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Commentary on Farsalinos et al. (2015): E-cigarettes generate high levels of aldehydes only in 'dry puff' conditions

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There is a lively debate concerning the public health implications of electronic cigarettes (e-cigarettes) [1, 2]. All debate participants are aware of the ongoing global health catastrophe caused by combustible cigarette use; many also note the urgent need to determine empirically the extent to which e-cigarettes may reduce the burden of tobacco-related disease [2, 3]. In this context, we read with interest Farsalinos et al.'s (2015) report entitled: 'E-cigarettes generate high levels of aldehydes only in "dry puff" conditions'. This title suggests resolution regarding the oft-cited problem of e-cigarettes aldehyde emissions [4–7]. Unfortunately, our initial enthusiasm was replaced by frustration with the final text as it appears in Addiction, a peer-reviewed journal. Peer review is a hallmark of modern science, designed to protect the integrity of the scholarly record. Among the criteria assessed commonly during peer review are the requirements that the method be described sufficiently so as to allow replication, results and data analytical techniques are presented thoroughly, and conclusions are based on the results presented. Farsalinos et al.'s (2015) text does not meet these criteria [8].

Insufficient Method Description

The study involved measuring aldehyde yield for two e-cigarette devices under various operating conditions. Numerous details that are reported routinely for yield measurement, and that would be required for replication, are not presented. These details include the puffing parameters (e.g. puff volume, duration, interpuff interval) used to generate the aerosol, the means by which the puffs were executed, and whether these means accounted for added flow resistance and gas compliance of the smoke traps. Similarly, no mention is made of the settings of the adjustable air flow openings of the Kayfun Lite Plus e-cigarettes used in the study. Also, the report states that participants were instructed to execute four puffs of 4-sec duration spaced 30?sec apart, but provides no indication of how participants attained these use conditions or if they did so consistently. Furthermore, the method does not describe if condition order was randomized or whether study staff were blind to condition. One function of rigorous peer review is to correct omissions such as these.

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Incomplete Result Reporting

A key study outcome was participant-reported ‘unpleasant taste’ (p. 3) under various e-cigarette use conditions. The nature of these self-report data is not stated. There were four puffs during each condition and seven participants, resulting in 28 observable puffing events per condition, yet no descriptive statistics are provided for the outcomes of these events. The text is unclear whether, when a positive finding for a given condition is reported, all 28 puffs elicited an ‘unpleasant taste’ report, the majority of puffs elicited the report, or only one puff elicited the report. This non-reporting of results is puzzling, given that: ‘The reason for recruiting seven vapers was to assess the interindividual differences in detecting dry puffs’ (p. 2). Again, rigorous peer review can help to identify omissions such as these.

Unjustified Conclusions

The text contains broad, unsubstantiated claims reported as fact. For example, in the Discussion, the text notes without reference to data that: ‘Dry puffs are experienced by vapers infrequently and in specific situations. Most usually, they are associated with very low levels of liquid’ (p. 4). The text also quantifies, again without reference to data, the frequency of dry puffing: ‘All cases combined, vapers are exposed to dry puff conditions rarely (usually less than once daily)…’ (p. 4). Most importantly, the key conclusion of this study, that e-cigarettes as a group generate high levels of aldehydes only during dry puff conditions, is based upon a very limited set of devices and conditions and thus is a near-textbook example of the fallacy of composition: if A is X and B is X the conclusion that all members of the group to which A and B belong are all X is fallacious. Setting aside the tenuous ontological status of ‘dry puff’, establishing the notion that aldehydes are emitted in significant quantities only when an e-cigarette user detects an unpleasant taste would require a far greater evidence base than provided in this study. In fact, this study showed that a specific e-cigarette unit operating at 9 and 10?W using a custom-built (but unspecified) coil with a single wick is capable of producing an aerosol that contains aldehydes at high levels under some conditions, and the aerosol produced by those devices is aversive to seven participants under other conditions. Without knowing the topography parameters used to produce the aerosol in which aldehydes were measured, there is no indication that these two conditions are even the same. Peer review is intended to help limit conclusions that are not based upon data presented.

We are concerned that the extraordinary rapidity with which this particular manuscript was reviewed was a contributing factor in the issues raised here. That is, each Addiction Research Report provides the date of manuscript submission as well as the date of completion of initial review. The span between these two dates for this paper was 11 days, whereas the mean for every other Research Report published in Vol. 110 (2015) of Addiction (issues 1–6, excluding Supplement 1) was 87 days, with a range of 42–342 days (n?=? 61; standard deviation?=?46). How was this paper, and no other in 2015, ushered through the review process so quickly? Interestingly, Addiction \Editor-in-Chief Dr Robert West has asserted publically that ‘E-cigarettes are about as safe as you can get… E-cigarettes are probably about as safe as drinking coffee’ [9]. These statements suggest a potential conflict of conscience [10] in the handling of a flawed report that reinforces Dr

West's professed faith in e-cigarette safety, although of course we do not know the extent to which that potential conflict played a role in this case. We ask that Addiction consider addressing conflicts of conscience and their management in future editions of its ethical guidelines [11] and that it reaffirm its commitment to the scientific enterprise by upholding rigorous peer review practices, especially in cases where work is produced by industry-funded authors.

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