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Insights from epidemiology on health impacts of air pollution

Dr. Tamara Schikowski

24. June 2020

Online EAERE pre-conference workshop

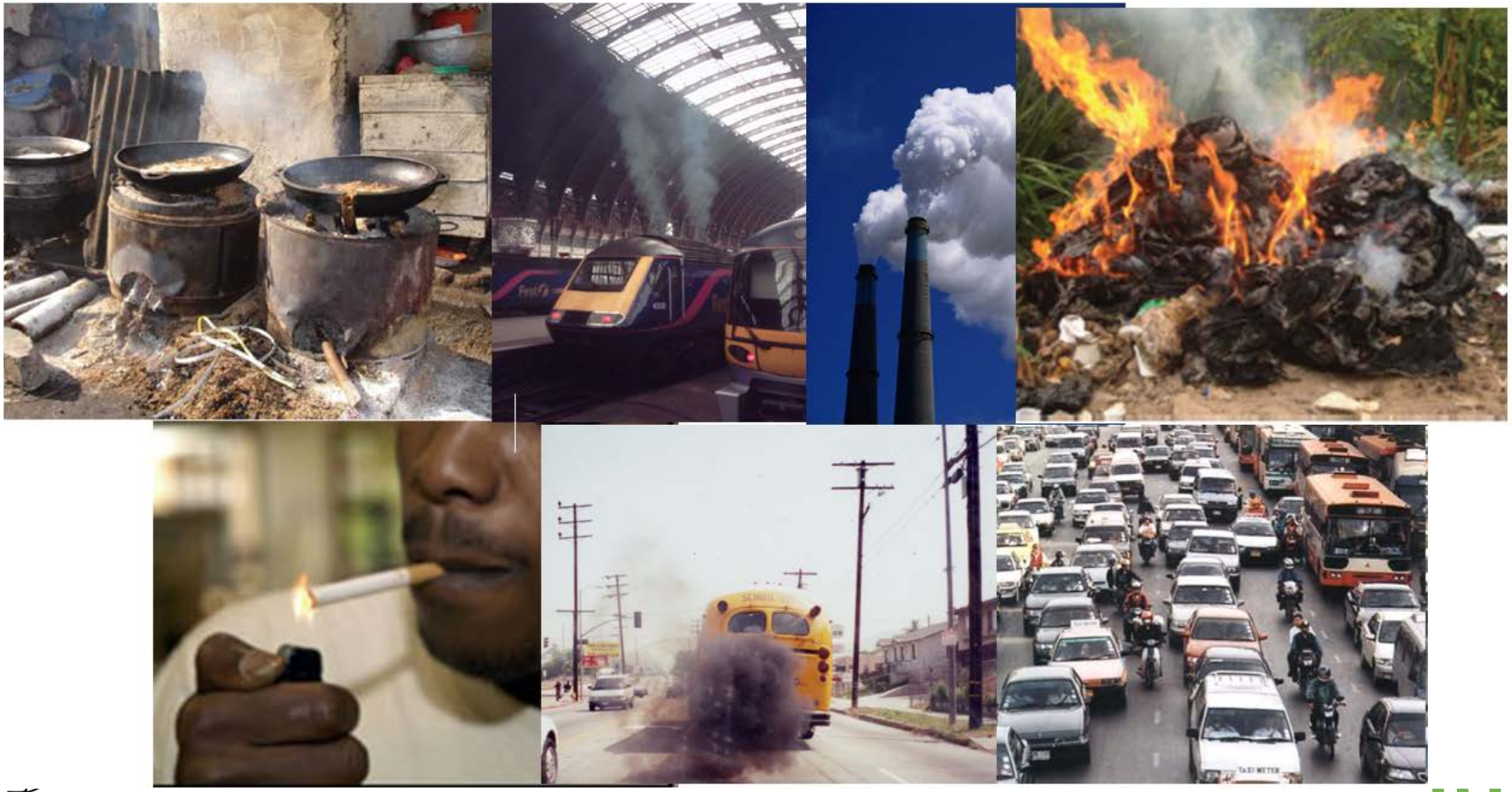
“The economic impacts of air pollution and the implications for policy”

Mitglied der Leibniz-Gemeinschaft

„gravioris caeli" (Heavy Sky)

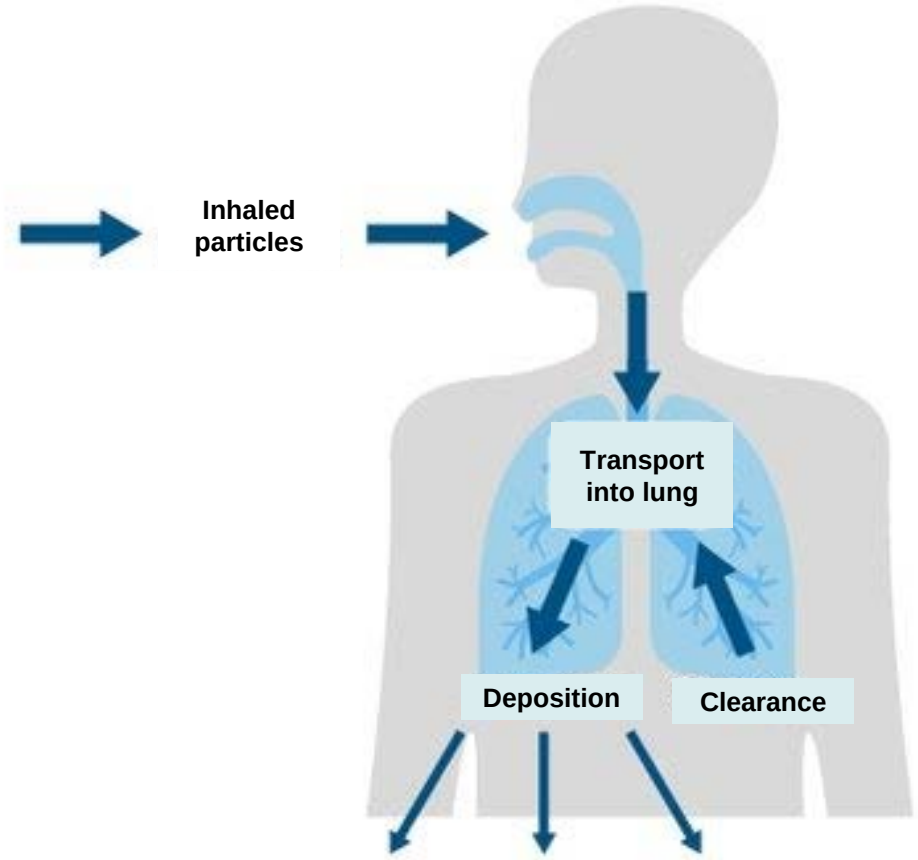
Claude Monet (1904): Parlament of London (in Smog) (Musée d´Orsay, Paris)

