

House of Representatives Standing Committee on Health, Aged  
Care and Sport

# Inquiry into the Use and Marketing of Electronic Cigarettes and Personal Vaporisers in Australia

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**Konstantinos Farsalinos, M.D.**

Researcher, Onassis Cardiac Surgery Center, Athens, Greece

Researcher, University of Patras, Greece

Researcher, National School of Public Health, Athens, Greece

**Konstantinos Farsalinos, M.D.**

Researcher, Onassis Cardiac Surgery Center, Athens, Greece

Researcher, University of Patras, Greece

Researcher, National School of Public Health, Athens, Greece

Corresponding address: Konstantinos Farsalinos, Eslin 12, Lamia 35100, Greece

Telephone: [REDACTED]

Email: [REDACTED]

**Research experience:** more than 50 publications in international journals about tobacco harm reduction and electronic cigarettes (<https://www.ncbi.nlm.nih.gov/pubmed/?term=farsalinos>).

**Subject:** Inquiry into the Use and Marketing of Electronic Cigarettes and Personal Vaporisers in Australia

Dear Members of the House Standing Committee on Health Aged Care and Sport,

The purpose of this letter is to provide you with the perspective and views of an active researcher in tobacco harm reduction and electronic cigarettes about the appropriate approach to regulating electronic cigarettes and personal vaporizers as a supplementary tool in tobacco control and with the only goal to accelerate the decline in smoking prevalence and eventually eliminate the smoking epidemic.

## Executive summary

- Tobacco harm reduction is a fundamental human rights issue for smokers, and complies with the World Health Organization Ottawa Charter for Health promotion and empowerment in health (1986).
- Electronic cigarettes are currently the most popular tobacco harm reduction product in countries where they are allowed to be marketed.
- Electronic cigarettes are at least 95% less harmful than smoking and, thus, represent a perfect harm reduction tool for smokers unable or unwilling to quit with currently-approved methods.
- Nicotine has minimal health effects and has been approved for long-term use, in the form of nicotine replacement therapies, as substitute for smoking.
- Nicotine in electronic cigarettes is of the same purity (pharmaceutical grade) as in medications and should be exempt from the Poisons Standard.
- Population studies show high rates of quitting smoking with electronic cigarettes and minimal use by never smokers, indicating that electronic cigarettes have a strong positive public health effect in accelerating the decline in smoking prevalence.
- Regular use of electronic cigarettes is extremely rare among never-smoking adolescents, while they could have a potential primary preventive role by preventing adolescents from initiating smoking.
- Regulation for electronic cigarettes should ensure product quality, promote use to intended population groups (smokers and former smokers), create a competitive advantage against tobacco cigarettes and ensure proper and reliable information to smokers so that they make informed decisions.
- Australian smokers deserve the opportunity to substantially reduce their risk for health harm caused by their mistake to initiate smoking.
- Electronic cigarettes can serve as a supplementary tool and an additional choice for these people in order to reduce smoking-related morbidity and mortality and could have a positive public health impact in Australia.

### *Tobacco harm reduction*

Harm reduction refers to policies, programmes and practices that aim to reduce the harms associated with the use of psychoactive drugs in people unable or unwilling to stop [1]. Harm reduction began to be discussed frequently after the threat of HIV spreading among and from injecting drug users was first recognised and is now almost universally accepted in developed countries, including Australia. Tobacco harm reduction refers to a similar strategy of providing alternative and less harmful sources of nicotine than combustible cigarettes to smokers who are unable or unwilling to quit tobacco and nicotine entirely [2]. It is based on the concept that “smokers smoke for nicotine but die from tar,” expressed by British tobacco addiction researcher Michael A.H. Russell [3], referring to combustion products and toxins other than nicotine which are present in smoke. The strategy of providing harm reduction to smokers is a necessity considering the difficulty in quitting smoking and the ineffectiveness of currently approved medications for smoking cessation. Of note, nicotine replacement therapies have a success rate of < 7% while oral smoking cessation medications have a success rate of less than 20% when assessing smoking cessation at 1 year [4,5]. **Tobacco harm reduction is a fundamental human rights issue for smokers**, and complies with the World Health Organization Ottawa Charter for Health promotion (1986), stating that: “*People cannot achieve their fullest health potential unless they are able to take control of those things which determine their health*”. Empowerment in public health requires that people should have access to information on public health issues and access to tools (products) that help them promote their health.

