Chemical analysis of fresh and aged Australian e-cigarette liquids

To the Editor: In their recent article, Larcombe and colleagues[1] describe the analysis of 65 electronic cigarette fluid samples. The gas chromatography mass spectrometry method, as described in the Supporting Information, used "the ratio between the peak area corresponding to the fragment with the highest signal-to-noise ratio … and the peak area of the internal standard" for quantification.[1] Direct comparison of the peaks for the analyte of interest and the internal standard does not take into account differences in response factor and/or ionisation efficiency for the different molecules. For accurate quantification, individual calibration curves should be prepared for all molecules of interest.

If the authors prepared calibration curves but did not include this information, then the methods section should be modified to reflect this, and additional validation should be provided for all analytes, including limits of detection, limits of quantification, and coefficients of determination for all curves. In addition, all samples should be analysed in triplicate and a standard deviation should be provided to further validate the analysis.

Larcombe et al[1] note in their article that the determined concentrations of benzaldehyde, menthol, 2-chlorophenol and benzyl alcohol exceed inhalational LC_{50} (the median lethal concentrations that kill 50% of a test animal population) values for these compounds. This assertion, as written, is incorrect and should have been reworded to a less confident statement. As the authors themselves acknowledge, the e-liquid concentration and the inhalational LC_{50} values are not comparable. Furthermore, the authors did not provide the LC_{50} values they were using nor a citation to their source for these values.

For a more accurate comparison, the volume of e-liquid vaporised per litre of inhaled vapour would need to be calculated. Assuming the consumption of 9.47 mg of e-liquid per puff and a puff volume of 55 mL,[2] the maximum concentration observed for both benzaldehyde (2.58 mg/m^3) and menthol (30.5 mg/m^3) would fall below their respective derived no-effect level (DNEL) values of 9.8 mg/m^3 and 132 mg/m^3.[3,4] We were unable to locate an inhalational DNEL or LC_{50} value for 2-chlorophenol. The maximum concentration for benzyl alcohol (251 mg/m^3) would exceed its DNEL value of 110 mg/m^3 for acute exposure.[5] This, along with the high prevalence of benzyl alcohol in e-liquid samples, requires further investigation.

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1 Larcombe A, Allard S, Pringle P, et al. Chemical analysis of fresh and aged Australian e-cigarette liquids. *Med J Aust* 2022; 216: 27-32. https://www.mja.com.au/journal/2022/216/1/chemical-analysis-fresh-and-aged-australian-e-cigarette-liquids
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