

## Electronic Cigarettes – A Boon or Bane to Smokers?

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## Short Communication

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**ABSTRACT**

E-cigarettes look like real cigarettes, but do not burn and combust tobacco leaves; they are often marketed as the healthier version of the conventional cigarette. . It gives a smoker the apparent effect of nicotine intake without delivering the toxic elements like Tobacco, Carbon Monoxide and Tar that harms the lungs. E-cigarettes contain a battery and an electronic device that produces a warm vapour or 'mist'.

**Smoking, an addiction**

More than habit" or "custom", cigarette smoking and other forms of tobacco use are now widely recognized as behaviors driven by nicotine addiction. It is addiction to nicotine that compels many smokers to continue to use tobacco products even when they appreciate its harmful effects and wish to quit <sup>[1,2]</sup>. The cigarette is an effective instrument for delivering nicotine to the body. Burned tobacco produces vaporized nicotine which is easily entrained into the lungs Within 10 to 15 seconds of puffing on a cigarette, nicotine is absorbed into the bloodstream of smokers and travels to the brain where it acts on nicotinic cholinergic receptors to produce a range of gratifying effects <sup>[3]</sup>. The release of a variety of neurotransmitters results in neural activation, producing effects such as pleasure, appetite suppression, arousal, cognitive enhancement, relaxation, and reduction in anxiety <sup>[4,5,6]</sup>.

**What are electronic cigarettes?**

Electronic cigarettes are battery powered devices that convert nicotine containing liquid into a vapor that can be inhaled. The World Health Organization has termed these devices electronic nicotine delivery systems (ENDS) <sup>[7]</sup>. ENDS were developed with the goal of mimicking the efficient nicotine delivery system of a conventional cigarette without the significant harmful effects of tobacco smoke.

Also referred to as an e-cigarette or smokeless cigarette or vapor cigarette, an electronic cigarette is actually aimed at helping smokers stop the habit of smoking tobacco. In recent years, e-cigarettes have been introduced to the global market. This device was invented by Ruyan Group (Holdings) Limited, China in 2003, and the company patented e-cigarettes in Canada in 2004 <sup>[8]</sup>.

**Components of E-Cigarettes**

E-cigarettes consist of a plastic tube, an electronic heating element, a liquid nicotine cartridge, and a lithium battery and atomization chamber with a membrane to suspend ingredients <sup>[9]</sup> (fig.1 )Some e-cigarettes contain a light emitting diode in the tip which illuminates when the user inhales (or "vapes"), giving the appearance of the burning end of a conventional cigarette. Chemicals introduced into the liquid vehicle produce aromas and flavors of tobacco, chocolate, mint, fruit, and coffee <sup>[10]</sup>.



Figure 1: – Components of E-cigarette

### How does ENDS substitute regular cigarette?

The device aerosolizes nicotine so that it is readily entrained into the respiratory tract and then enters the bloodstream, resulting in a near instantaneous nicotine reward in the central nervous system. Propylene glycol – the chemical used to generate artificial “smoke” for theatrical productions – is added to the liquid vehicle to stimulate the appearance of using a “real” cigarette. The device does not deliver tar or chemical elements that are present in regular cigarettes that are known to cause and increase the risk of developing cardiovascular and pulmonary diseases. Instead, there is a replaceable cartridge containing concentration), chemical additives, and flavours (e.g. chocolate, coffee, mint, fruits). As the user exhales, some visible vapour is released, but no tobacco smoke. With these features, the e-cigarette industry insists that the device is safe, can be used in non-smoking areas, and is free from second-hand smoke concerns.

### Safety of e cigarettes?

Are e-cigarettes truly safe? Can they be used as a smoking cessation aid as the industry advertises? There is a lack of scientific evidence offering clear answers to these questions. There are a few short-term studies that have investigated e-cigarettes <sup>[11,12]</sup>, but the evidence is not sufficient to conclusively end the controversial debates on the safety of e-cigarettes.