### *Safety of electronic cigarettes*

A lot of discussion about electronic cigarettes and personal vaporizers focuses on safety. Extensive research has been published in the last few years evaluating the relative risk of electronic cigarettes compared to combustible tobacco cigarettes. Evidence is overwhelming that electronic cigarettes are by far less harmful than smoking [6]. This is based on the fact that there is no combustion and no tobacco in electronic cigarettes. The temperatures of evaporation of liquid are by far lower compared to the temperatures of combusting cured tobacco. Additionally, all ingredients in electronic cigarette liquids have been approved for human consumption and are used in food products, cosmetics and medications. Characteristically, propylene glycol and glycerol, the main ingredients used in electronic cigarette liquids, have been approved for human consumption since 1982 and 1959, respectively [2], while flavourings are derived from the food flavouring industry. Electronic cigarettes do emit potentially toxic chemicals, but a basic principle in toxicology since the 16<sup>th</sup> century is that “*Nothing is a poison and everything is poisonous; solely the dose determines that a thing is not a poison (Sola dosis facit venenum)*” [7]. Evidence has shown that not only most chemicals emitted from tobacco cigarettes are absent in electronic cigarettes, but also other chemicals are emitted at levels lower than currently established safety standards. For example, a risk assessment analysis found that metal emissions from electronic cigarettes were lower than the safety limits for inhalational medications or occupational exposure limits [8]. Formaldehyde emissions are lower than exposure to formaldehyde at homes complying with the World Health Organization-defined maximum acceptable limit of formaldehyde levels [9]. Nitrosamines are present at levels similar to pharmaceutical nicotine replacement therapies, products that have been approved as long-term substitutes for smoking, and orders of magnitude lower compared to tobacco products [6,10].

The levels of exposure are so low that studies assessing biomarkers of toxin exposure found that electronic cigarette users were exposed to the same levels of toxins as non-smokers [11,12].

Based on current evidence comparing emissions from electronic cigarettes with tobacco cigarettes, two reputable health organizations in the UK, Public Health England and the Royal College of Physicians, have stated that electronic cigarettes are at least 95% less harmful than smoking. Thus, **electronic cigarettes represent a perfect harm reduction tool for smokers unable or unwilling to quit with currently-approved methods.**

### *Nicotine*

Nicotine is a natural substance present in tobacco and other plants of the nightshade family (tomatoes, potatoes, eggplants). It has also been approved as a medication, in the form of nicotine replacement therapies, for smoking cessation. Recognizing the difficulty in quitting smoking, the FDA (USA) and the MHRA (UK) have **approved the long-term use of nicotine replacement therapies as substitutes for smoking** [13,14]. This is based on the very simple concept that “... *there are no circumstances in which it is safer to smoke than to use NRT*” [13]. **Nicotine is not classified as a carcinogen, does not cause lung disease and has minimal (if any) effects in the initiation and propagation of atherosclerosis at the levels obtained by smokers and electronic cigarette users** [6,15]. Strong epidemiological evidence about the safety profile of nicotine is derived from studying the use of another tobacco harm reduction product, snus. Snus use has been a tradition for many Scandinavian (especially Swedish) men, and thus has been studied extensively in large epidemiological studies. A major characteristic of snus users is that they obtain similar or higher amounts of nicotine daily compared to smokers

[16]. Therefore, if nicotine was the main cause of smoking-related disease, we would have observed high incidence of such disease conditions among snus users. However, snus use is associated with minimal health risk, which in many cases is comparable to the risk of never smokers. A pooled analysis of more than 130,000 never smokers identified that the risk for development of any type of stroke (ischaemic, haemorrhagic or unspecified) in snus users was similar to never smokers [17]. A similar pooled analysis showed that snus use was not associated with risk of myocardial infarction (heart attack), and concluded that “... *toxic components other than nicotine appear implicated in the pathophysiology of smoking related ischemic heart disease.*” [18]. A systematic review of the relation between snus use and cancer found that the risk was so low that if all current and former smokers in the US were snus users, the annual number of smoking-related cancer deaths would have been reduced from 104,737 to 1102 [19]. Moreover, if the whole US population were snus users (but no current or former smokers existed), the annual number of smoking-related cancer deaths would have been reduced from 104,737 to 2081 [19]. This represents a tremendous potential for harm reduction and positive public health effects when nicotine is delivered in a non-combustible product. In fact, proof of concept about the positive population health effects of implementing a tobacco harm reduction policy exists in Sweden. Swedish men have a high prevalence of tobacco use, but most of it is snus instead of combustible tobacco cigarettes. Because of that, Sweden has by far the lowest incidence of deaths due to cancer and cardiovascular disease of all European Union countries [20]. A recent analysis concluded that 355,000 deaths would have been prevented annually in Europe if all countries had followed the Swedish patterns of smoking and snus use [21].

