Effects of filter ventilation and activated carbon filters on cig. smoke constituent uptake - Presentation W Röper

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Expected action Info
Effects of filter ventilation and activated carbon filters on cigarette smoke constituent uptake in UK smokers – some biomarker data

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What is claimed…

• “Surrogate exposure indicators suggest that filter ventilation does not lead to any reduction in exposure…”
  W E Stephens 2007, Tobacco Control 16

• “The use of charcoal in cigarette filters is an example of a design change with an impact that is not well characterized by normalization to nicotine.” [using ISO smoking data]
Study objectives

• To evaluate the smoke uptake by UK regular smokers of factory manufactured cigarettes (FMCs) with 8~10 mg & 5~7 mg ISO ‘tar’, resp.
• To study the effects of switching to carbon filtered test cigarettes with comparable tar yields on smoke uptake in a sub set of these smokers.

The biomarker study...

Imperial work from 2006/07, in collaboration with COVANCE, UK
• Clinical out-patient study in two parts
• Part 1: cross-sectional, males & females
  – 581 UK smokers of FMCs 8~10 mg ISO tar
  – 207 UK smokers of FMCs 5~7 mg ISO tar
  – ‘Smoking diary’, self-reported daily consumption
  – One 24-hour-urine and blood collected
  – Urinary biomarkers corrected for creatinine excr.
  – Biomarker data not corrected for daily cigarette consumption
The biomarker study...

• Part 2: brand-switching for three weeks to carbon filtered test cigarettes (10 & 6 mg ISO tar, resp.)
  – 54 & 51, resp., smokers recruited from part 1 groups, ad libitum smoking, free cigarette supply
  – Recruitment independent of part 1 results (first come, first served), target number 50, minimum
  – 24-hour-urine and blood collected after three weeks of switching
  – Smoking diary and data evaluation as in part 1

Biomarkers analysed...

• Nicotine + 5 in urine (→ nicotine uptake)
• COHb in blood (→ CO uptake)
• NNAL in urine (→ NNK uptake)
• 1-OHP in urine (→ PAH, B[a]P uptake)
• Thiocyanate in blood (→ HCN uptake)
• Acetonitrile in blood
• SPMA in urine (→ benzene uptake)
• HPMA in urine (→ acrolein uptake)
• MHBMA & DHBMA in urine (→ 1,3 butadiene uptake).

• All biomarker levels normalised (FMC 8~10 mg = 1) for the purpose of this presentation
Effects of filter ventilation & carbon filters (FMCs & test cigarettes) – Full data set

Biomarkers of exposure to selected GVP and particulate compounds

Effect of filter ventilation – FMC products

Biomarkers of exposure to selected GVP and particulate compounds (all subjects)
Effects of filter ventilation – carbon filters

Biomarkers of exposure to selected GVP and particulate compounds

Effects of filter ventilation & carbon filters (FMCs & test cigarettes) – Full data set

Biomarkers of exposure to selected GVP and particulate compounds

Carbon effect
**Effect of carbon - ~ 10 mg products**

Biomarkers of exposure to selected GVP and particulate compounds

![Bar chart showing biomarkers relative to internal dose for different chemical compounds at 10 mg of carbon exposure.]

**Effect of carbon – ~ 6 mg products**

Biomarkers of exposure to selected GVP and particulate compounds

![Bar chart showing biomarkers relative to internal dose for different chemical compounds at 6 mg of carbon exposure.]

- Thiocyanate (HCN)
- SPMA (benzene)
- HPMA (acrolein) biomarker
- N equiv (nicotine)
- 1-OHP (B[a]P)
Conclusions

Data from this study suggest that, under human smoking conditions,

• Filter ventilation is the most effective tool to reduce smoke constituent uptake
• Carbon filters are an effective tool to even further reduce smokers’ exposure to vapour phase compounds.