# Electronic Cigarettes and Vape Devices

## A Comprehensive Guide for Clinicians and Health Professionals

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*We dedicate this book to the memory of Regina Whitmore, MPH, director of the Division of Tobacco Control at the American Academy of Pediatrics (AAP) and center administrator of the AAP Julius B. Richmond Center of Excellence from 2010 to 2015. Regina was a staunch supporter of the crusade against tobacco and tobacco-related diseases and a tireless advocate for children. Regina's hope was that someday, all children might live in a world free of tobacco and secondhand smoke. We hope to carry that vision forward through this work.*

# Introduction

In the 1960s, 43% of adults in the United States smoked cigarettes, and it was routine to see smoking on planes, restaurants, and even in hospitals. While today's rate of adult smokers is still unacceptably high, in 2020 it had dropped to 13%. At the same time, youth tobacco use has skyrocketed, largely due to the use of a new type of tobacco product, e-cigarettes and vape devices. Data from the National Youth Tobacco Survey 2020 (data collection prior to the pandemic) reports that 19.6% of high school students had used e-cigarettes in the past 30 days.

In order to understand the impact of e-cigarette use on individual and population health, it is crucial to understand more about these products and the factors that have resulted in the rapid increase in awareness and use. *The Health Impacts of Electronic Cigarettes and Vape Devices* addresses these questions with some of the foremost experts in the field of tobacco control using a scientific approach to the available literature. Thus, the book begins with a history of tobacco and efforts of the tobacco industry to market and advertise to youth.

There is no question that e-cigarettes have negative health impacts for youth users and non-users of tobacco and nicotine. There is overwhelming evidence detailed that e-cigarettes have harmful health effects in the short term, while the impact of long-term health effects, particularly on the developing body and mind, may not be fully understood for decades. This book reviews not only the health effects for the user, but the potential health impact of secondhand aerosol exposure. It was not until 1986 that the Surgeon General reported in *The Health Consequences of Involuntary Smoking* on the harmful health effects of secondhand smoke exposure; we now know tobacco smoke exposure causes a myriad of diseases, while worsening and contributing to many more.

The impact of e-cigarettes on population health has been more challenging to answer. The literature on e-cigarettes as a smoking cessation device has not favored the use of e-cigarettes over FDA-approved tobacco cessation pharmacotherapy. One of the most revealing facts is that at the time of this publication, no e-cigarette company has filed an application to the FDA as a smoking cessation device. Meanwhile, millions of youth are frequent users of e-cigarettes, and there is limited research and resources to address adolescent nicotine addiction. Chapter 6 of this book addresses

treatment for youth e-cigarette use and presents recommendations to address nicotine addiction while recognizing that there is a fervent need for more research on treating adolescent nicotine action.

In considering the final question of the factors that have contributed to the rapid rise of youth e-cigarette use, it is relevant to consider the framework proposed by Dr. Julius Richmond, 12th Surgeon General of the United States, for advancing public health policy. He described a three-pronged strategy which includes strengthening the knowledge base, social strategies, and political will. While many of the chapters of this book summarize the knowledge base on e-cigarettes, the social strategies and political will necessary to reverse the trend of youth e-cigarette use is equally as important for readers to consider. Chapters 8 and 9 of this book address the role of marketing and advertising in changing social norms around tobacco use as well as the federal, state, and local policies and advocacy opportunities.

There has never been a more important time to focus on prevention and treatment of tobacco use, particularly as we consider the known and potential health harms of e-cigarette use to our youth. Tobacco use is a social determinant of health, contributing to the significant and unacceptable health disparities present in the population. We must learn from the lessons of the past and hope this book provides a useful summary of the current literature and opportunities for research, advocacy, and education.