Air pollution sources (Anthropogenic)



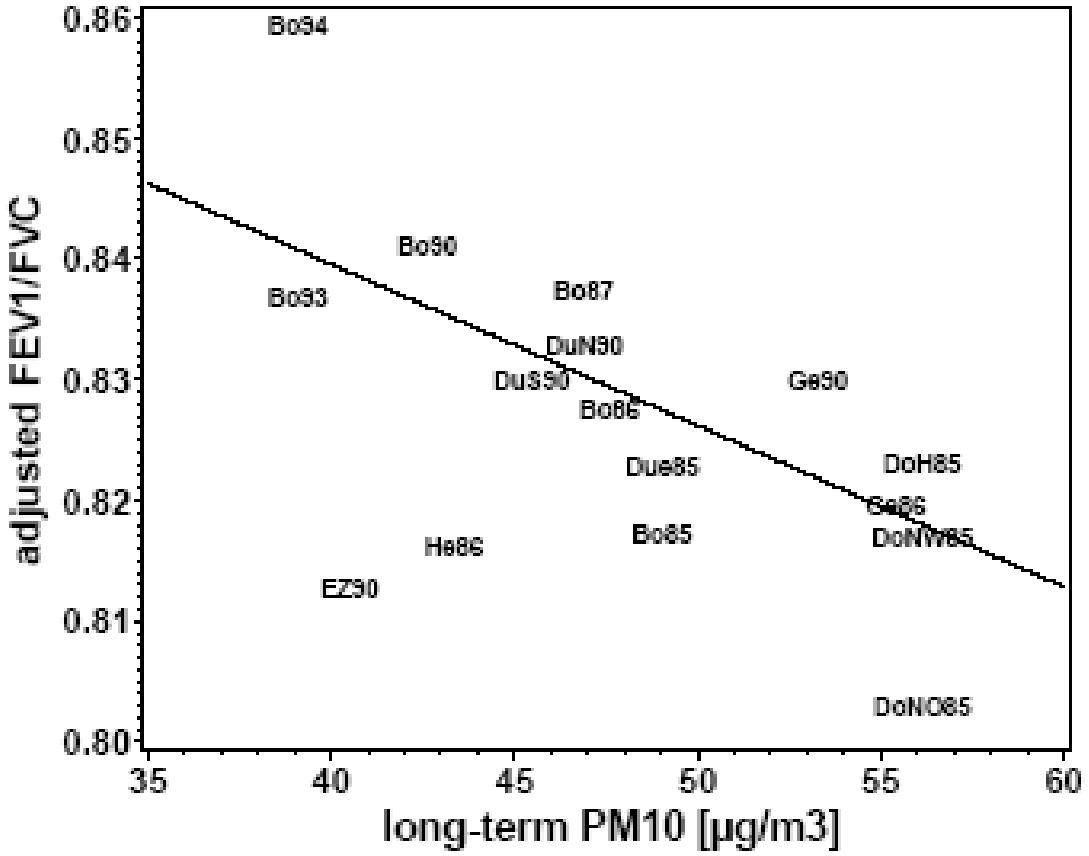
Air pollution and lung health

Particles and Lung



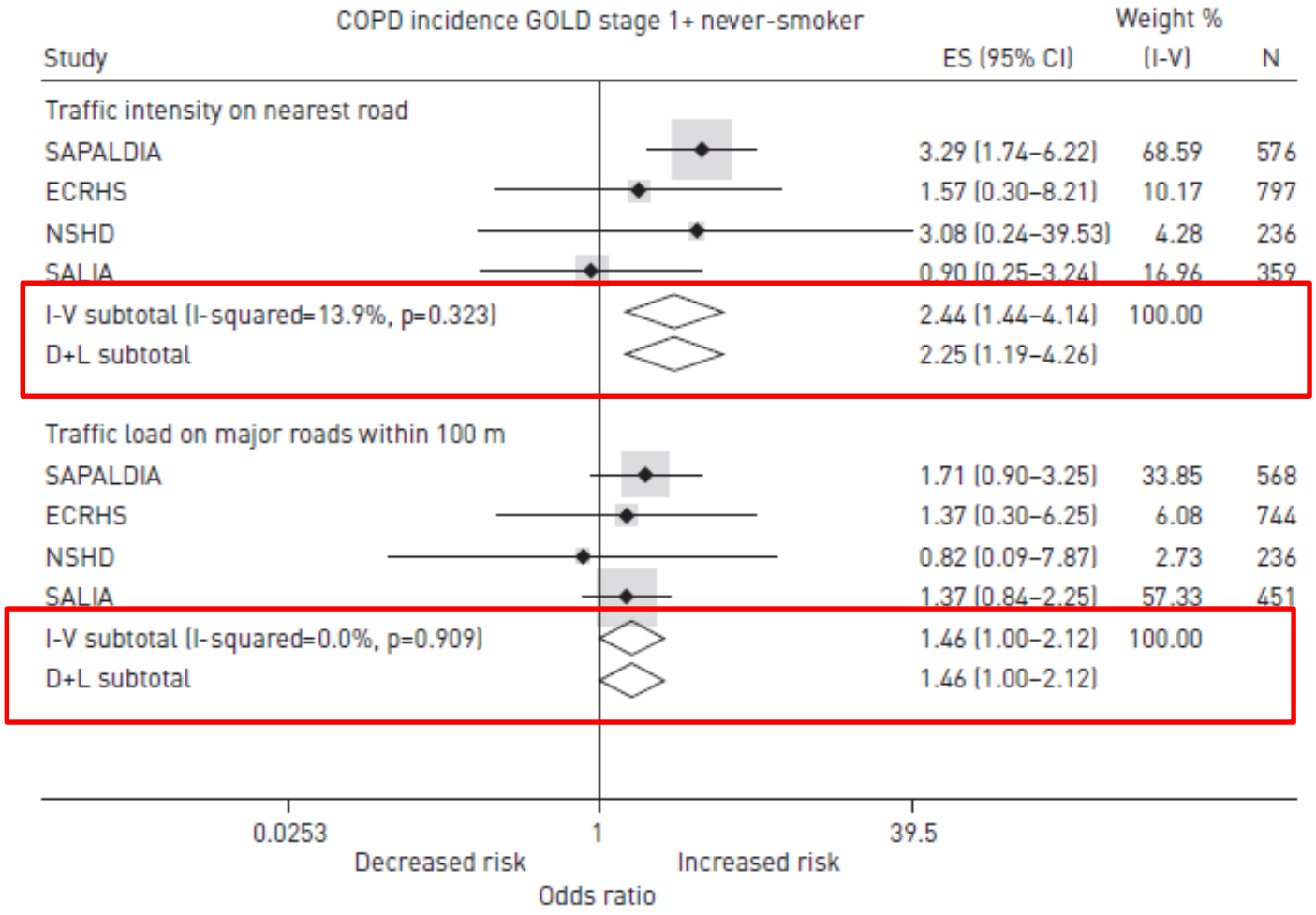
Association between COPD (low FEV1/FVC) and ambient PM10 among 4757 women (SALIA)

