

## Chemical analysis of fresh and aged Australian e-cigarette liquids

TO THE EDITOR: Larcombe and colleagues<sup>1</sup> report a range of potentially harmful chemicals in locally purchased e-liquids, highlighting the need for rigorous Australian standards and regulation of vaping liquids. However, the biological and clinical significance of these findings is unclear.

Simply detecting the presence of a chemical with a potential risk has little meaning. The risk to human health depends on the level of exposure, under a fundamental principle of toxicology that “the dose makes the poison”.<sup>2</sup> Apart from flavouring chemicals, most of the chemicals in the e-liquids were at low or very low levels. Low doses of chemicals are ubiquitous in the environment, including arsenic in tap water and acrylamide in coffee.<sup>3</sup> These cause little harm.

To properly assess risk, the dose should be referenced to some standard, such as an established occupational or environmental exposure standard. No such comparison was made; therefore, no conclusions should be drawn.

Nicotine was found at trace levels in six out of 65 samples. The authors imply that this has “implications for health and addiction”. However, nicotine was

detected at a dose of 0.29 mg/L, which is around 1000 times lower than the lowest concentration of nicotine (3 mg/mL) in commercial e-liquids and is not of any biological or clinical significance.

Furthermore, as the authors note, predicting the risk to health should be based on the analysis of vapour rather than e-liquid. This is a far more useful guide to the exposure of chemicals to the user.

Most importantly, any risk should be compared with the risk from smoking. As frequent vaping is largely confined to smokers, minor harm from vaping is justified if it allows switching from the far more harmful behaviour of smoking.<sup>4</sup>

A Public Health England review found that most toxins responsible for health damage from smoking are absent in vapour and those that are present are at much lower levels (below 5% and mostly below 1%) than in tobacco smoke.<sup>5</sup>

It is disappointing that the authors declare no relevant disclosures when three of the four funding organisations have established antivaping positions (the Minderoo Foundation, Lung Foundation Australia, Cancer Council Western Australia). This should have been declared in the competing interests statement.

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