

Air Pollution and Lung Inflammation Among Public Housing Residents



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Disclosure of Conflict of Interest Information

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- ✦ I have no existing conflicts of interest to disclose
 - ✦ Disclosure information stated above is current as of November 14, 2006.

Overview

- ✦ Background: The “Asthma and Demolition in Chicago Public Housing” Study
- ✦ Measures of air quality
- ✦ Measures of airway inflammation in longitudinal community-based research
- ✦ Findings:
 - ◆ Particulate matter and demolition
 - ◆ Longitudinal measures of inflammation
 - ◆ Pollution, asthma, and inflammation

Background: 1999 Town Hall Meeting, Dr. Ken Olden



Key Questions:

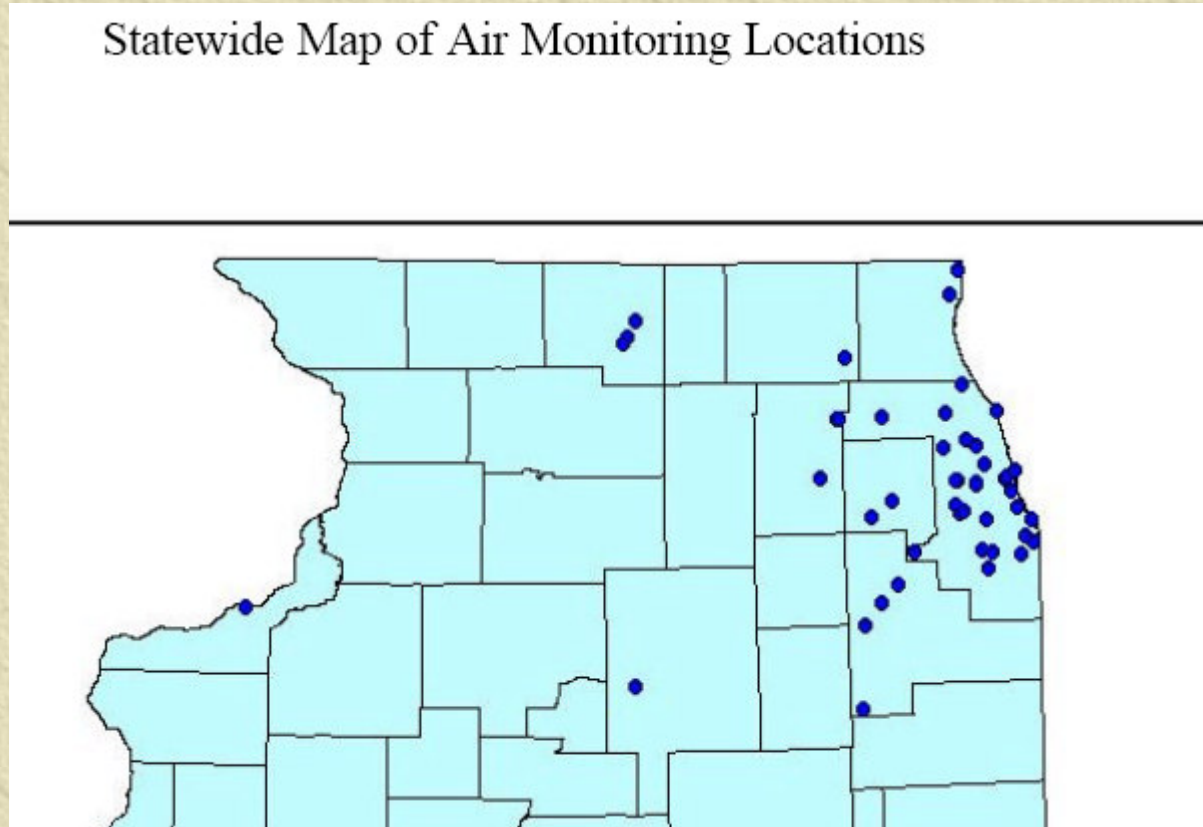
- ✦ What impact does demolition of CHA high rises have on air quality nearby?
- ✦ What impact does demolition have on the respiratory health of public housing residents
- ✦ What impact does regional air quality have on respiratory health of public housing residents?
- ✦ Are subgroups more susceptible to pollutant effects?