Schikowski et al. Respir Res 2005



Association of ambient air pollution with the incidence of COPD

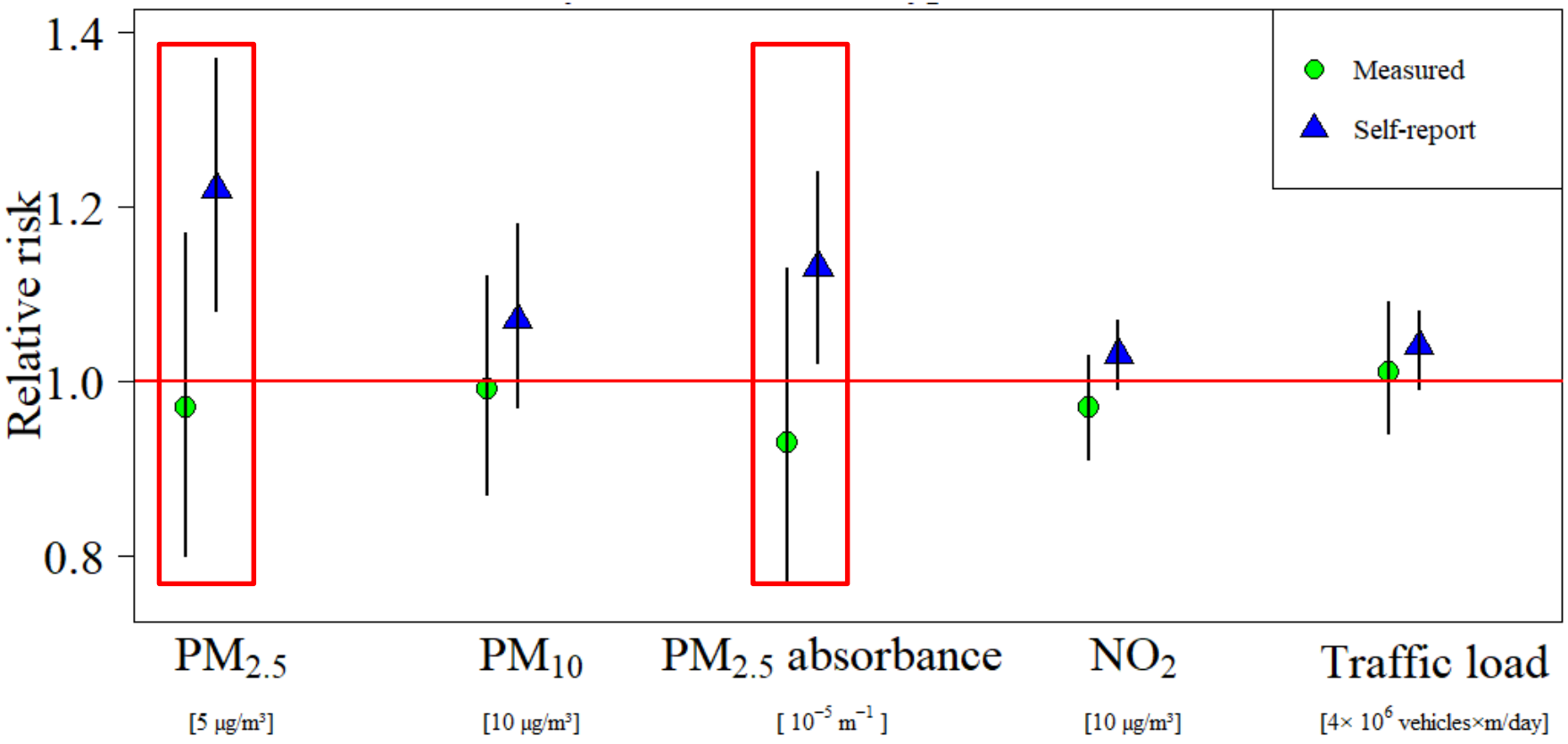
Schikowski et al. ERJ, 2014



Air pollution and cardiovascular health

Meta-analysis with incident hypertension (ESCAPE)

