

E-Cigarettes: Promise or Peril?

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KEYWORDS

• Tobacco • Policy • Smoking cessation • Smoke-free
• Harm reduction • Addiction

This article provides an overview of the history, production, and marketing of e-cigarettes, the contents of e-cigarettes and vapor, how they are used, public health concerns, and implications for nursing practice, research, and policy development. Current information was gathered by searching the professional literature and monitoring relevant websites and listservs. This article does not provide a comprehensive, systematic review of the pharmacokinetics and pharmacodynamics of e-cigarette use.

MECHANISM OF ACTION

E-cigarettes are battery-operated devices that contain cartridges generally filled with nicotine, flavor and other chemicals.^{1,2} Puffing activates a battery-operated heating element in the atomizer and the solution in the cartridge is vaporized and inhaled (**Fig. 1**).³ Because e-cigarettes do not burn tobacco, they do not emit smoke. Rather, the user inhales and exhales a vapor, also called a plume, fog, or aerosol.^{4–6} Most e-cigarettes are designed to look like traditional cigarettes and simulate the visual, sensory, and behavioral aspects of smoking traditional cigarettes.^{7,8} However, some e-cigarettes look like everyday items such as pens and USB memory sticks that may go unnoticed.⁹ E-cigarette cartridges can be refilled using drops of solution sold in bottles, some of which contain more than 500 mg of nicotine, approximately 10

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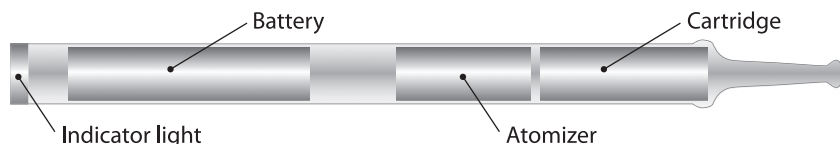


Fig. 1. E-cigarette components. (Courtesy of University of Kentucky. Copyright © 2011, University of Kentucky.)

times the lethal dose.³ Pauly and colleagues¹⁰ described the stated or implied intent of e-cigarettes as reducing toxins in the mainstream and secondhand smoke and helping smokers quit.

History of the Product, FDA Regulation, Current Marketing, and Profits

E-cigarettes were introduced into European markets in 2006 and American markets in 2007.¹¹ Because of the rapid increase in use and uncertainty about the chemical contents and their safety, the FDA blocked new shipments in 2008 under its authority to regulate drugs, drug delivery devices, or drug/device combinations under the Food, Drug, and Cosmetic Act (FDCA).¹² In July 2009, the FDA released laboratory analyses of a few e-cigarette samples and issued a public warning that e-cigarettes may contain carcinogens and toxic chemicals, as well as nicotine (which is highly addictive). In this warning, the FDA expressed concern about safety and marketing, including marketing to youth over the Internet and at mall kiosks.¹ In September 2010, the FDA sent warning letters to five e-cigarette manufacturers¹³ and wrote to the Electronic Cigarette Association inviting firms to work with the agency toward lawful marketing of e-cigarettes in the United States.⁹

In 2009, the FDA blocked import of a shipment from Sottera, an importer and distributor, claiming authority under the FDCA.¹⁴ Sottera, Inc. challenged the authority of the FDA to prevent import of its e-cigarettes, saying they serve the same purpose as cigarettes, and therefore should be regulated under the Tobacco Act.¹⁴ The District Court agreed and an appeal was filed. The US Court of Appeals for the Washington, DC Circuit decided in December 2010 that e-cigarettes can be regulated as “tobacco products” under the Family Smoking Prevention and Tobacco Control Act of 2009 and that they are not drugs/devices unless therapeutic claims are made. In a letter to stakeholders, the FDA announced the court decision and its intent to regulate e-cigarettes as tobacco products and to consider issuing a “guidance” and/or regulation on “therapeutic” claims.¹⁵ As of September 2011, the FDA was in the initial process of drafting a regulation; they will invite public comment and analyze the comments before a final regulation is issued.¹² When this regulation will be implemented or how broad it will be were unknown as of September 2011.

Meanwhile, those who support and manufacture alternative smoking products have become increasingly interested in the potential to enlarge their customer base and increase profits.² At least three major US organizations promote and advocate for e-cigarettes and other alternatives to smoking, including the Electronic Cigarette Association, the Consumer Advocates for Smoke-Free Alternatives Association (CASAA), and Vapers International, Inc.¹¹ In 2010, the National Vapers Club estimated that at least 1 million people in the United States used e-cigarettes and that the number of e-cigarette companies had risen to approximately 300.¹⁶ In January 2009, Ruyan Group, Ltd. reported worldwide revenues of approximately \$54 million and Vapor Corp reported \$7.95 million in US sales.¹¹

Internet marketing has proliferated through Web sites, social networking sites such as Facebook, YouTube promotional videos, advertising on search engines, and

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