JRC's Activities on Indoor Air Quality- Future Needs and Challenges

Dimitris Kotzias

European Commission-Joint Research Centre

Institute for Health & Consumer Protection

Physical & Chemical Exposure Unit

Ispra, ITALY

IAQ-activities in JRC

INDEX (Indoor exposure limits for priority pollutants in the EU)

THADE (Towards healthy air in dwellings in Europe)

EXPOLIS (Air pollution exposure distributions of adult urban populations in Europe)

BUMA (Prioritization of building materials as indoor pollution sources)

ETS-Research to support the Commission's strategy

AIRMEX (Indoor air monitoring and exposure assessment)

Effects of indoor air priority compounds and mixtures on cells

Exposure modeling and physiology-based pharmaco-kinetic/dynamic modeling

European Collaborative Action (ECA) on

"Urban Air, Indoor Environment and Human Exposure"

Prioritization of chemical substances for indoor spaces

High priority chemicals

- ***Formaldehyde, Nitrogen Dioxide, Carbon Monoxide, Benzene, and Naphthalene***

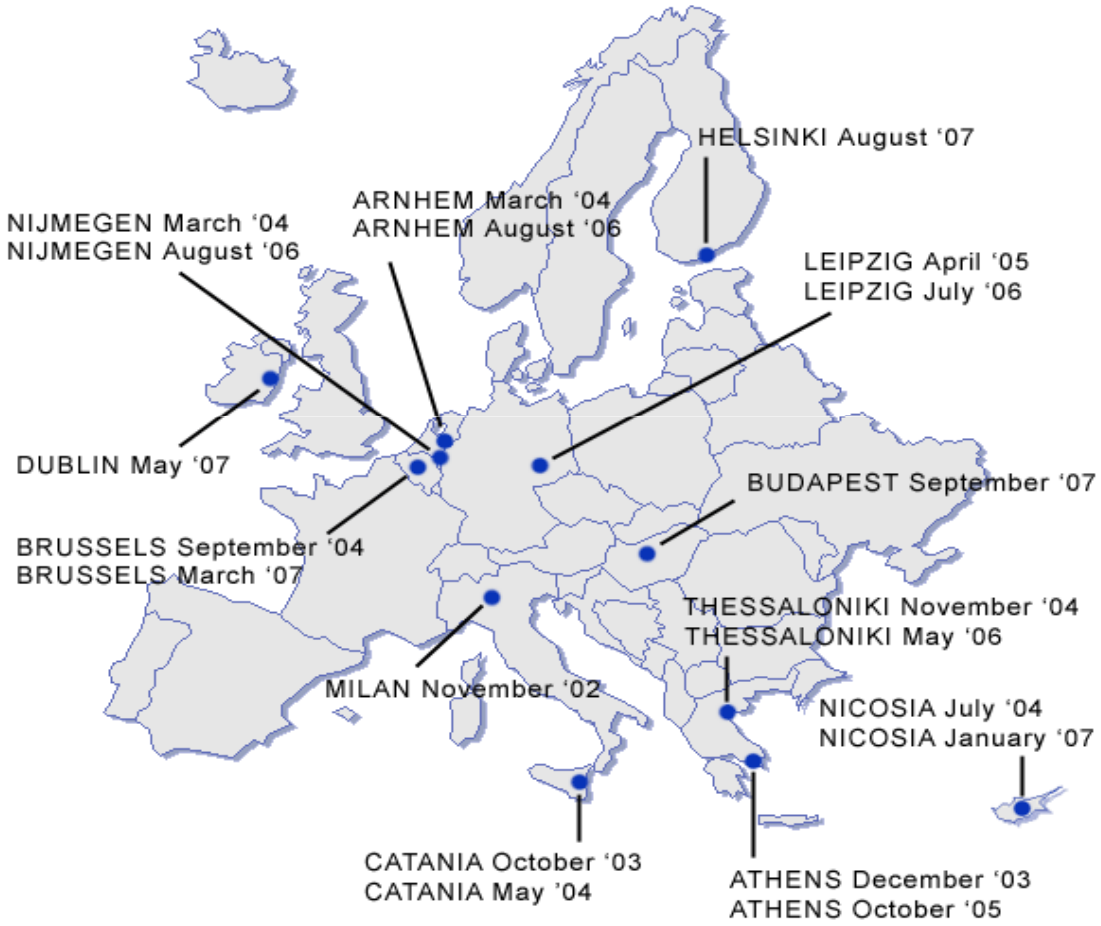
Second priority chemicals

- ***Acetaldehyde, Styrene, Toluene and Xylenes***

Additional chemicals of interest

- ***Ammonia, delta-Limonene, and alpha-Pinene***

AIRMEX Project: campaigns' map



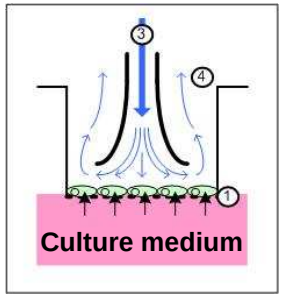
Benzene/AIRMEX

25% of the outdoor concentrations, **30%** of the indoor concentrations, and **40%** of the personal exposure concentrations measured exceeded the limit value of 5 ug/m3.

Combined exposure to benzene/toluene

Gas mixture (3)

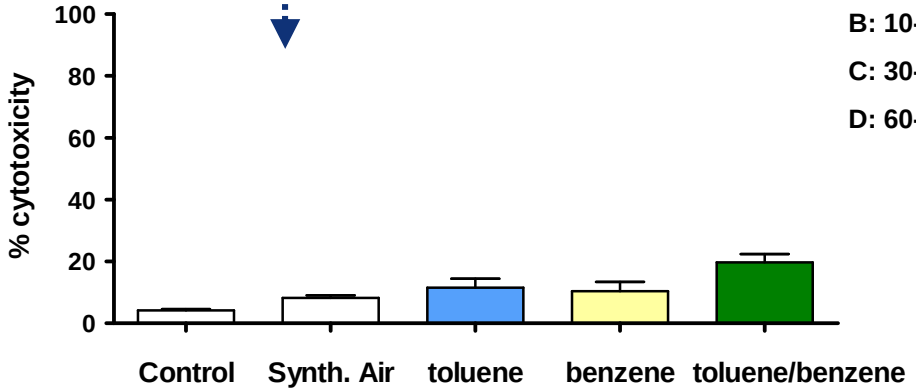
Lung cells (1) in air lifted *in vitro* exposure module (4)



1h Exposure

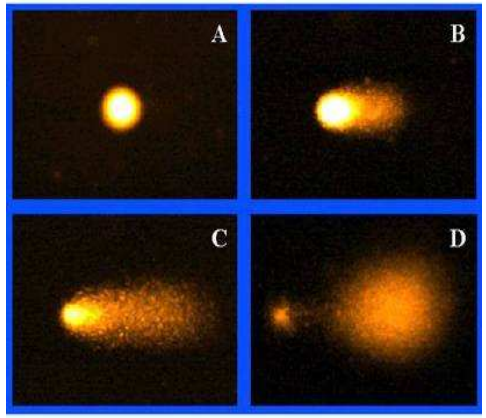
LDH Assay:

Cytotoxicity (24h)



Comet Assay:

- DNA damage (0h)
- DNA repair (3, 24h)