Fuks et al. EHP 2016a



Adjusted for sex, age, body-mass index, lifestyle (smoking, alcohol consumption, sport), passive smoking, socio-economic status education, occupation), neighborhood socio-economic status

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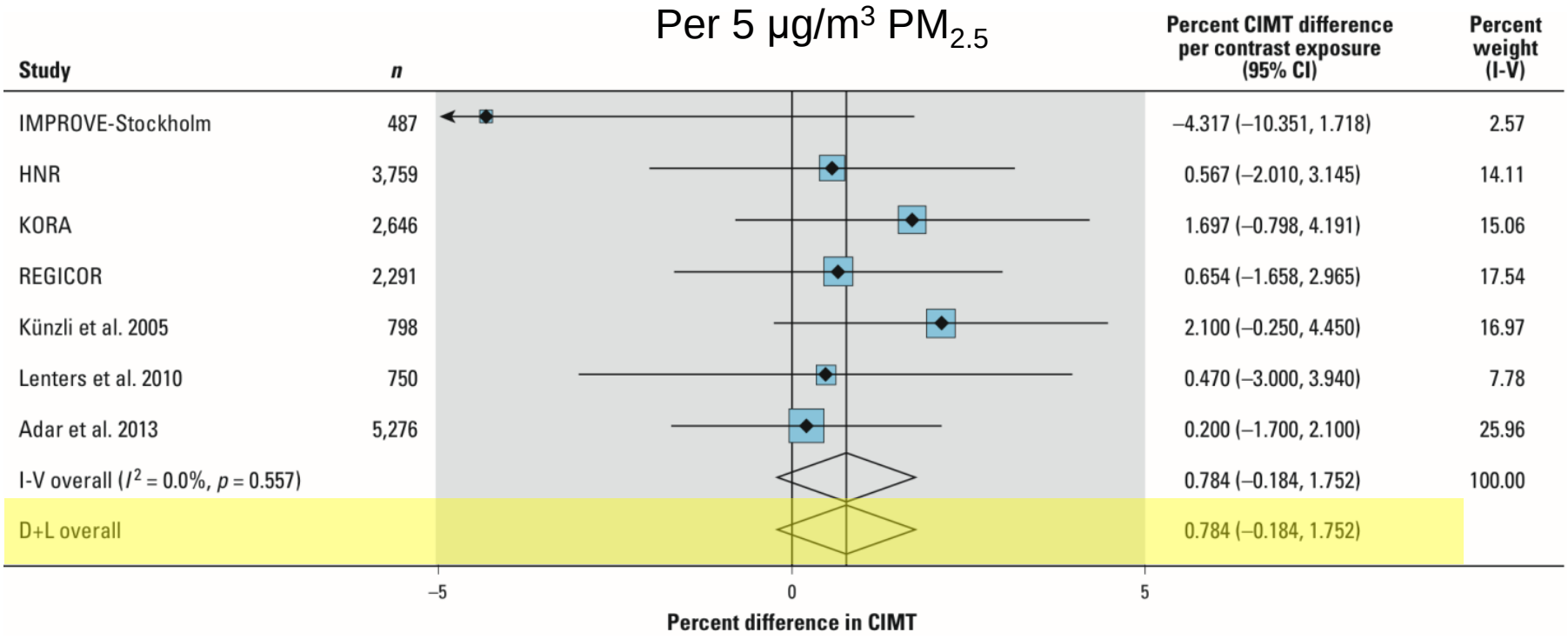
PM2.5 and Subclinical atherosclerosis
Perez et al. EHP 2015

Per 5 μg/m^3 $PM_{2.5}$



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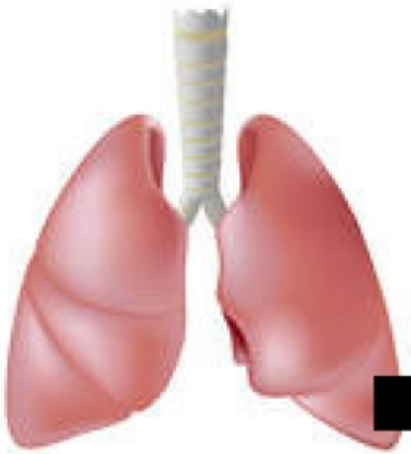
Air pollution and the brain

