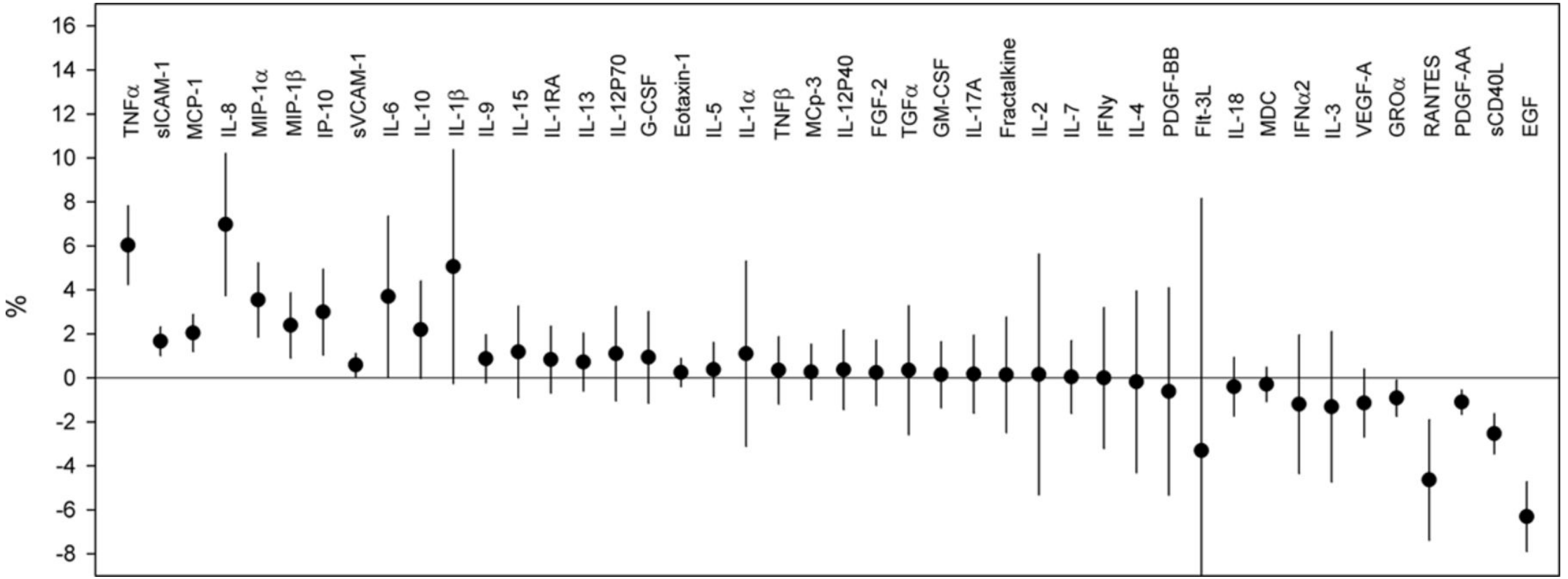
Exposure to PM Decreases Circulating EPC levels





