

## E-cigarettes: promise or peril?

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Electronic cigarettes (e-cigarettes) are battery-operated devices that produce a vapour consisting of nicotine (although some are nicotine-free), propylene glycol or glycerol, and flavourings. E-cigarettes were invented in 2003 in China and entered the United States and European markets in 2006 [1]. Hence, it is obvious that no observational data on the long-term health effects of e-cigarettes exist as yet. Data on the health consequences of chronic nicotine exposure is available from studies in prolonged users of nicotine replacement products [2]. These data do not suggest that chronic nicotine exposure increases cardiopulmonary or cancer risk. Toxic and carcinogenic compounds may be found in e-cigarettes, but in trace amounts that are much lower than levels found in conventional cigarettes. E-cigarettes do not expose the user to most of the constituents of cigarette smoke at concentrations that are responsible for many of the tobacco-attributable diseases. Therefore, most experts believe that inhaling e-cigarette vapour is less harmful than inhaling cigarette smoke. The limited available evidence suggests a potential for e-cigarettes as a smoking cessation tool and/or an instrument for reducing conventional cigarette use (harm reduction concept) [3]. During the past few years e-cigarettes have gained popularity, primarily among smokers who want to reduce the risk of smoking [4]. The paper from Guillet S. et al. [5] adds some information about the perception and the use of e-cigarettes. The authors performed a cross-sectional survey in 2013 among 300 students and instructors of the French school of military paramedical personnel using self-administered questionnaires. They found a prevalence of smoking among the 200 responders of 40%, which is higher than in the general French population. In tobacco smokers the observed e-cigarette lifetime use prevalence was 57% and was close to the 50% of smokers observed in the general population. However, the daily use prevalence was much lower, at 4% in the study population and 3% in the French population. The motivation for e-cigarette use in smokers was the intention to reduce tobacco consumption in 43% and to quit smoking in 8%. But almost half of the responders reported a decrease in tobacco consumption following e-cigarette initiation (average decrease of 5 to 10 cigarettes). Only about half of all respondents, smokers and nonsmokers, perceived e-cigarettes as being less harmful than tobacco.

A 30- to 40-times higher number of adults (age  $\geq 18$  years) were surveyed in the US [6]. This annual consumer-based web survey comprised 6 555 persons in 2010–2011 and 8 173 between 2012–2013. Among smokers, an increase in

ever use of e-cigarettes from 9.8% to 36.5% was found, and an increase in current (i.e. past 30-day) use from 4.9% to 9.4%. Of importance is the fact that among never smokers ever use remained unchanged (1.3%–1.2%). A recent Swiss survey among approximately 5 000 persons in 2013 found considerably lower numbers: 6.7% had ever used an e-cigarette during their lifetime, 5.5% of daily smokers had consumed e-cigarettes during the past month before the survey and only 0.4% were daily users [7].

The following reasons may be responsible for e-cigarette use not becoming more popular in tobacco cigarette smokers and may explain the difference between the numbers of ever users and of current users of e-cigarettes.

- Awareness and sound knowledge on vaping remain at a disappointing level in the general population and even in smokers.
- Smokers quite often become frustrated with e-cigarettes, since they do not purchase the appropriate vaping devices, are using liquids with a too low nicotine concentration and are not informed about adjusting their inhalation technique.
- E-cigarettes in their current form are less satisfactory than tobacco cigarettes, since they do not have the same nicotine-delivery profile. The “ideal e-cigarette” has not been invented yet.

E-cigarettes and future nicotine delivery products have the potential to make an important, and even game-changing, contribution to public health by helping heavily nicotine dependent persons to reduce the number of tobacco cigarettes smoked and eventually to stop smoking.

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