The Lung-Brain Connection

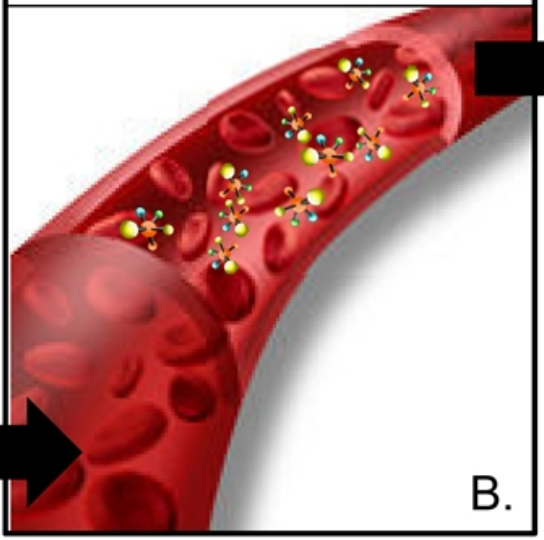
LUNG → BLOOD → BRAIN

Air Pollution Inhalation: Pulmonary Pathology



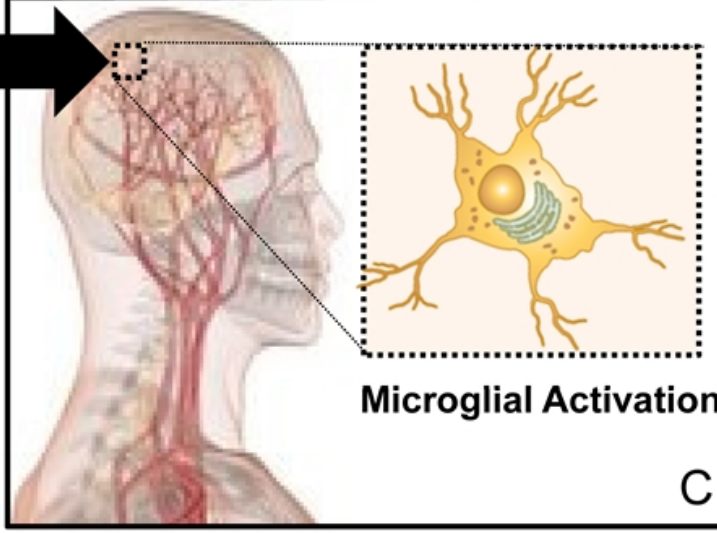
A.

Blood Circulation: Secondary & Tertiary Products



B.

Immediate & Persistent CNS Responders: Microglia



Microglial Activation

C.

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Long-term exposure to traffic-related particulate matter impairs cognitive function in the elderly ☆

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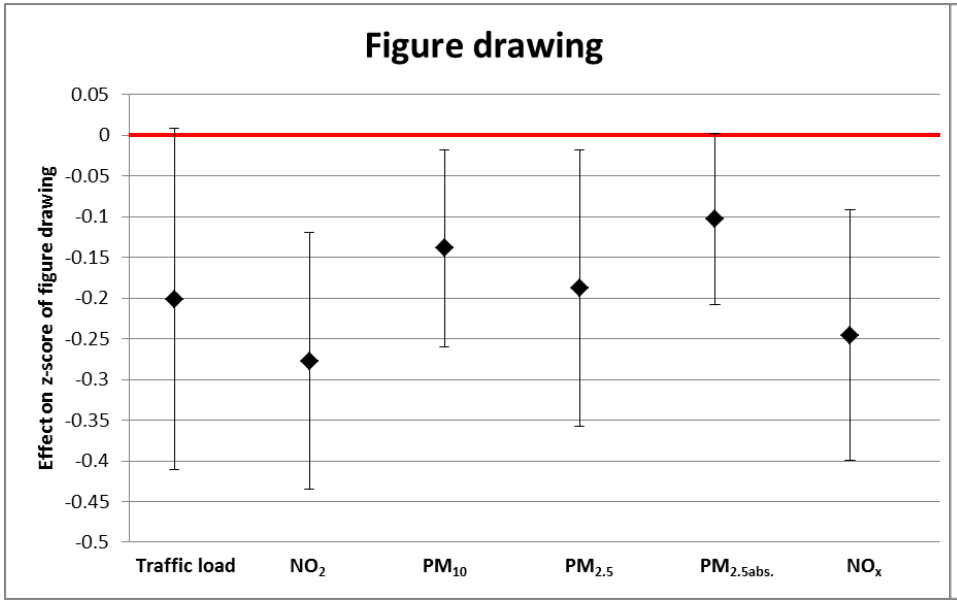
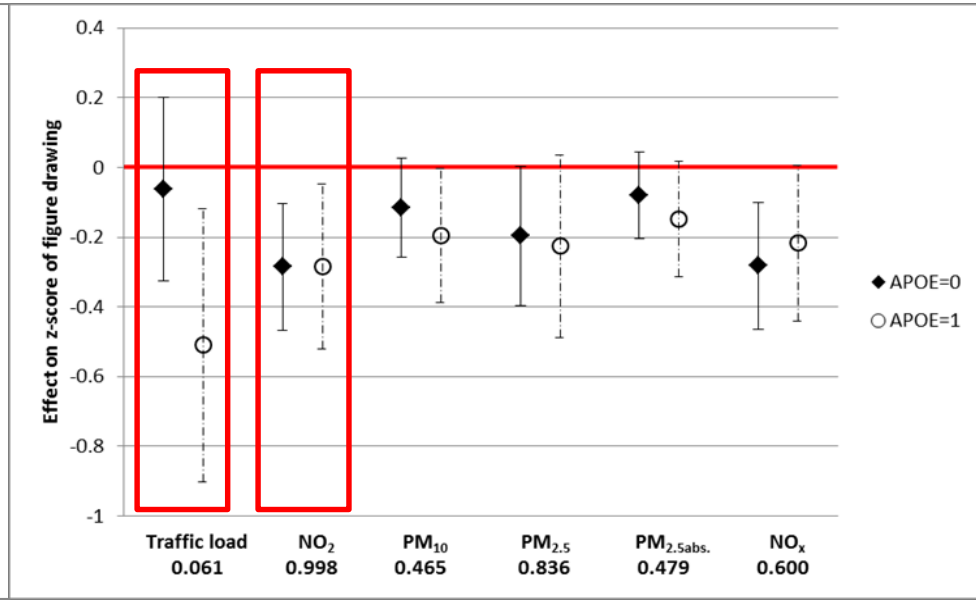
ABSTRACT

Animal studies have suggested that fine particulate matter (PM) can translocate from the upper respiratory tract to the brain and cause brain inflammation. Brain inflammation is involved in the pathogenesis of neurodegenerative diseases. Hypothesizing therefore that long-term exposure to fine PM might contribute to the development of Alzheimer's disease (AD), the objective of this study was to investigate the association between exposure to fine PM and mild cognitive impairment (MCI) which is associated with a high risk of progression to AD. A study group of 399 women aged 68–79 years who lived for more than 20 years at the same residential address has been assessed for long-term exposure to PM and tested for MCI. The exposure assessment comprised background concentration of PM_{10} and traffic-related PM indicated by the distance of the residential address to the next busy road. The women were assessed for MCI by a battery of several neuropsychological tests and their odor identification ability. Consistent effects of traffic-related air pollution exposure on test performances including a dose–response relation were found. The associations were adjusted for potential confounders using regression analysis. These results indicate that chronic exposure to traffic-related PM may be involved in the pathogenesis of AD.