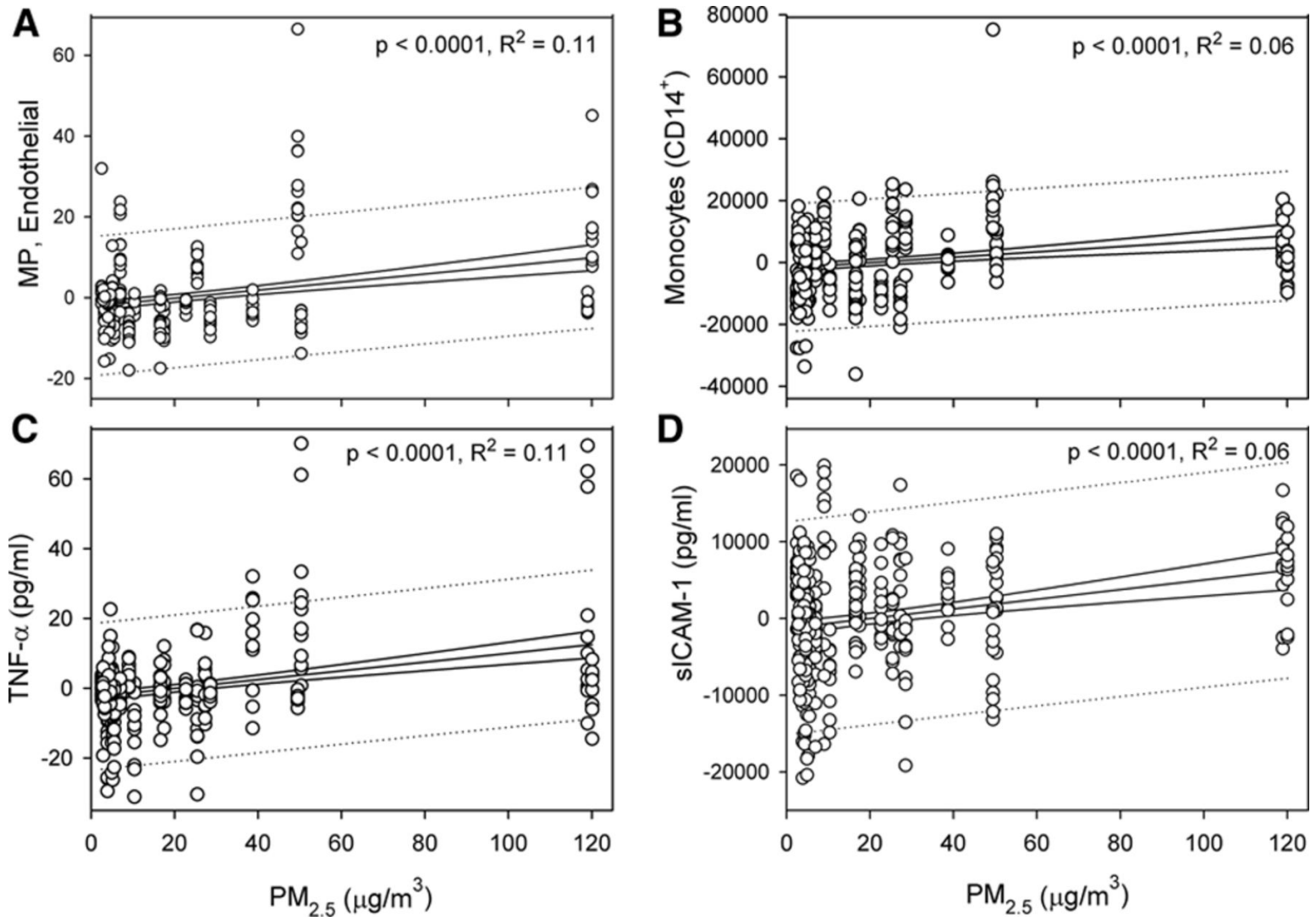
Circ Res 107, 107, 2010

Exposure to PM induces low-grade inflammation



