Electronic Cigarettes

Electronic cigarettes, also called e-cigarettes, are advertised as a safer, more convenient, and socially acceptable alternative to smoking tobacco cigarettes. Widely available in retail stores and on the Internet, their use has been increasing over recent years, primarily among smokers, but also among non-smokers.\(^1\),\(^2\)

THE DEVICES — E-cigarettes are battery-operated devices that typically consist of a mouthpiece and two interlocking plastic or metal tubes. Some models have an LED light at the tip that glows when the device is in use, giving it the appearance of a lit cigarette. The distal tube contains the battery. The proximal tube is a cartridge that contains a heating element (atomizer) and a reservoir of liquid (usually nicotine dissolved in propylene glycol and/or glycerin). When the user inhales, the liquid nicotine is vaporized into a visible mist. E-cigarettes are available in various strengths of nicotine (including no nicotine) and in flavors such as tobacco, cherry, and chocolate. Depending on the brand, each cartridge is designed to produce about 250-400 puffs, equivalent to the number obtainable from 1-2 packs of tobacco cigarettes.

CLINICAL STUDIES — E-cigarettes have not been approved by the FDA as aids in smoking cessation. In a study in adult smokers not intending to quit, 300 participants were randomized to e-cigarettes containing 5.4-7.2 mg of nicotine or no nicotine. At 12 weeks, complete abstinence from smoking tobacco cigarettes occurred in 14% of those randomized to a nicotine-containing e-cigarette and in 4% with the nicotine-free device.\(^3\) A randomized trial in 657 smokers who wanted to quit compared a 16-mg nicotine e-cigarette, a 21-mg nicotine patch, and a placebo e-cigarette. The percentage of patients who achieved abstinence from smoking tobacco cigarettes at 6 months was slightly higher with the nicotine e-cigarette (7.3%) than with the nicotine patch (5.8%) or placebo device (4.1%); these differences were not statistically significant.\(^4\)

ADVERSE EFFECTS — The most common adverse effects reported during clinical trials of e-cigarettes were mouth and throat irritation and dry cough. Lipoid pneumonia has been reported.\(^5\) In non-smokers, repeated exposure to nicotine in e-cigarettes could result in addiction and might increase the risk of ischemic vascular events.

CONTAMINANTS — In an analysis of 2 different brands of e-cigarette cartridges, the FDA found a number of impurities including polycyclic aromatic hydrocarbons and tobacco-specific nitrosamines, which are carcinogenic.\(^6\) A study evaluating the vapor from 12 brands of e-cigarettes found potentially toxic and carcinogenic substances, but at levels much lower than those found in cigarette smoke.\(^7\)

CONCLUSION — Electronic cigarettes are devices for inhalation of nicotine. Their efficacy as aids in smoking cessation remains to be established and their long-term safety is unknown. Use of electronic cigarettes by non-smokers could lead to nicotine addiction and possibly cardiovascular toxicity.

\(^7\) ML Goniewicz et al. Levels of selected carcinogens and toxicants in vapour from electronic cigarettes. Tob Control 2013 March 6 (epub).