Local Measures of air quality



Regional Air Quality Data: IEPA

Statewide Map of Air Monitoring Locations



Regional Air Quality Data: IEPA

2004 SITE DIRECTORY

CITY NAME AIRS CODE	ADDRESS	OWNER/ OPERATOR	UTM COORD. (km)	EQUIPMENT
COOK COUNTY				
Chicago (0310060)	Carver H.S. 13100 S. Doty	Cook County DEC	N. 4611.594 E. 450.911	NAMS - PM ₁₀
Chicago (0310026)	Cermak Pump Sta. 735 W. Harrison	Cook County DEC	N. 4635.707 E. 446.469	SLAMS - Pb SPMS - TSP
Chicago (0310063)	CTA Building 320 S. Franklin	Ill. EPA	N. 4636.096 E. 447.365	NAMS - CO, NO/NO ₂ , SO ₂
Chicago (0310076)	Com Ed Maintenance Bldg. 7801 Lawndale	Cook County DEC	N. 4622.217 E. 440.658	SLAMS - PM _{2.5} /SPEC, O ₃ ⁿ , NO/NO ₂ , SO ₂ ⁿ SPMS - WSWD, PM _{2.5} /SPEC
Chicago (DISC) (0310014)	Farr Dormitory 3300 S. Michigan Ave.	Cook County DEC	N. 4631.367 E. 448.202	SLAMS - PM _{2.5}
Chicago (0310072)	Jardine Water Plant 1000 E. Ohio	Ill. EPA	N. 4638.169 E. 449.597	PAMS - NO/NO ₂ , O ₃ , VOC WSWD, SOL, MET, UV, RAIN

Use of IEPA data to differentiate background from local source of PM



Local PM=

**What we want
to know**

$$\beta_0 + \beta_1 * \text{Regional PM} + \beta_2 * \text{Demolition} + \beta_3 * \text{wind speed}$$

