

Commentary on Farsalinos et al. (2015): E-cigarettes do not expose users to dangerous levels of aldehydes

Most smokers switching to e-cigarettes (e-cigs) do so to reduce the risks smoking poses to their health. E-cigs do not yet match cigarettes in providing smokers smoothly and easily with what they want, and so the switch requires some effort and adjustment. Many smokers are trying e-cigs, but would abandon them and return to smoking quickly if told that e-cigs are in fact no safer than cigarettes.

A few weeks ago, the media world-wide informed smokers that far from being safer than smoking, e-cigs deliver up to 10 times more carcinogens than cigarettes. This big-headline-worthy news came in two waves. The first wave followed a press release from Japan in November 2014 [1]. A Japanese researcher announced that during tests on a number of e-cig models, one product released 10 times more formaldehyde than cigarettes. The study has not yet been published, so no further details are available. However, the press release mentioned specifically that formaldehyde was released when the e-liquid was overheated.

In January 2015 a similar report was published as a research letter to the *New England Journal of Medicine* [2]. In this study, only negligible levels of formaldehyde were released at lower e-cig settings, similar to those found in previous studies [3]. However, when a third-generation e-cig (e-cig with variable power settings) was set to the maximum power and long puff duration, this generated levels of formaldehyde that, if inhaled in this way throughout the day, would exceed between 5 and 15 times the formaldehyde levels that smokers obtain from cigarettes.

Commentators pointed out that given the product specifications, it is likely that the *New England Journal of Medicine* study was measuring chemicals formed by thermal degradation during so-called dry puffs [4]. This poses no danger to either experienced or novice vapers, because dry puffs are aversive and are avoided rather than inhaled in repeated long drags.

The elegant study by Farsalinos and colleagues [5] has now documented that this was indeed the case. The alarm waves with a potential to trigger relapse to smoking in millions of e-cig users were generated by subjecting e-cig apparatus to conditions which human smokers do not use.

Most toasters have a setting which burns the toast to a crisp. The function of this setting presents one of the deeper mysteries of life, but it is there and you can burn your toast if you want to. Although burned toast contains carcinogen, it is highly unlikely that *New England Journal of Medicine* would publish a paper demonstrating this and warning people that toasts are carcinogenic.

This raises an intriguing question of how such studies get to see the light of day and receive so much attention. E-cigs are a disruptive technology which threatens sales of conventional tobacco products and sales of stop-smoking medications, as well as some of the established beliefs and positions in tobacco control. There seems to be a substantial appetite for news of e-cig dangers. Studies which can be interpreted in this way seem to have an easy progress to publication in prestigious medical journals even if they contain obvious flaws; journals tend to publish press releases which further exaggerate the findings; and some public health officials with anti-e-cig sentiments use such reports to warn smokers not to use e-cigs.

A large proportion of the scientific literature reports results that are later disproved and shown to be 'simply accurate measures of the prevailing bias' [6]. Science eventually corrects itself. In this area, however, by the time a correction comes along, shabby research interpretation and irresponsible press releases can generate real damage to the health of people thus misinformed. All credit to Dr Farsalinos for generating this scientific correction with such a breathtaking speed; and to *Addiction* for peer-reviewing and publishing this important information so quickly. There is good news here. The recent scares were without substance, and the general verdict that e-cigs are at least 95% safer than smoking remains solid. Smokers who cannot or do not want to stop smoking have a much safer alternative available. Media may prefer scary stories, but here is a piece of good news definitely worth covering.

Declaration of interests

I have provided consultancy for and received research funding from manufacturers of stop-smoking medications.

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