Letter to the Editor

E-cigarette use and indoor air quality: Methodological limitations
Response to W. Schober et al.’s “Use of electronic cigarettes (e-cigarettes) impairs indoor air quality and increases FeNO levels of e-cigarette consumers”

We read with particular interest the study by Schober et al. (2013) evaluating emissions from e-cigarette use and their impact on indoor air quality. It is our opinion that there are significant limitations in this study which should be further addressed.

It would be expected that control environmental conditions would be evaluated by the researchers just before (but on the same day of) using the e-cigarettes, with all participants present inside the room. Instead, researchers chose to evaluate control conditions on a separate day. Moreover, they did not clarify whether the participants were present inside the room during the control measurements. These are important limitations. Studies have shown that there is a significant day-to-day variation in environmental levels of polycyclic aromatic hydrocarbons (PAHs) (Ravindra et al., 2008). It is well-established that PAHs are formed during combustion, which does not occur with normal e-cigarette use. Therefore, it cannot be excluded that any difference in PAHs levels was due to the expected day-to-day changes in environmental levels rather than to emissions from e-cigarettes.

The authors observed that urinary levels of 3-hydroxypropylmercapturic acid (3-HPMA) were elevated only after participants used nicotine-containing e-cigarettes. This is a paradox because acrolein is not derived from nicotine in e-cigarettes but from heating of glycerine (Stein et al., 1983). Since there was not a statistically significant difference in glycerine content between nicotine and non-nicotine e-cigarettes, the differences in urinary 3-HPMA could be attributed to other sources, such as food (Stevens and Maier, 2008).

Concerning the elevation in exhaled FeNO after e-cigarette use, the authors tried to explain the discrepancy between their observation and the reduction in exhaled FeNO observed by Vardavas et al. (2012). It seems odd that in both cases the results, although contradictory, were similarly interpreted as activation of inflammatory pathways. In fact, Schober et al. observed only minor changes in FeNO levels, with all participants being within normal limits (<25 ppb) (Dweik et al., 2001) even after e-cigarette use, except from an outlier who already had high levels at baseline. Additionally, no placebo was used as a control evaluation of changes in FeNO. Therefore, there is doubt whether such results represent the activation of inflammatory pathways or may indicate the potential for long-term damage from e-cigarette use.

The issue of particulate matter emitted from e-cigarettes has been misrepresented in several studies. The authors correctly mention that such particles are mostly expected to be 1,2-propanediol (and glycerine) droplets. It should be clarified that such composition is entirely different from that of microparticles emitted from tobacco cigarette smoke or present in environmental pollution. Currently there is no evidence that e-cigarette aerosol microparticles is a risk factor for cardiovascular or lung disease.

The authors discussed the toxicity of nicotine and reproduced the information that 30–60 mg of nicotine causes death by respiratory paralysis. This is contrary to evidence provided in a recent analysis by Mayer (2014), who established that this information was based on dubious experiments performed more than 150 years ago. Based on post-mortem examinations, he determined that approximately 500–1000 mg of nicotine need to be absorbed in order to have lethal effects. In fact, Mayer did not take into account that the first symptom after ingesting significant amounts of nicotine is voluminous vomiting. Therefore, it is expected that more than 1000 mg of nicotine needs to be ingested in order to have lethal consequences; this was confirmed by a case presentation in which ingestion of 1500 mg of nicotine was treated by activated charcoal and observation for 6h, with the patient subsequently discharged without further complications (Christensen et al., 2013).

Conflicts of interest statement

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References


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Konstantinos E. Farsalinos∗
Vassilis Voudris
Department of Cardiology, Onassis Cardiac Surgery Center, Kallithea 17674, Greece

* Corresponding author. Tel.: +30 6977454837; fax: +30 2109493373.
E-mail address: kfarsalinos@gmail.com (K.E. Farsalinos)

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