Association between mild cognitive impairment and exposure to air pollution

Schikowski et al. Environ Res, 2015

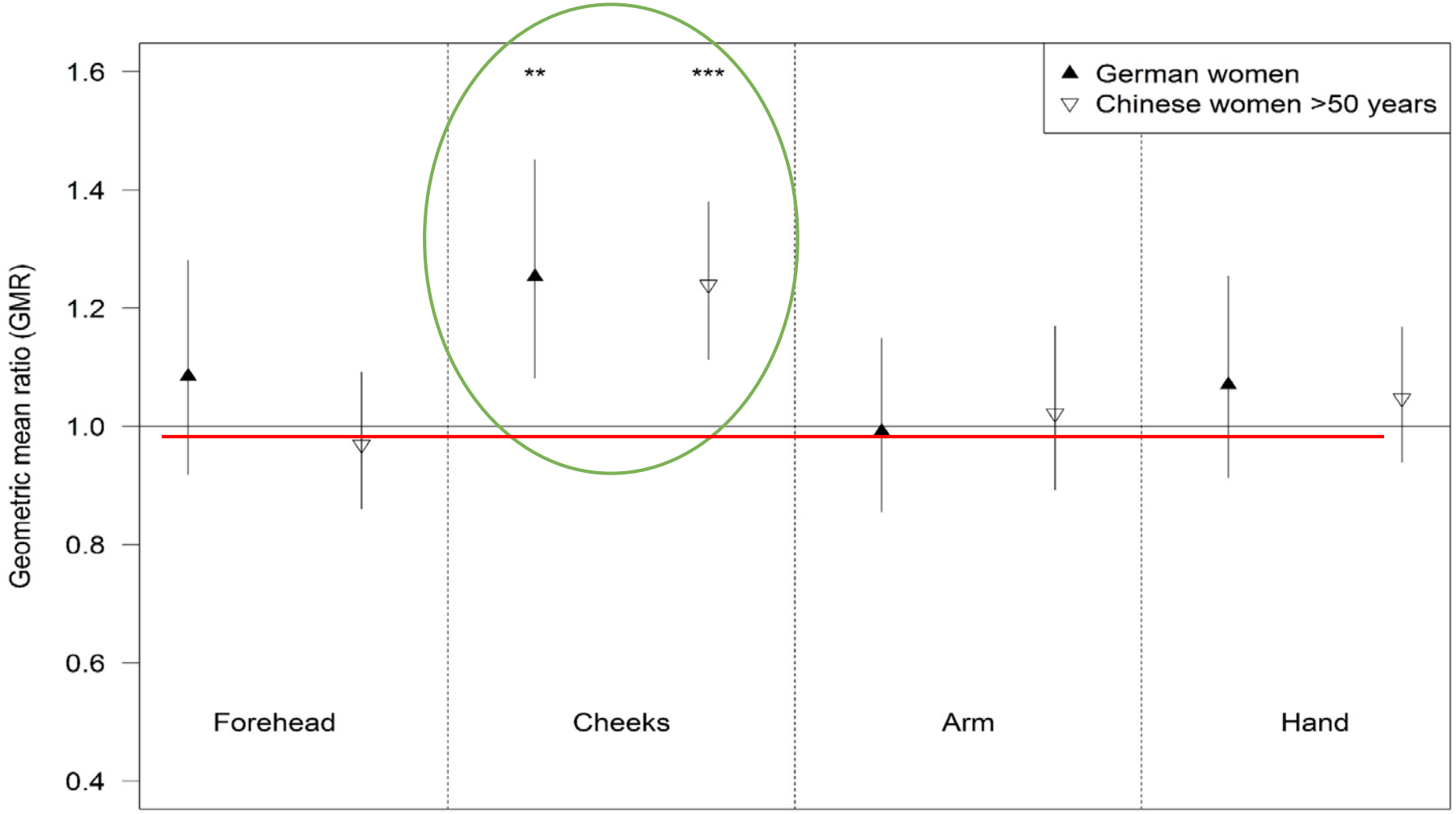




Air pollution and the skin

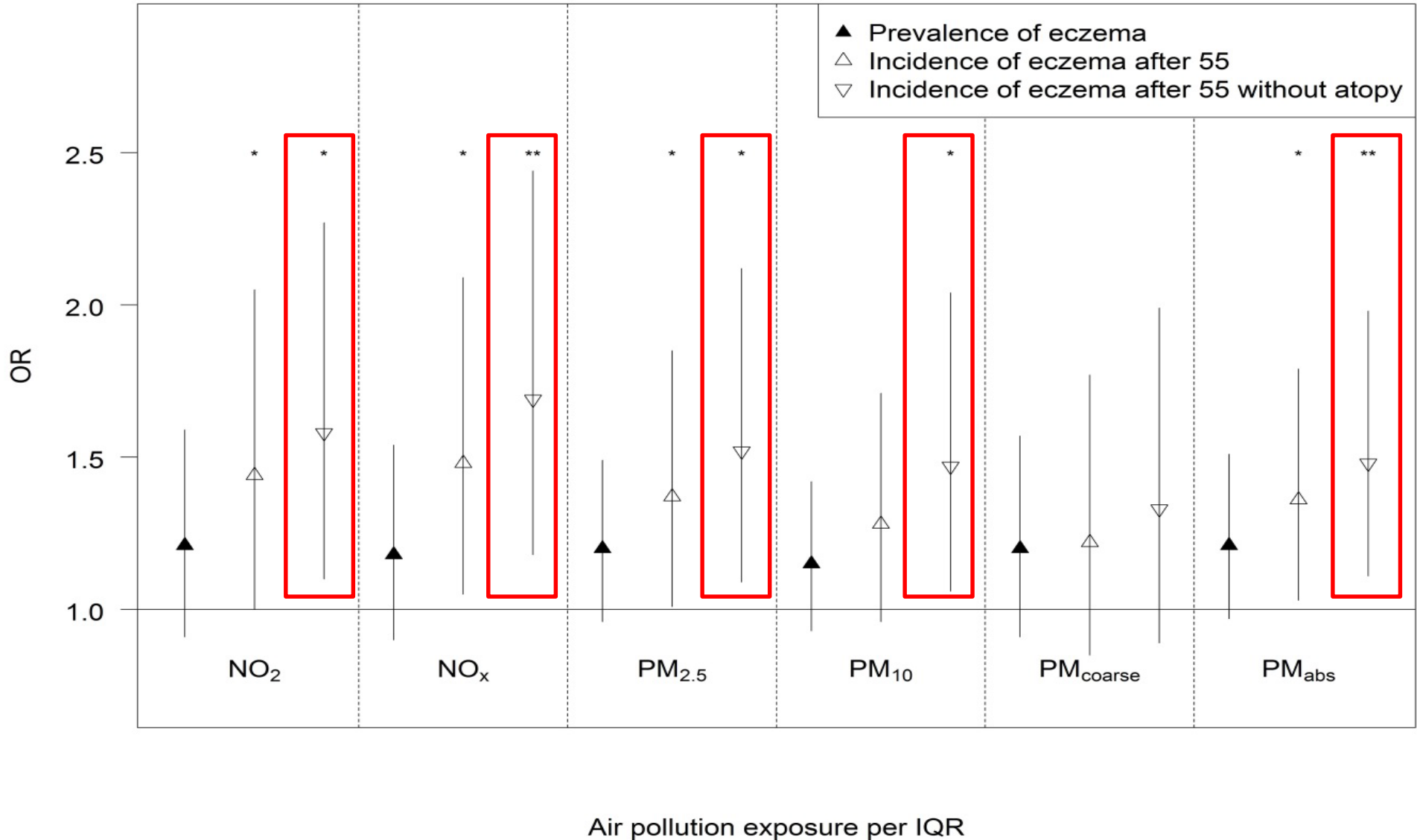
Association between an increase of 10 µg/m³ in NO_2 and pigment spot development