In Australia, nicotine has been classified as a poison, but exceptions to this ruling exist for tobacco cigarettes and pharmaceutical products. This creates the paradox of allowing the sales of

the most lethal product delivering nicotine (tobacco cigarettes) while banning the use of nicotine in a substantially less harmful form (electronic cigarettes). Another paradoxical outcome of this ruling is that the pharmaceutical grade nicotine used in electronic cigarettes is classified as a poison while nicotine of the same purity in pharmaceutical products is considered legal and non-poisonous. Finally, classifying a chemical as a poison violates the fundamental toxicological principle mentioned above that “*Nothing is a poison and everything is poisonous; solely the dose determines that a thing is not a poison (Sola dosis facit venenum)*”. Moreover, no cases of intoxication have ever been reported from intended use of any nicotine product (including electronic cigarettes) because of the phenomenon of nicotine self-titration, the ability of nicotine users to self-control nicotine intake based on their personal needs [22,23]. Therefore, the only possibility for harm is related to intentional (suicidal) or accidental (unintentional) overdose. However, this is not good-enough justification to classify nicotine in electronic cigarettes as a poison since it is well-known that the highest incidence of accidental or intentional intoxication is reported with pharmaceutical and household cleaning products while the cases of accidental intoxication from electronic cigarettes represent a very small minority even in countries with widespread use of these products. Considering the position of electronic cigarettes as a tobacco harm reduction product, **nicotine in electronic cigarette liquids should be exempt from the Poisons Standard.**

### *Population use*

The effects of electronic cigarettes on public health will depend on which subpopulations use them and how they affect the smoking habit. Use by smokers is expected to be beneficial if they

promote smoking reduction or (ideally) cessation, while use by never smokers might result in harm, especially if these users subsequently become smokers and electronic cigarette use is causally linked with this transition (“gateway to smoking” hypothesis).

Population studies are clearly showing that electronic cigarettes are popular among smokers while regular use by never smokers is rare. Data from the Eurobarometer 2014 survey (a survey of a representative sample of more than 27,000 Europeans) showed that only 0.08% of never smokers reported current daily electronic cigarette use, while current daily nicotine-containing use was reported by 0.04% of never smoking participants [24]. At the same time, 49.1% of current daily nicotine-containing electronic cigarette users reported quitting smoking, while an additional 31.4% reported reduction in smoking consumption. Overall, 6.2 and 9.2 million Europeans have reported quitting smoking and reduction in smoking consumption respectively with the help of electronic cigarettes [25]. Recently, the UK announced that 1.5 million smokers have managed to quit with the help of electronic cigarettes, with 52% of current electronic cigarette users being former smokers [26]. **The combination of high rates of quitting smoking and minimal use by never smokers shows that electronic cigarettes have a strong positive public health effect in accelerating the decline in smoking prevalence.** This is particularly important for Australia, where no significant reduction in smoking prevalence has been observed in the past 3 years. In contrast, smoking prevalence in the UK, a country where electronic cigarette use is endorsed as a smoking substitute by the scientific community, has declined more rapidly and is now (2016) at levels similar to Australia.

An important issue that dominates the discussion on population effects is the use of electronic cigarettes by youth. It is true that experimentation with electronic cigarettes was growing in the US until 2015. However, the two major surveys of youth tobacco and electronic cigarette use,

Monitoring the Future (MTF) and National Youth Tobacco Survey (NYTS) showed a substantial decline in electronic cigarette experimentation in 2016 [27,28]. Recently, a meta-analysis reported that electronic cigarette use by never smoking adolescents predicts future tobacco cigarette use, and concluded that a “gateway to smoking” effect exists in youth [29]. However, there are some major flaws in supporting this theory. The assessment is based on the epidemiological approach of risk factor (baseline exposure) versus future outcome (development of disease). In this approach, the risk factor should always be present before the outcome. However, electronic cigarette use more frequently follows rather than precedes tobacco cigarette use, and past smoking predicts future electronic cigarette use [30]. This means that the basic prerequisite for applying the epidemiological approach of risk factor and future disease cannot be applied to the behavioral assessment of electronic cigarette and tobacco cigarette use.

Furthermore, none of the studies in the meta-analysis evaluated regular electronic cigarette use and nicotine use at baseline, and none evaluated regular smoking at follow-up. To substantiate the gateway to smoking hypothesis, there must be proof that non-smoking adolescents become addicted to electronic cigarette use (which means that they are regular users of nicotine-containing electronic cigarettes at baseline) and then transitioned to regular tobacco cigarette use. Additionally, these people would not have initiated smoking if electronic cigarettes did not exist. Until now, there is no such evidence published in the scientific literature. In fact, **regular use of electronic cigarettes is extremely rare among never-smoking adolescents**. In the US, the 2015 NYTS identified that only 0.3% of never smoking adolescents were using electronic cigarettes for more than 19 days of the past 30 days (analysis submitted for publication and currently under review). Data from the 2015 MTF showed that the vast majority of never-smoking adolescents were using non-nicotine electronic cigarettes, while regular electronic