Electronic cigarettes are probably less harmful than tobacco smoking, but they are almost certainly more dangerous than medicinal nicotine inhalers <sup>[13,14]</sup>

Internationally, the legality of e-cigarettes varies; they cannot be sold in Australia, Brazil, Canada, Denmark or Switzerland, but their sale is authorized in other countries (e.g. China, New Zealand) <sup>[15,16,17]</sup>

Analyses conducted by the United States Food and Drug Administration (FDA) showed that e-cigarettes contain carcinogens, including nitrosamines, toxic chemicals such as diethylene glycol, and tobacco-specific components suspected of being harmful to humans (anabasine, myosmine, and beta-nicotyrine) <sup>[13]</sup>. The FDA also found that e-cigarette cartridges labeled as containing no nicotine did in fact contain low levels of nicotine. Consequently, the inhaled vapour may contain impurities that may be dangerous to consumers <sup>[13]</sup>.

A randomized trial in 40 smokers found that the Ruyan e-cigarette (Chinese manufacturer of e-cigarettes) delivered nicotine to the blood more rapidly than the nicotine inhaler, but less rapidly than cigarettes, and that the effect of the e-cigarette on craving was similar to that of the nicotine inhaler, but less than that of cigarettes <sup>[18]</sup>. A recent U.S. study found that 10 puffs of an e-cigarette delivered little or no nicotine <sup>[19]</sup>.

### E cigarettes in cessation of tobacco smoking

Electronic cigarettes have proved to be effective to stop tobacco smoking, as they leave a physical sensation and a flavor similar to those of smoked tobacco products. The difference lies in the fact that e-cigarettes are devoid of tobacco and smoke.

One may hypothesize that the positive effects of e-cigarettes may include smoking cessation, smoking reduction or relapse prevention. The e-cigarette could also be used as an aid during a preparation period before cessation, similar to the pre-cessation treatment or “cut down to quit” approach that is an approved indication for NRT <sup>[20]</sup>. On the other hand, e-cigarettes may be dangerous because of the frequent and longterm lung inhalation of diethylene glycol, nicotine and other toxic components, and because of the sub-standard manufacturing process, relative to pharmaceutical products <sup>[7]</sup>. Because of its rapid nicotine delivery <sup>[18]</sup>, the e-cigarette also has the potential to be addictive. In addition, the refill bottles may be dangerous as they contain up to one gram of nicotine, whereas the fatal dose of nicotine is estimated to be 30 to 60 mg for adults and 10 mg for children <sup>[15]</sup>. The e-cigarette may also enable smokers to continue to ‘smoke’ in smoke-free environments, thus delaying or preventing cessation in people who might otherwise quit. Finally, the

fruit and chocolate flavours may appeal to young people, and this raises the concern that e-cigarettes may facilitate initiation of nicotine dependence in young never-smokers [15]. However, none of these hypotheses has yet been tested.

One study has shown decreased desire to smoke with the use of e-cigarettes after overnight abstinence, when compared with a placebo or regular cigarettes, and an effect similar to a nicotine inhaler [21]. However, ENDS as a treatment for nicotine addiction, or as promoting long-term abstinence from tobacco, have not been formally investigated.

### E cigarettes-limitations

Information on the pharmacology, toxicology, and safety of e-cigarettes is limited. Accessible information provides details about the presence of nicotine (including cotinine), tobacco specific impurities (anabasine, myosmine, beta-nicotyrine), propylene glycol (rarely diethylene glycol), and tobacco specific nitrosamines (which include carcinogens) in commonly available brands of electronic cigarettes [22].

### Conclusion

Because of the huge burden of tobacco-related death and disease, and because e-cigarettes have potential to help smokers quit, there is an urgent need for research into these products. First, there is a need to know why and how these products are used, and whether users are satisfied with them. The e-cigarette is a novel nicotine delivery device, which has some appealing features and is gaining widespread interest.

However, a paucity of knowledge about e-cigarettes or electronic nicotine delivery systems (ENDS) and concerns about their safety and public health impact have raised important concerns about their use. ENDS are widely available, but are not FDA approved as quit smoking devices.

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