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Letter
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Letter

Comment on Farsalinos et al., "Evaluation of Electronic Cigarette Liquids and Aerosol for the Presence of Selected Inhalation Toxins"

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We read with great interest the recent publication, *Evaluation of electronic cigarette liquids and aerosol for the presence of selected inhalation toxins*.[1] We are particularly grateful to the authors for recognizing the high rate of chronic obstructive pulmonary disease and of bronchiolitis, specifically, in smokers and for measuring the concentrations of diacetyl (DA) and acetyl propionyl (AP, also known as 2,3-pentanedione) in electronic cigarette (e-cigarette) liquids and aerosols. However, we would like to clarify two issues:

1. The National Institute for Occupational Safety and Health (NIOSH) draft document, *Criteria for a Recommended Standard: Occupational Exposure to Diacetyl and 2,3-Pentanedione*, proposes recommended exposure limits (RELs) to reduce the risk of respiratory impairment (decreased lung function) and the severe irreversible lung disease, constrictive bronchiolitis obliterans, associated with occupational exposure to these chemicals. As noted by Farsalinos and co-workers in their limitations section, it is not intended to establish "safe" exposure concentrations for consumers or the general public.[1]
2. The exposure comparisons between e-cigarette users and traditional cigarette smokers and workers use values that are not widely accepted.

First, NIOSH RELs as well as Occupational Exposure Limits (OELs) set by other organizations are only intended for occupational settings. OELs use different calculations and policy decisions than those risk assessments for the general public.[2] This has to do with differences in the exposed populations (those healthy enough to work as opposed to unselected populations which include susceptible sub-groups), technical feasibility considerations, and differences in the number of hours exposed per day (8 hr per day, 5 days per week vs. 24 hr per day, 7 days per week), and differences in the total duration of exposure (working lifetime vs. full lifetime). Therefore, an occupational exposure limit does not mean that an exposure at that limit is considered sufficiently safe for the general population. Indeed, the NIOSH draft REL for DA is not expected to eliminate all DA-associated morbidity; it is calculated to limit significant morbidity and mortality to no more than 1 in 1,000 workers exposed to that concentration (5 ppb) for 8 hr a day, 40 hr a week for a 45-year working lifetime. Existing data suggest that AP may have toxicity comparable to DA but the proposed REL was set at 9.3 ppb due to analytical limitations.[3–5] In addition, the intentional inhalation of smoke from traditional cigarettes and e-cigarettes involves different inhalation patterns than normal breathing.[6] We are unaware of studies investigating differences in airway dosimetry for DA and AP which could result from these differences. Therefore, for multiple reasons, the draft NIOSH RELs for DA and AP are not intended or appropriate as safe exposure limits for vapors present in cigarette smoke. U.S. Food and Drug Administration (FDA) has proposed regulating e-cigarettes as tobacco products but that rule (http://www.fda.gov/downloads/TobaccoProducts/GuidanceComplianceRegulatoryInformation/UCM394914.pdf) has not been finalized.

Second, the comparisons between DA and AP exposures of e-cigarette smokers and traditional cigarette smokers should be viewed with caution. We have concerns regarding the accuracy of the measurements of the DA and AP concentrations in cigarette smoke which form the basis for the Farsalinos et al. estimates of smokers' exposure,[7] and await an independent replication of these measurements. Further, worker exposures to DA and AP were calculated by Farsalinos et al. based upon the minute volume of sedentary people, which is not the value accepted for workers who conduct a degree of manual activity during their working day. Even light activity for a portion of the working day will greatly increase the minute volume of workers.[8]

What is apparent is that quantifiable and potentially important DA and AP exposures occur in those who use traditional and e-cigarettes. Additional studies will be needed to investigate the potential contributions of DA and AP in traditional and e-cigarettes to chronic

obstructive pulmonary disease, which is a major cause of morbidity and mortality worldwide.[9,10]

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Declaration of Interests

None declared.

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