Title *

BIOLOGICALLY REACTIVE CONSTITUENTS OF COMBUSTION-DERIVED PARTICULATE MATTER: Pro-inflammatory effects in lung epithelial and vascular endothelial cells.

Abstract *

Biological effects of combustion particles such as diesel exhaust (DEP) and wood smoke (WSP) has been attributed to soluble organic chemicals adhered to the particle surface. However, the biologically reactive substances remain to be identified.

Organic compounds were extracted and fractionated according to polarity from DEP (MAPCEL soot and NIST SRM 2975) and WSP and chemically characterized Extracted fractions were tested for cytotoxicity and pro-inflammatory effects (gene expression by qPCR and qPCR-array) in human lung epithelial cells lines (BEAS-2B, H292). MAPCEL extracts was also tested in HMEC-1 microvasculature endothelial cells and primary human endothelial cells. The role of the Ah-receptor (AhR) and redox responses was explored by inhibitor (CH223191) and antioxidant (NAC) treatment.

Only extracts of DEPs induced pro-inflammatory genes in BEAS-2B cells. The lipophilic fractions of MAPCEL, which contained the majority of PAHs, induced up-regulation of pro-inflammatory genes accompanied by increased expression of CYP1B1 and HO1. By contrast, the most hydrophilic fraction of SRM stimulated CXCL8 in BEAS-2 B cells in absence of effects on CYP1B1 and HO1.

The most lipophilic fractions of MAPCEL also induced expression several proinflammatory genes in endothelial cells, with primary cells being considerably more sensitive than BEAS-2B and HMEC-1. Moreover, the pro-inflammatory responses were accompanied by increased expression of CYP1A1/1B1, and attenuated by AhR-inhibitor and antioxidant treatment.

The results show that different constituents may contribute to the biological effects of combustion particles, but that the majority of effects are due to lipophilic compounds and points towards a central role of AhR-activating compounds.

Permission to publish *

☑ Check this box to give us permission to publish your abstract on a flash drive/USB Stick for distribution to all delegates if it is accepted for presentation

Affiliations and Authors *

Author Information
Johan Øvrevik (Presenting)

Affiliations
Norwegian Institute of Public Health, Oslo, Norway

Author Information
Bendik C. Brinchmann

Affiliations
Norwegian Institute of Public Health, Oslo, Norway

Author Information
Tonje Skuland

Affiliations
Norwegian Institute of Public Health, Oslo, Norway

Author Information
Alena Kubatova

Affiliations
University of North Dakota, Grand Forks, USA

Author Information
Klara Ondrusova

Affiliations
University of North Dakota, Grand Forks, USA

Author Information
Marit Låg

Affiliations
Norwegian Institute of Public Health, Oslo, Norway

Author Information
Magne Refsnes

Affiliations
Norwegian Institute of Public Health, Oslo, Norway

Author Information
Per E. Schwarze

Affiliations
Norwegian Institute of Public Health, Oslo, Norway

Author Information
Jørn A. Holme

Affiliations
Norwegian Institute of Public Health, Oslo, Norway