cigarette use was again rare [31,32]. The association between electronic cigarette use at baseline and smoking at follow-up simply represents the propensity of a specific part of youth to engage in an inhalational habit. In fact, **electronic cigarettes could have a potential primary preventive role for this subpopulation, by preventing these adolescents from initiating smoking.** This potential needs to be explored. In general, all current evidence from the US and other countries [33-35] show that regular use of electronic cigarettes by youth is largely confined to smokers and is very rare among never smokers. Finally, it should be emphasized that the increasing rate of ever-use of e-cigarettes among U.S. youth has coincided with the sharpest declines in youth smoking rates in many decades. Data from the NYTS showed that past 30-day smoking prevalence in high school students decreased from 15.8% in 2011 to 12.7% in 2013 and to 9.2% in 2014. The 2015 MTF survey showed a continuous decline in past 30-day smoking prevalence to 7.0% in 2015 compared to 11.7% in 2007.

### *Appropriate regulatory framework for electronic cigarettes*

There is a lot of controversy, strong debate and differences worldwide in the regulatory approach to electronic cigarettes. The main reason for this is the use of the precautionary principle. The key element of the precautionary principle is the justification for acting in the face of uncertain knowledge about risks. It mandates the use of preventive measures before fully substantiating the risk, and shifts the burden of proof from demonstrating the presence of risk to demonstrating the absence of risk [36]. There has been a lot of criticism about the precautionary principle, especially when used as a basis for decision making [37-40]. However, even for those supporting the value and applicability of the precautionary principle in public health, it is difficult to

currently justify the level of criticism for electronic cigarettes and the need for restrictions up to the point of complete ban on nicotine-containing products.

A complete ban on nicotine containing and flavored electronic cigarettes would create significant ethical issues [41], related in some cases to unintended consequences. It would be a paradox to ban a less harmful form of nicotine intake, while allowing the sales of the most lethal form of nicotine intake (tobacco cigarettes). Nicotine seems to play an important role in the success of electronic cigarettes to substitute smoking, especially during the initial transition period [42,43], while flavors provide the necessary satisfaction not only to smokers but also to former smokers and now-established electronic cigarette users, helping the former in their quit attempts and the latter in preventing relapse [44]. Banning nicotine or flavors would only make electronic cigarettes less appealing to smokers and would have the unintended consequence of protecting the tobacco cigarette market. Several unintended consequences would result from following the medicinal regulation approach. Medicinal licensing requirement would hinder further development of electronic cigarettes because small improvements would require new licensing applications, extend dramatically the innovation timescale and make the cost of innovation prohibitive. Consequently, the cost for electronic cigarettes would increase, and tobacco cigarettes would remain a more attractive option for smokers since they are not subject to such regulation. Moreover, this would bar the route to small innovating companies, leaving the whole market to the tobacco and pharmaceutical companies, which have sufficient resources to handle these costs. It could also create a conflict of interest with their own products (cigarettes and medicines) and might undermine their willingness to further develop e-cigs. Finally, such a regulation would be contrary to the patterns of electronic cigarette use by consumers, which is to substitute the experience perceived from smoking with a similar experience from a less harmful

product [45]; the huge variability of products and flavors is exactly serving the purpose of satisfying personal preference [44], and this is why electronic cigarettes are so successful in substituting for smoking.

A proper regulatory scheme should first of all ensure that smokers are honestly informed on the relative harmfulness of the different products at stake. This cannot be achieved with over-restrictive and prohibitive regulation. Considering all the above, it is evident that electronic cigarettes have unique characteristics and a unique role to play in tobacco harm reduction. Regulation for electronic cigarettes should be regarded as setting proper rules that will:

- **Ensure product quality.**
- **Promote them to intended population groups (smokers and former smokers).**
- **Create a competitive advantage against tobacco cigarettes in terms of accessibility, product variability, satisfaction for smokers and price.**
- **Ensure proper and reliable information to smokers so that they make informed decisions.**

Nicotine-containing, flavored electronic cigarette products should become available to Australian smokers through a regulatory framework that will be reasonable, proportionate and realistic.

Regulation should be different from tobacco cigarettes so that smokers understand the risk difference and make informed decisions. Finally, advertising and marketing should not be banned but appropriately regulated in order to promote use by the intended population while avoiding use by never smokers. **Australian smokers deserve the opportunity to substantially reduce their risk for health harm caused by their mistake to initiate smoking.** Since smoking is so addictive and quitting is very difficult, **electronic cigarettes can serve as a**

**supplementary tool and an additional choice for these people in order to reduce smoking-related morbidity and mortality and could have a positive public health impact in Australia.**

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