Third-hand smoking: indoor measurements of concentration and sizes of cigarette smoke particles after resuspension

In a previous study of ‘secondhand’ cigarette smoke, we showed that 75% of the particles added to indoor air were of ultrafine sizes and had a half-life in air of 15 minutes at 25°C. These particles after their deposition on household surfaces could be later put back in suspension and constitute a toxic ‘thirdhand’ smoke which has not, as yet, been documented through quantitative data. Consequently, we undertook direct measurements of the concentration and sizes of smoke particles after their deposition and resuspension in a closed room.

A smoking device burned 10 cigarettes in 30 minutes in a non-ventilated furnished room that was then kept closed. On the next

![Diagram showing sources of Official Information Act inquiries to the Ministry of Health about tobacco control 2005-2009 (n=129).](image_url)

**Figure 1** Sources of Official Information Act inquiries to the Ministry of Health about tobacco control 2005-2009 (n=129).

undertaken to determine the associations of requestors with the tobacco industry.

There were 129 requests in total. Charges totalled over NZ$13,000. They were in accordance with official guidelines. They included staff time for searching for information, and photocopying. Figure 1 shows that most (84%) of the requests were from tobacco industry related sources. They were a public relations company whose managing director was previously director of public relations, Communications and Corporate and Regulatory Affairs for British American Tobacco (BAT) New Zealand; law firms who have represented tobacco companies and tobacco companies.

Topic areas included the 2006 review of the tobacco packaging, labelling and display provisions of the Smoke-free Environments Amendment Act (59% of requests); a review of point-of-sale tobacco product displays (11%); provisions of the existing act (10%); tobacco control spending (8%); tobacco control research (5%); the industry (4%); reduced harm products (2%); and personal rights (2%). Two requests solicited information about more than one topic.

Tobacco industry related sources asked for copies of presentations, tobacco control service purchase agreements, contracts and information ‘including, but not limited to papers, minutes, reports, briefings, memos and correspondence (including emails) caught by the wording’. They included the legal obligation to provide information within 20 working days (n=107). Requests increased from three in 2005 to 79 in 2006 when the review of the Smoke-free Environments Amendment Act was under way. During this time, the lawyers, Philips Fox, sent one person 67 letters which differed only in the name of the organisation they sought information about. They also sent identical requests to six different people. With regard to tobacco control spending, 10 of 13 requests were from industry-related sources. Two asked for details about government funded delegates to international tobacco control conferences.

The majority of public requests for information about tobacco control and tobacco control expenditure were from the industry. The work of public health officials was disrupted at a critical juncture in tobacco control action by an influx of repetitive and time consuming OIA requests from the tobacco industry. Each required assessment to determine if the information existed; if the request was frivolous or vexatious; if the information could be released; and to provide quotes for services since only a limited amount of photocopying and time for searching is free.

Tobacco companies portray themselves as socially responsible corporate citizens. Yet they abuse legal avenues designed to protect the public’s right to access to official information. This should be included in a campaign exposing the activities of the tobacco industry to support achieving the New Zealand tobacco control workforce’s vision of a tobacco free society by 2020.

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REFERENCES


day, for particle resuspension, we mobilised the dust on furniture, clothes and surfaces by wiping and shaking and created even more turbulence with a ventilator.

An impactor (ELPI) measured the particle sizes (between 0.28 μm and 10 μm) and concentration in the air, 60 cm above the floor:

- on the first day before and after the cigarettes were smoked (secondhand smoke) then 4 hours later.
- 24 hours later, before and after resuspension manoeuvres (thirdhand smoke).

Median diameter, concentration in number and mass of particles were respectively:

- 0.18 μm, 1.31×10^6 ml⁻¹ and 15.4 mg.m⁻³ after smoking
- 0.30 μm, 0.93×10^4 ml⁻¹ and 0.62 mg.m⁻³ 4 hours later.
- 0.07 μm, 1.66×10³ ml⁻¹ and 0.05 mg.m⁻³ 1 day later.
- 0.15 μm, 0.92×10⁴ ml⁻¹ and 0.50 mg.m⁻³ 1 day later after resuspension manoeuvres.

This showed that after cigarette smoking:

- the airborne particles were of ultraline sizes.
- their concentration was divided by 100 in the first 4 hours and again by 100 in the following 24 hours. After resuspension, the concentration was multiplied by 100, going back to that observed 4 hours after smoking. This rise can only be attributed to particles smaller than 0.3 μm since other measurements made after resuspension manoeuvres without previous smoking only increased the concentration of particles over 0.3 μm of size.

These quantitative data support the hypothesis of a resuspension from the cigarette smoke surface contamination. However, this airborne contamination through resuspension remains much lower (100 times) than that of secondhand smoke. The rest of the aerosol mass initially produced by cigarette smoke could be firmly attached either to surfaces, leading to ingestion hazards and dermal transfer or to household dust and be inhaled with it. ¹ ²

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SPECIAL COMMUNICATION

Tobacco control haiku

“You smell
But I stink”

Ralph Sutton

References


What this paper adds

This study is the first to investigate the hypothesised resuspension of deposited particles of tobacco smoke (‘thirdhand smoke’).