Hüls A et al. J Invest Dermatol, 2016



Association of air pollution and incidence of eczema

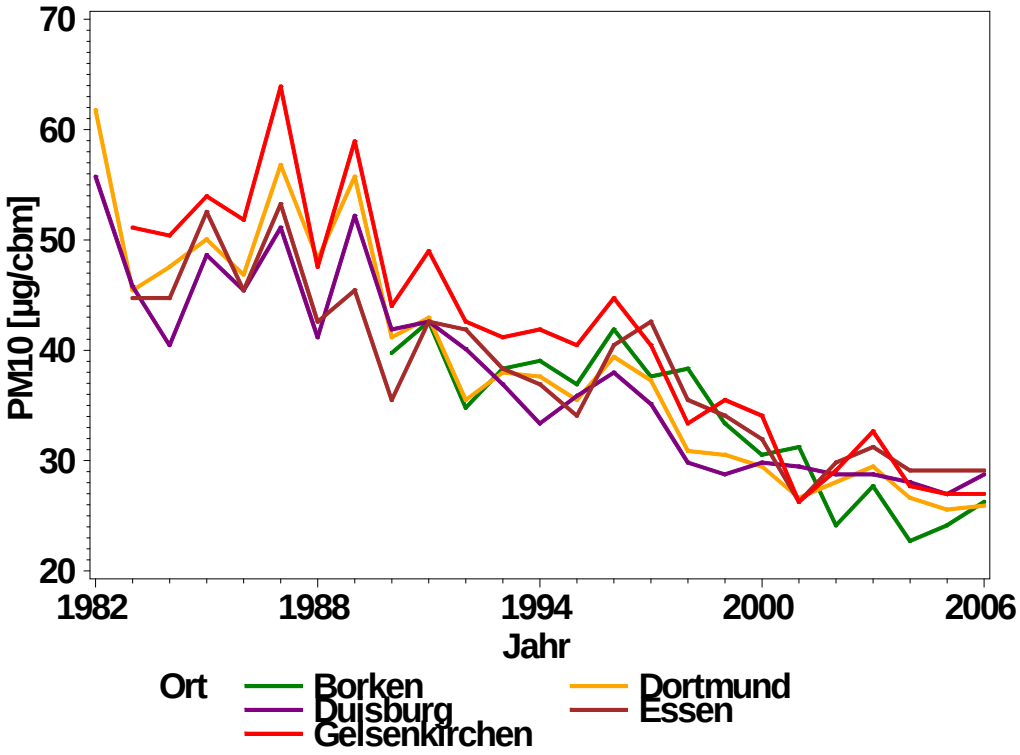
Schnass et al. IJHEH*2018*



Global Challenges and Opportunities

Air pollution in the Ruhr area in 1980s

Global Challenges and Opportunities

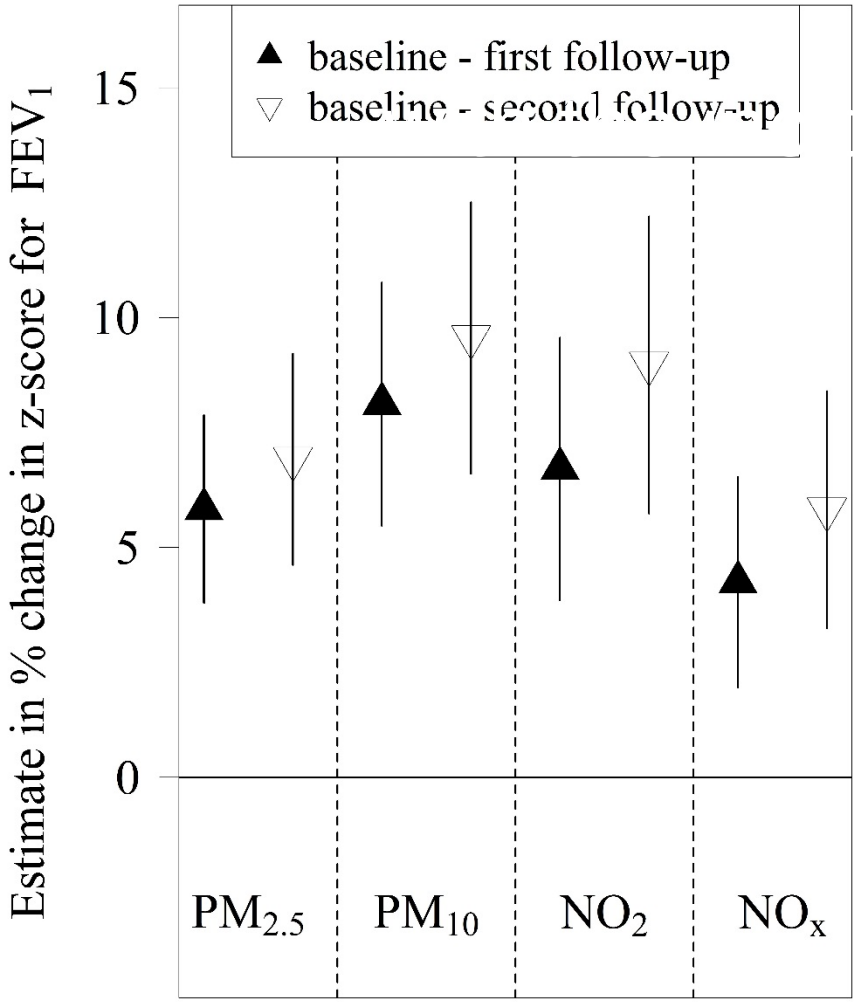


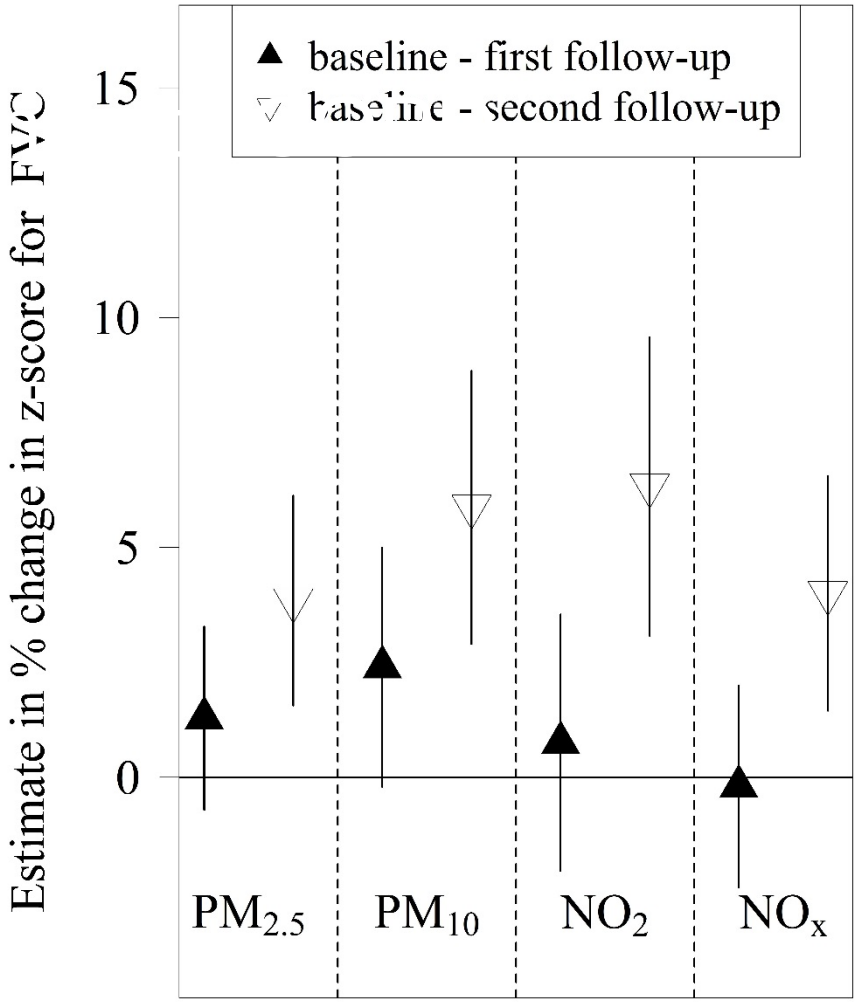
- 1987 Introduction of the Clean Air Plans
- Decrease in heating with fossil fuels mainly coal
- Closure of coal mines
- Filter introduction to high chimney stacks

Air pollution levels nowdays

Relative Improvement of lung function after reduction of air pollution in SALIA

Hüls et al. ERJ *2019*





Air pollution- a global problem!

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