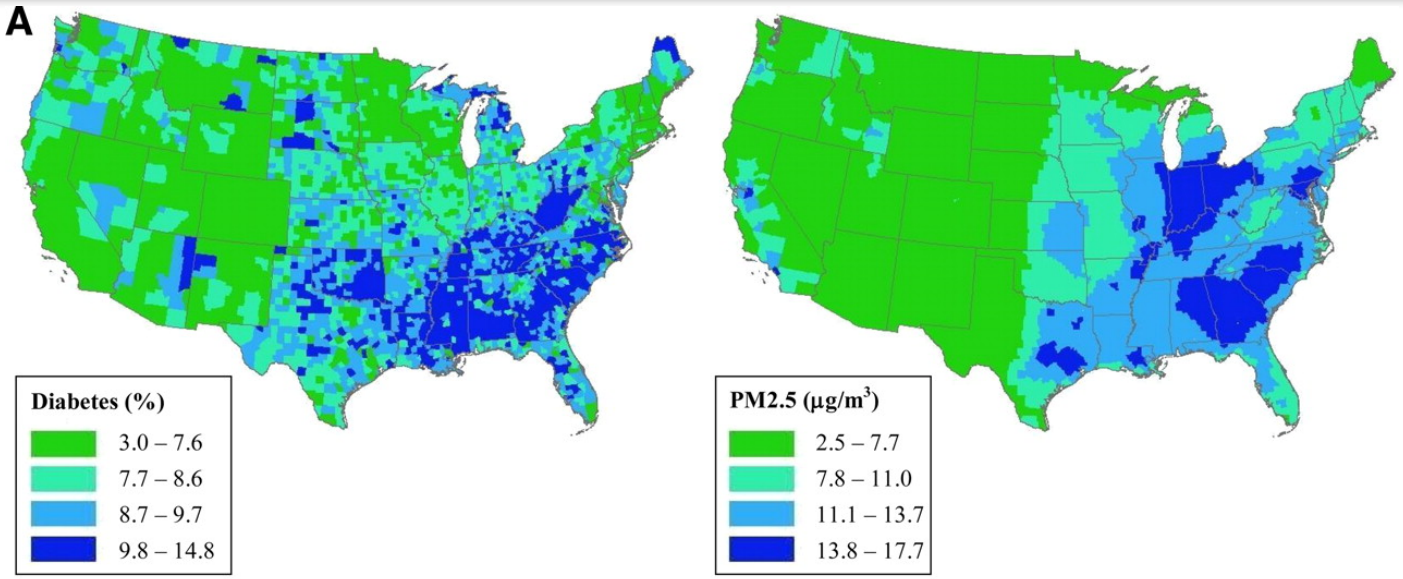
Circ Res 119, 1204, 2016

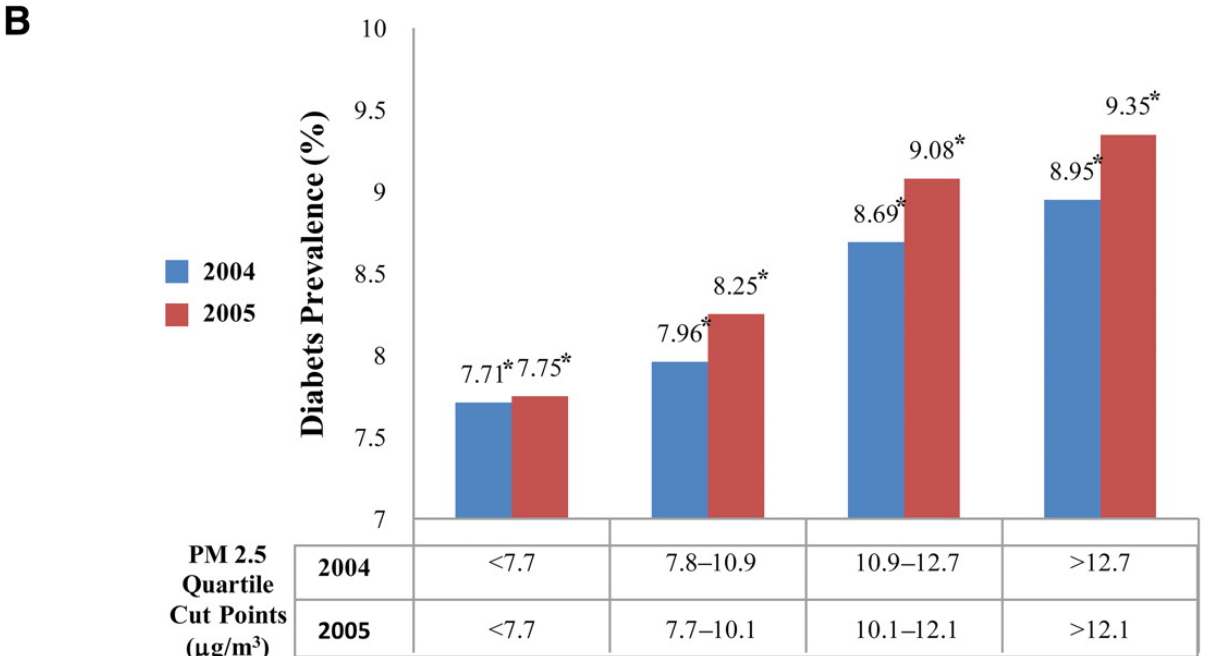
Exposure to PM induces endothelial injury