From IEPA

From NCDC,
Midway

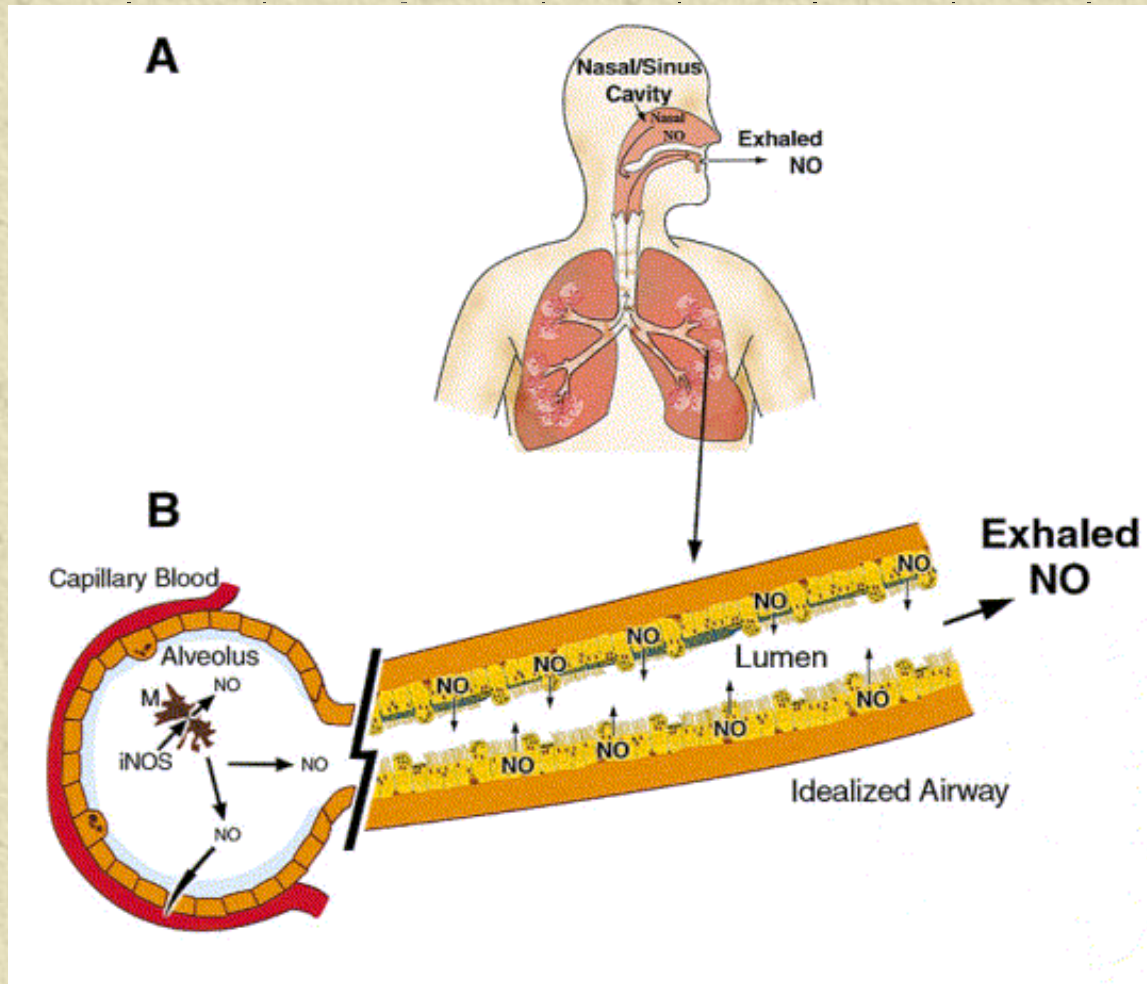
Measured



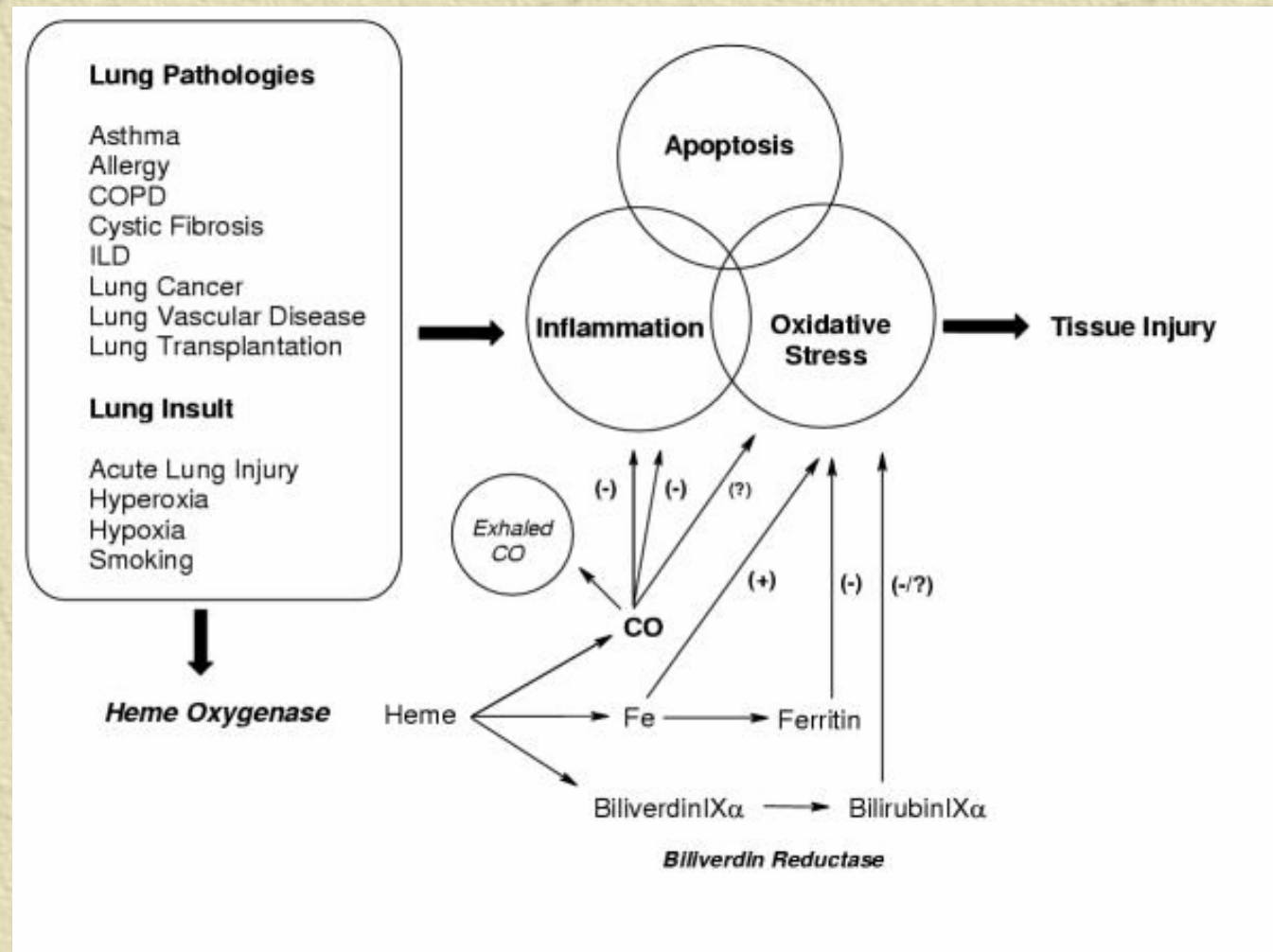
Measuring Airway Inflammation

- ✦ Gold standard: Tissue or fluid from the lung
- ✦ Limitations for community based research
- ✦ Biomarkers

Exhaled nitric oxide (eNO)



People produce carbon monoxide?



