

Commentary on Dawkins *et al.* (2015): Electronic cigarettes – from smoking cessation to smoking sensation and back

Cigarette smoking is a chronic relapsing disorder, with more than half of all smokers attempting to quit each year, but with only about 7% achieving long-term abstinence [1]. Cigarette smokers will continue smoking because of their addiction, and when given the options of smoking or giving up nicotine completely, many will not give it up. This rigid dichotomous scheme may now change as a result of the increasing availability of reduced risk alternatives to combustible tobacco cigarettes [2]. Compared to conventional cigarettes, the emerging category of nicotine-containing products has the potential to reduce substantially the individual risk and the harm for the population [3].

Among the available nicotine-containing reduced risk products, the electronic cigarette (EC) has been gaining rapidly on conventional cigarettes [4]. The growing popularity of ECs proves that many adult smokers are now ready for new, alternative, technological forms of smoking. Currently, users report the long-term use of EC to reduce cigarette consumption or quit smoking to relieve tobacco withdrawal symptoms, and to continue having a 'smoking' experience [5]. Moreover, the popularity of ECs appears to be associated with the fact that they can be used in many smoke-free areas, their prices are competitive and they are perceived to be a much less harmful smoking alternative [6–8], given that vapour toxicology is far less problematic than tobacco cigarette toxicology [9].

Although the high rate of ECs trials demonstrates the strong latent demand for less harmful nicotine-containing products, at present there is a low rate of conversion from trial to usage of these products. This is an indication that the current generation of ECs are not yet fit to bring about a fulfilling smoking experience.

When considering the appeal of ECs it is important to highlight design varieties among products. For example, first-generation devices consisting of small rechargeable batteries and disposable cartridges designed to look like conventional cigarettes ('cigalikes') allow only a limited number of puffs (requiring frequent recharging) and a narrow range in flavour assortment. Moreover, 'cigalikes' are not very efficient at delivering nicotine [10]. Second-generation devices, instead, are equipped with higher-capacity lithium batteries, much more efficient vaporizing systems and tanks that can be refilled with a countless variety of flavoured liquids. Moreover, nicotine delivery to the bloodstream using second-generation devices is, by and large, superior compared to current 'cigalikes' [11,12]. Presumably, second-generation devices allow a more fulfilling vaping experience compared to 'cigalikes', as shown by

their high adoption rates in first-time users not intending to quit [13].

In this issue of the *Journal*, Dawkins and colleagues [14] are advancing current understanding by exploring diversities and similarities between first- and second-generation ECs in terms of smokers' preference and subjective effects. In spite of a number of study limitations, some findings are of great interest.

Half of smokers chose a first-generation EC because of its resemblance to a conventional cigarette and the other half a second-generation EC for the opposite reason: it did not look like a conventional cigarette and was more stylish. Clearly, cigarette-like cues have different (positive versus negative) significance for different smokers, so that their personal preference for a specific device will be dictated by a trade-off between positive and negative values. Thus, it was not surprising that none of the standard independent variables used for the regression analyses could predict device choice.

Both first- and second-generation ECs were equally effective at reducing urge to smoke and withdrawal symptoms in first-time users. Although not measured specifically in this study, similar nicotine absorption with both devices could have been achieved in these first-time users. Moreover, it is also possible that positive qualities of the specific 'cigalike' used for these experiments (e.g. 'throat hit' similar to that delivered by second-generation EC) were sufficient to control symptoms in inexperienced users. Therefore, the working hypothesis that second-generation ECs are superior to 'cigalike' may be an oversimplification, and requires careful consideration of the dynamic interplay among specific products and individual smoking phenotypes.

Although replication of Dawkins' findings in a less selective population sample and with a large assortment of ECs models will be required, the data presented here still support the notion that these products may constitute valid conventional cigarette substitutes. However, currently available ECs require further improvement, so that users' smoking experience could be as fulfilling as possible. It is ironic, but the extent of displacement from tobacco smoking to regular vaping will also depend upon how good ECs will become in replicating smokers' smoking experience. In fact, substantial public health benefits (i.e. increase in smoking cessation rates and a continued decline in smoking prevalence) are now reported in countries with a high vaping prevalence [15].

By exploring diversities and similarities among first- and second-generation ECs, we are now

beginning to learn that the extent of smoking abstinence is connected intimately with their role as smoking sensation products, where smoking cessation is the main 'collateral benefit' for many smokers switching to regular ECs use.

Therefore, it is important to re-evaluate the sensorial attributes that can make the users' vaping experience more fulfilling, to learn why smokers buy these products, which factors facilitate or hinder use under realistic conditions and what are the products' features leading to negative and/or positive users' perceptions. This knowledge may prove helpful to product developers, researchers, policymakers, regulators, health-care providers and consumers.

Declaration of interests

None of the authors have any competing financial interests to declare, with the exception of R.P. R.P. has received lecture fees and research funding from Pfizer and GlaxoSmithKline, manufacturers of stop smoking medications. He has also served as a consultant for Pfizer, Global Health Alliance for treatment of tobacco dependence, Arbi Group Srl (the Italian distributor for Categoria electronic cigarettes), and ECITA (Electronic Cigarette Industry Trade Association in the UK). Lectures fees from a number of European electronic cigarette industry and trade associations (including FIVAPE in France and FIESEL in Italy) were directly donated to vaper advocacy organizations. He is currently scientific adviser for LIAF, Lega Italiana Anti Fumo (Italian acronym for Italian Anti-Smoking League).

Keywords Addiction, first- and second-generation electronic cigarette, smoking, smoking sensation, vaping.

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