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# Chapter 1
# A Brief History of Tobacco and Implications for New Tobacco Products


**Jonathan D. Klein and Elissa A. Resnick**

Before the late 1800s, combustible tobacco use (smoking) in America was largely limited to Native American ceremonial usage. Despite popular imagery to the contrary, this ceremonial usage was infrequent, and burning the leaves of the plant was either sacred or medicinal in intent, rather than casual, commercial, or addicted use [1]. Habitual tobacco use through most of the nineteenth century was limited to chewing tobacco. Cigarettes became more readily available in 1881 with the advent of the automatic cigarette rolling machine. At the turn of the twentieth century, combustible tobacco also came to be preferred, as public health efforts discouraged spittoon use to try to curb the spread of both influenza and tuberculosis [2].

Early advocacy against tobacco was led by religious health advocates, including the YMCA, Salvation Army, and Woman's Christian Temperance Union. These groups were largely concerned that cigarette smoking would lead to the use of alcohol and narcotics. The Anti-Cigarette League of America, founded in 1899 by Woman's Christian Temperance Union member Lucy Page Gaston, had more than 300,000 members by 1901. Their advocacy led to cigarette sale bans in 15 states by 1921 [3].

World War I brought an end to the early anticigarette movement in the US. Servicemen smoking helped elevate the image of cigarettes as a symbol of masculinity and strength, rather than as a gateway drug for those who were "weak." Previous supporters of the anticigarette movement began distributing cigarettes to the troops in an effort to be seen as patriotic [3]. Cigarettes were considered necessary for troop morale and Congress ordered their inclusion in daily rations for those overseas. The tobacco industry seized this opportunity and developed patriotic-themed advertisements [4]. At the same time, smoking among women also increased, due to targeted advertising and changing social roles during the war [5]. The tobacco industry successfully lobbied to repeal anticigarette laws, often employing

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members of the American Legion and Veterans of Foreign Wars to argue that these laws were unpatriotic. The antitobacco movement was also undermined by governments' need for funds during prohibition, when alcohol tax revenues were not available.

Postwar public health research started to show the connection between smoking and cancer, and shorter life expectancy [6, 7]. Despite these findings, cigarette consumption continued to increase rapidly during this time period, and smoking began to be considered a normative behavior, fueled by advertising and the media. (See Fig. 1.1 for a historical view of smoking over the course of the twentieth century).

To combat growing public health concerns about cigarettes, tobacco companies used physicians' endorsements in advertisements [8, 9]. American Tobacco's Lucky Strike cigarettes was the first to mention physicians. The company promoted "toasted" tobacco, a product created by heat-curing rather than drying tobacco leaves, claiming they decreased throat irritation – and included an image of a white-coated doctor on their advertisements. Importantly, neither the doctor nor the health claim was real. RJ Reynolds also employed medical advice with Camel's slogan "More doctors smoke Camels than any other cigarette" (Fig. 1.2). The claim was