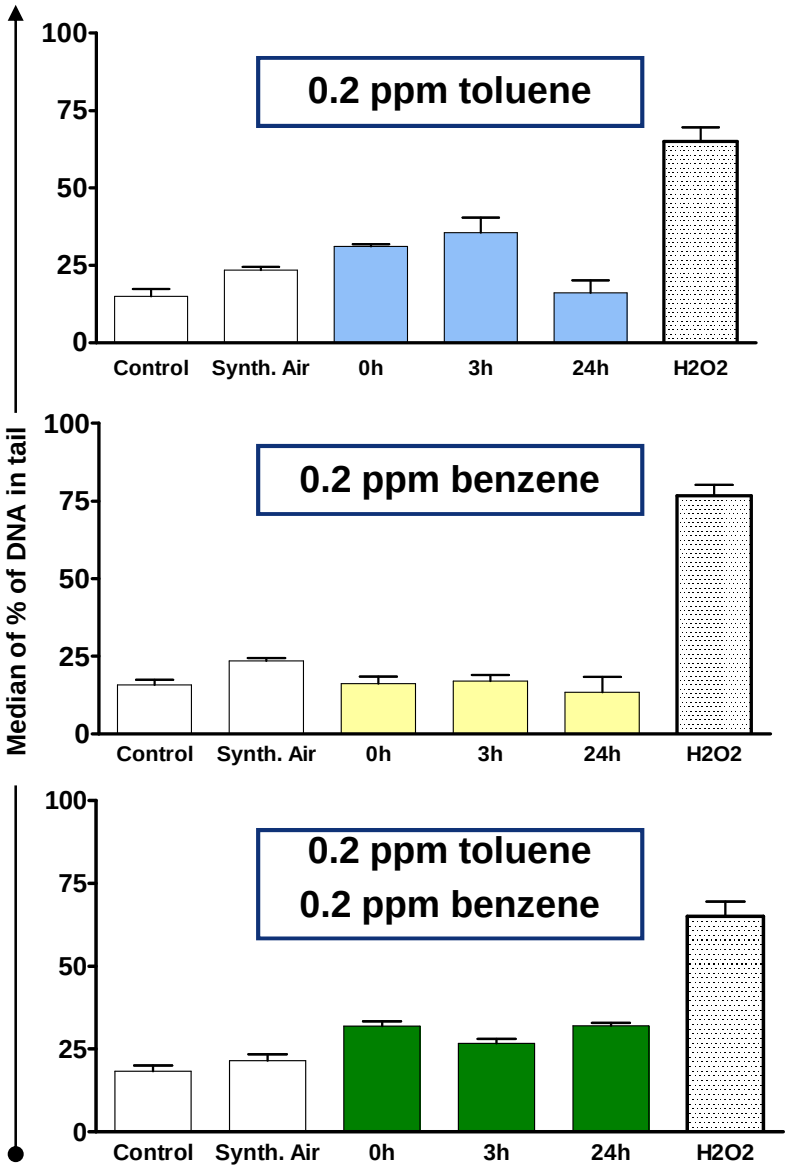


A: 0-10% damage

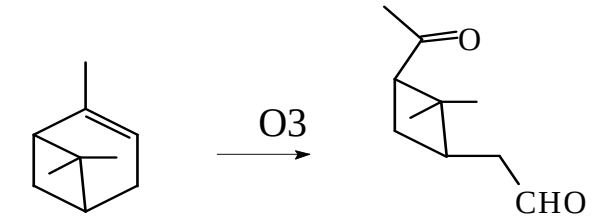
B: 10-30% damage

C: 30-60% damage

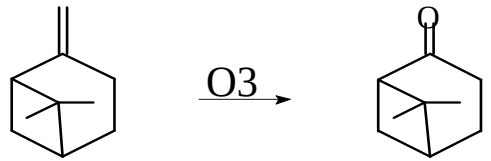
D: 60-90% damage



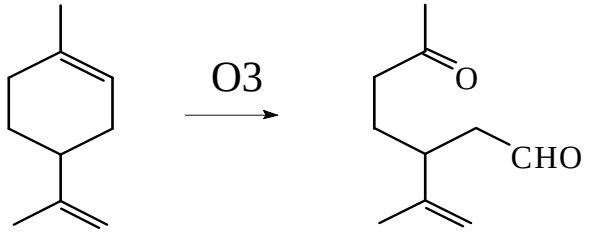
F. PARISELLI, M.G. SACCO, D. REMBGES – unpublished results -



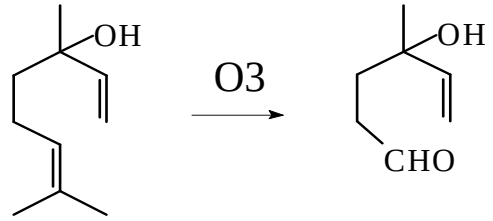
α -Pinene Pinonaldehyde



β -Pinene Nopinone



Limonene Endolim



Linalool Lactol

Weschler et al., 2000; Wolkoff et al., 1997; A. Calogirou and D.Kotzias, 1995

Concluding remarks/Outlook

-Environmental health effects: significant part of the total burden of disease-According to WHO 25-30% of this burden in developed countries can be attributed to environmental factors. ***On the basis of the information available right now the contribution of bad indoor air quality to the total burden of disease cannot be quantified with a high degree of certainty***.

-Exposure to single compounds does not reflect real health risks. Future work should focus on ***combined exposure to chemical mixtures (cocktail effect) at environmentally relevant concentrations and to exposure to chemicals and physical agents (e.g. noise).***

Concluding remarks/Outlook (cont.)

-Toxicological studies based on ***chronic low dose exposure*** would provide more in-depth information on possible long term effects of air contaminants at ***concentrations typical for indoor environments***.

-European projects combining ***epidemiological, chemical, biological studies*** could provide the knowledge needed to assess the risk and evaluate the impact of indoor air pollutants on human health.

Thank you for your attention!