Offline collection of exhaled air

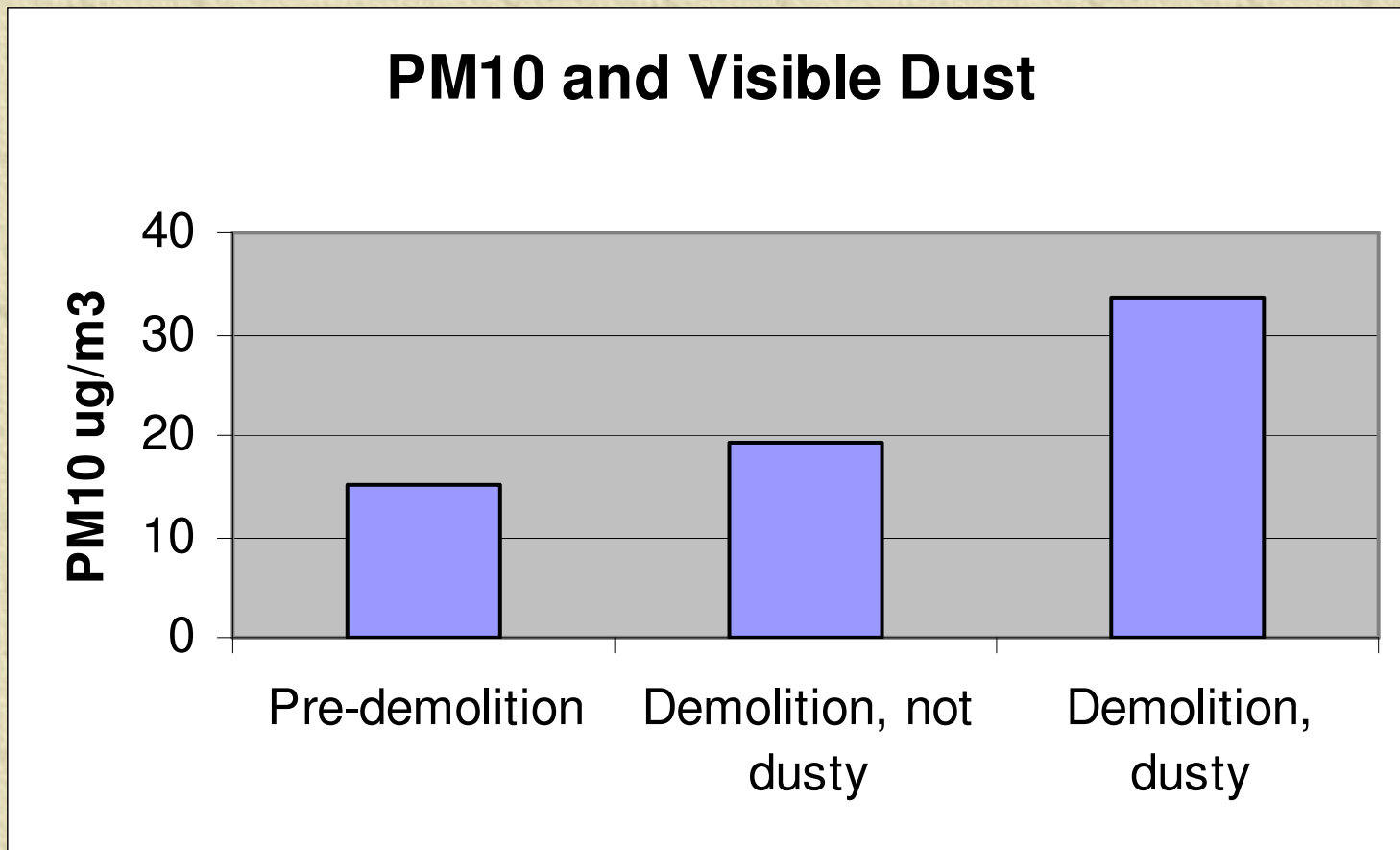
✦ See photo

✦ ATS guidelines 1999, 2005

✦ Collected indoor air and exhaled air

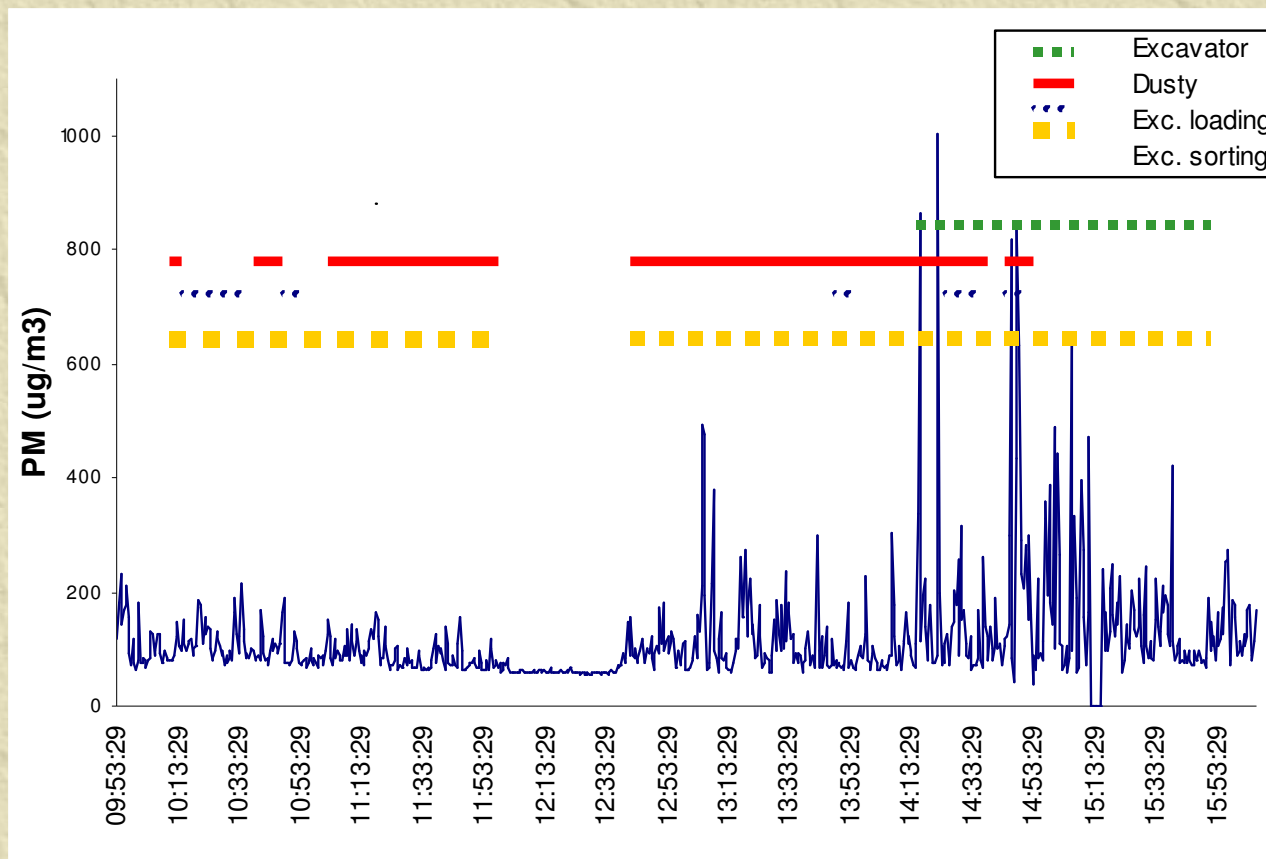
What we found: Air quality

Dorevitch et al, JA&WMA, 2006



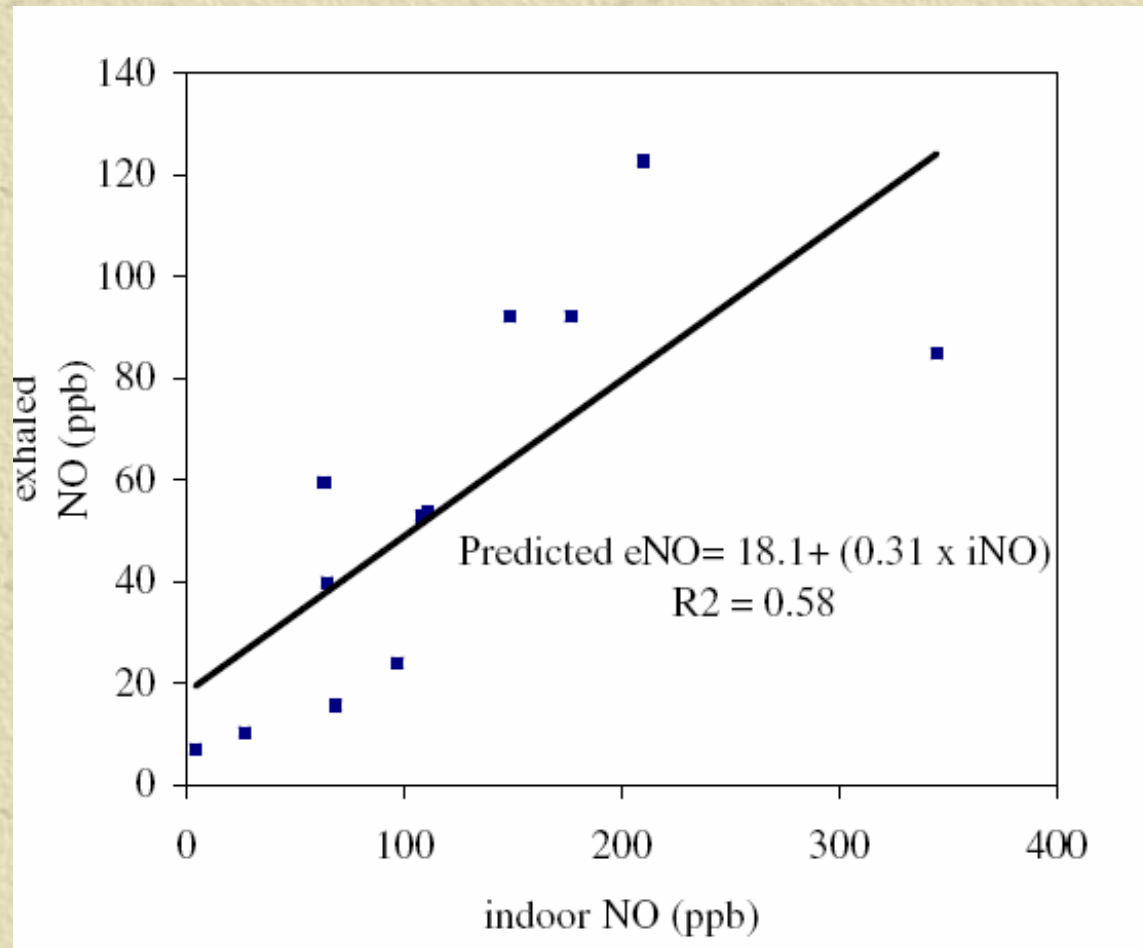
Demolition activities and PM

Dorevitch et al, JA&WMA, 2006

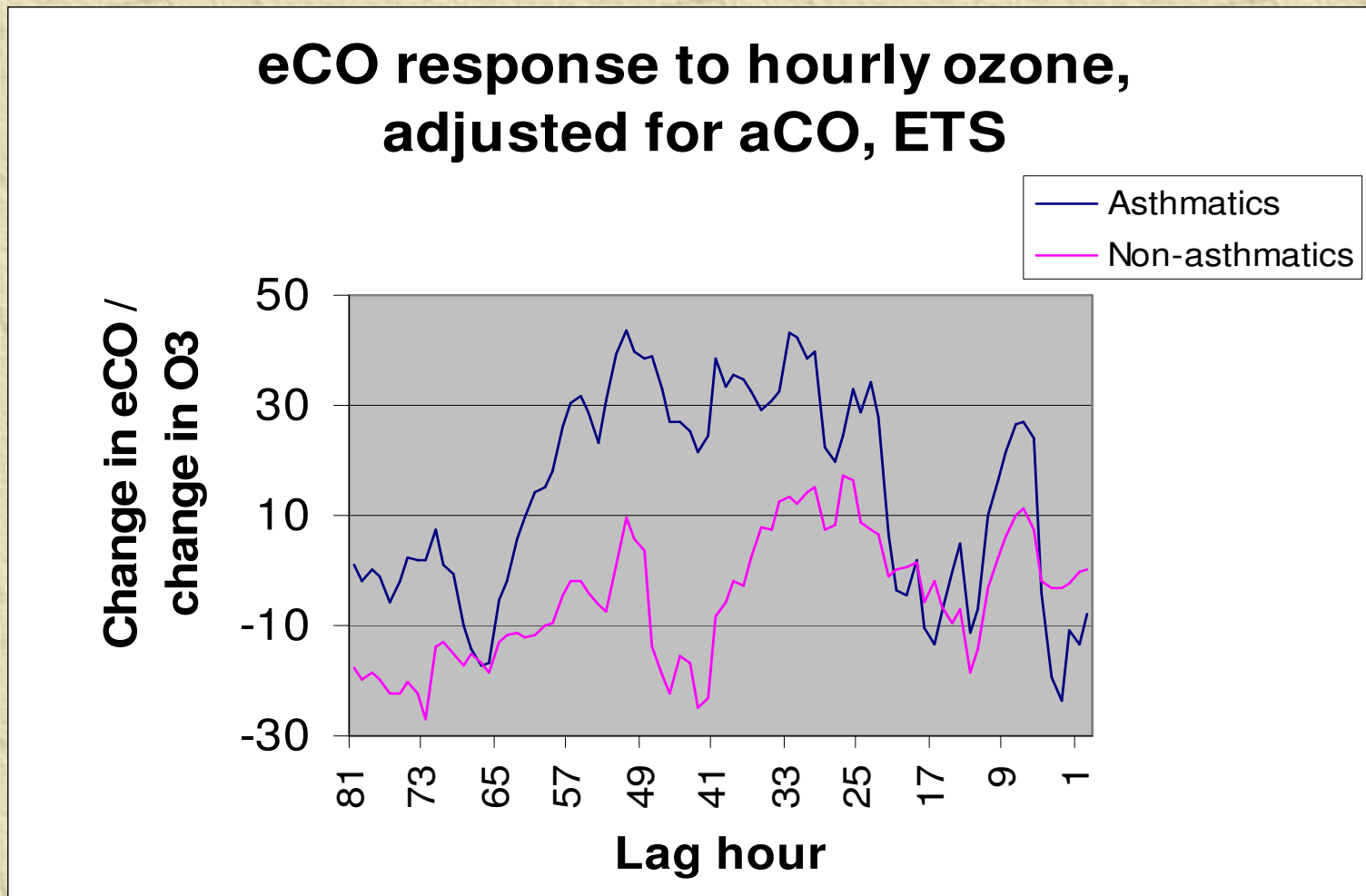


Exhaled NO and CO

Dorevitch et al, J Exposure Science and Environ Epidemiology (in press)



Ambient Ozone and eCO



Ozone and eCO


- ✦ Possible mechanism: oxidant load
- ✦ Asthmatics as “susceptible” for EPA regulation
- ✦ Relatively low ozone concentrations
- ✦ Lag effects longer than expected

Next steps...

- ✦ Obesity as a modifier of airway measures of oxidative stress
- ✦ Multipollutant modeling of lag effects
- ✦ Exploration of other biomarkers

Community Partners and Collaborators

- ✦ The Grand Boulevard Federation
- ✦ West Side Future
- ✦ LAC Presidents, Robert Taylor, Stateway Gardens, ABLA
- ✦ Peter Scheff, PhD
- ✦ Victoria Persky, MD
- ✦ Serap Erdal, PhD
- ✦ Lorraine Conroy, ScD
- ✦ Todd Schoonover, MS
- ✦ Hakan Demirtas, PhD



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