Circ Res 119, 1204, 2016

Diabetes Prevalence and $PM_{2.5}$ for US Counties

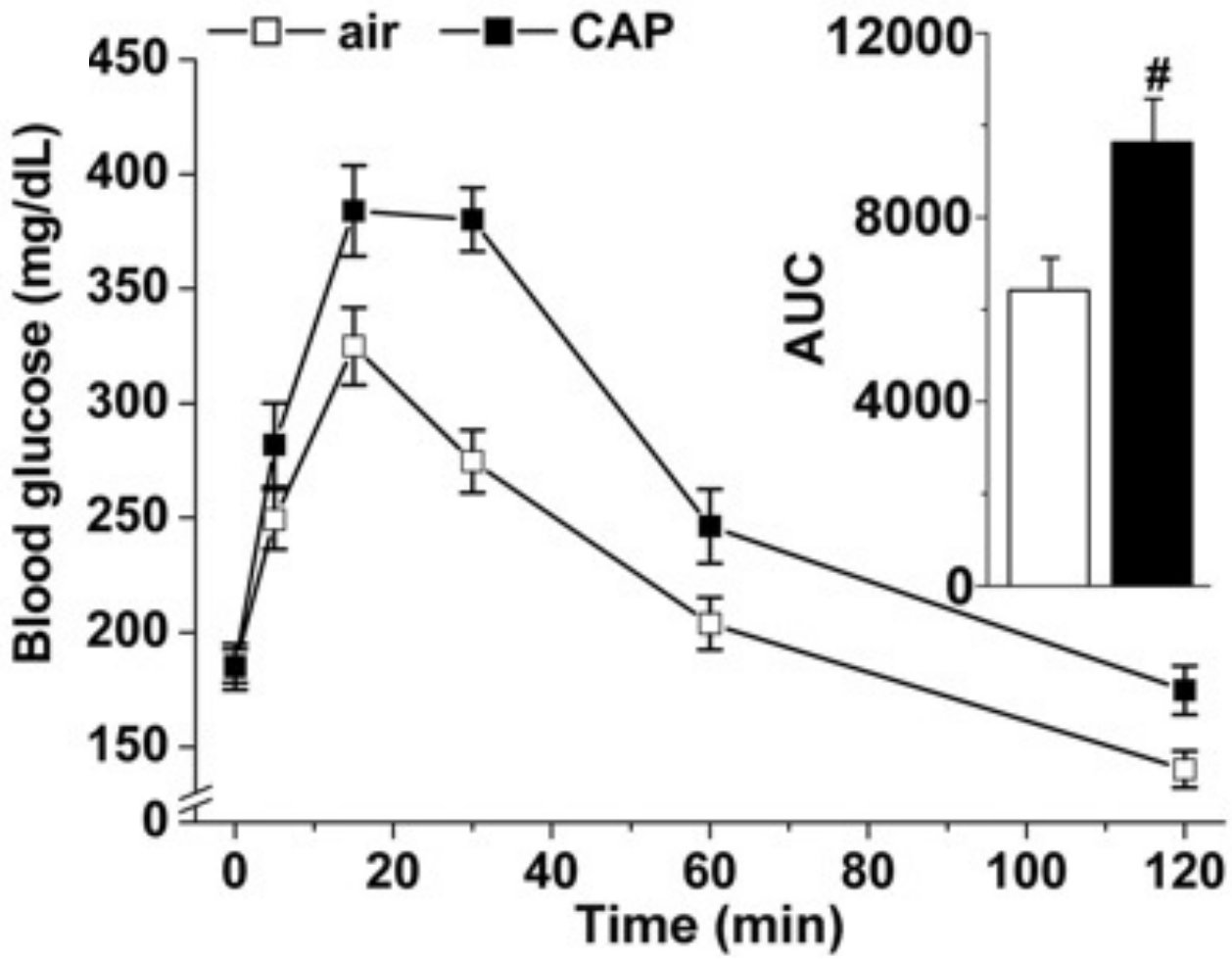




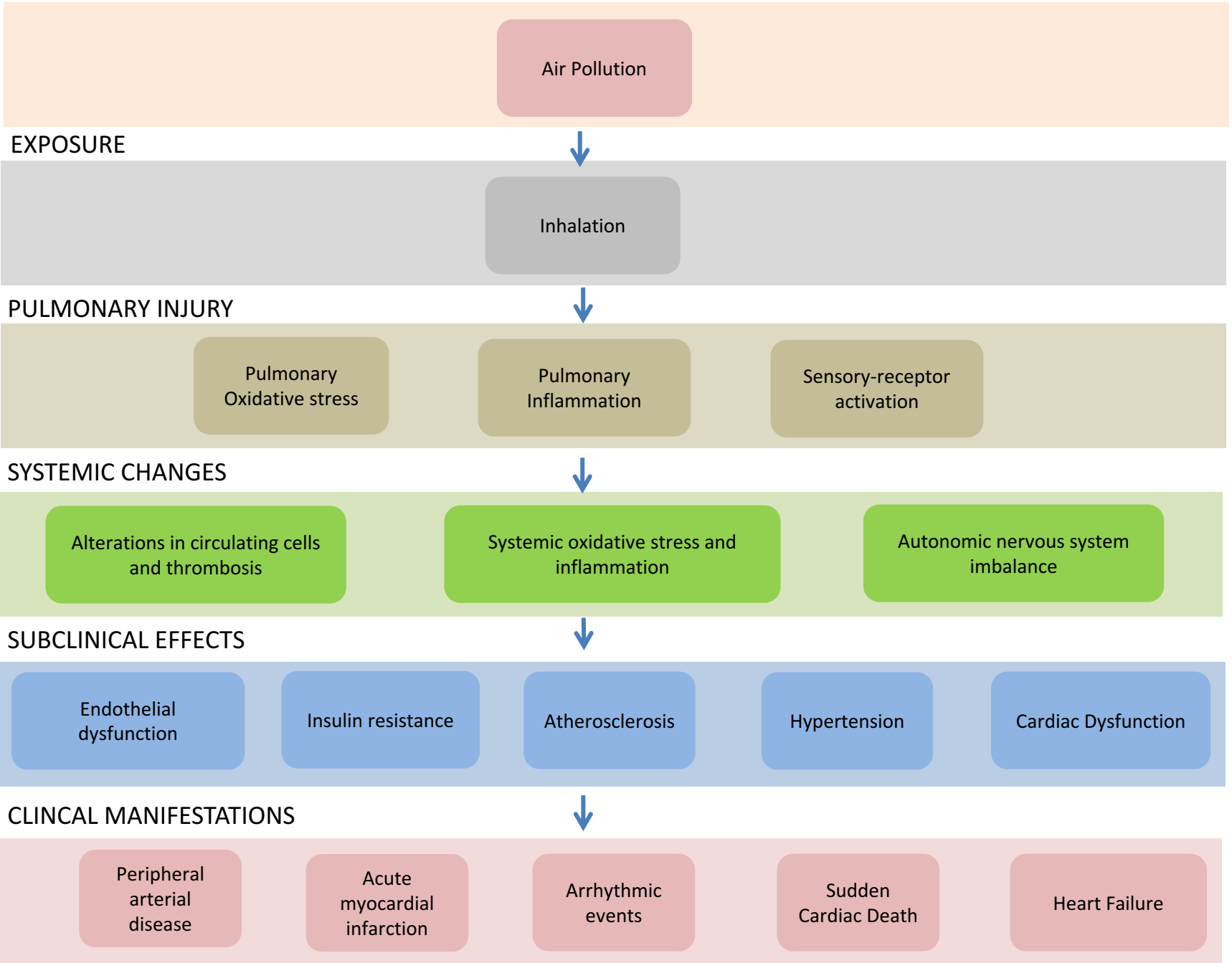
PM 2.5 Quartile Cut Points (µg/m³)					
2004	<7.7	7.8–10.9	10.9–12.7	>12.7
2005	<7.7	7.7–10.1	10.1–12.1	>12.1

Diabetes Care 33, 2196, 2010

PM increase insulin resistance



Environ Health Perspective 124, 1830, 2016


Air Pollution
EXPOSURE
Inhalation
PULMONARY INJURY
Pulmonary Oxidative stress
Pulmonary Inflammation
Sensory-receptor activation
SYSTEMIC CHANGES
Alterations in circulating cells and thrombosis
Systemic oxidative stress and inflammation
Autonomic nervous system imbalance
SUBCLINICAL EFFECTS
Endothelial dysfunction
Insulin resistance
Atherosclerosis
Hypertension
Cardiac Dysfunction
CLINCAL MANIFESTATIONS
Peripheral arterial disease
Acute myocardial infarction
Arrhythmic events
Sudden Cardiac Death
Heart Failure

Circulation
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