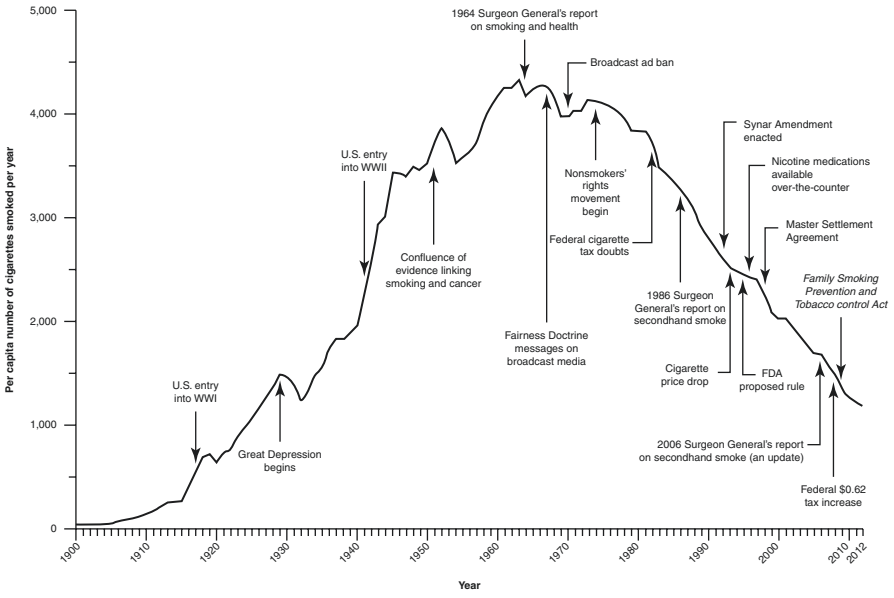


**Fig. 1.1** From the 2014 Surgeon General's Report. Adult (≥18 years) per capita cigarette consumption and major smoking and health events, United States, 1900–2012 (*Source:* From the National Center for Chronic Disease Prevention and Health Promotion (US) Office on Smoking and Health. The Health Consequences of Smoking—50 Years of Progress: A Report of the Surgeon General. Atlanta (GA): Centers for Disease Control and Prevention (US); 2014. 2, Fifty Years of Change 1964–2014. https://www.ncbi.nlm.nih.gov/books/NBK294310/as adapted from Warner 1985; U.S.DHHS 1989; Creek et al. 1994; U.S. Department of Agriculture 2000; U.S. Census Bureau 2013; and US Dept of the Treasury 2013)


**Fig. 1.2** Camel Doctor Advertisement. R.J. Reynolds's campaign to reassure the public about the safety of their products used an image of a doctor with the statement "More Doctors smoke Camels." R.J. Reynolds was able to make this claim through surveys conducted immediately after Camel cigarette samples were gifted to doctors at medical conventions (From the collection of Stanford Research Into the Impact of Tobacco Advertising (tobacco.stanford.edu))

based on a survey the company conducted immediately after providing free cartons of Camels to physicians at an AMA meeting [10].

During the so-called Golden Age of Hollywood, tobacco companies partnered with movie studios to portray smoking as glamorous [11]. Cross promotion of movies and tobacco benefited both industries, but damaged public health. From 1937 to 1938, American Tobacco paid the over $218,000 (the equivalent of $3.7 M today) to 42 Hollywood stars. These actors and actresses smoked on screen and appeared in ads, in exchange for which American Tobacco paid for the film studio's advertising campaigns. As the US entered World War II, the daily rations of cigarettes for soldiers was increased above what had been provided during World War I. Tobacco companies created advertisements with soldiers, further cementing smoking as a symbol of strength and patriotism [4, 12] (Fig. 1.3). Even cartoon strip soldiers were depicted as smokers [13].

In the early 1950s, more evidence linking smoking to lung cancer became public, resulting in a slight dip in cigarette sales. The tobacco industry responded by forming the Tobacco Industry Research Committee in 1953, an organization dedicated to attacking scientific studies [14]. That same year, companies created filtered cigarettes and promoted the new product as a healthy alternative. Despite the illusion that these new products were safer, smokers of filtered cigarettes often inhaled as much or more tar, nicotine, and other toxins as those who smoked unfiltered cigarettes. Although the tobacco companies knew and recognized (in internal documents) that filters did not make their products safer, they continued to advertise them as such [15]. Tobacco company product placement also continued in the 1950s, expanding to television as this media became more popular. Cigarette brands sponsored shows and invested in product placement; and even Fred Flintstone smoked Winston cigarettes [16]. (This video and other images from tobacco's marketing efforts are available at http://tobacco.stanford.edu/tobacco_main/videolist_tvshows.php from the Stanford Research into the Impact of Tobacco Advertising website.)

In 1958, the tobacco industry centralized their efforts to undermine public health by forming the Tobacco Institute, which supported the Tobacco Industry Research Committee's attempts to discredit public health science. The Tobacco Institute claimed that antitobacco advocates and scientists had distorted evidence and overinterpreted findings. They argued that there was insufficient or inconclusive evidence to support tobacco legislation or regulation. In addition to casting doubts on science, the Tobacco Institute described smoking as a personal choice rather than an addiction and argued that health problems afflicting smokers were due to heredity and lifestyle choices other than smoking [17].

Cigarette consumption continued to escalate, peaking in early 1960s. After this, rates began to decline as a result of public health efforts, starting with the 1964 report "Smoking and Health: Report of the Advisory Committee of the Surgeon