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Is Vaping Safer than Smoking Cigarettes?

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Electronic cigarettes, or e-cigarettes, are being marketed as the “safe” new alternative to conventional cigarettes. They now come in a variety of forms and include vape mods, Juuls, and vape pens. The focus of this article is on e-cigarettes because most of the research that exists has been done on them, but much of the information below is relevant to these other products as well.

The big questions are: Are they safe? What does the FDA think about them? Will they reverse the decline in smoking—giving new life to an old habit—or can they help people quit smoking? Here is what you need to know.

What are E-cigarettes?

E-cigarettes are battery-operated devices that were initially shaped like cigarettes, but now include vape mods, Juuls, and vape pens. All these products contain nicotine, an addictive drug that stimulates, relaxes, and is naturally found in tobacco. It is the nicotine in cigarettes that makes smoking so addictive, and the same is true for vaping and juuling. These electronic products allow nicotine to be inhaled, and they work by heating a liquid cartridge containing nicotine, flavors, and other chemicals into a vapor. Because e-cigarettes heat a liquid instead of tobacco, what is released is considered smokeless.^[1]

Is Vaping Safer than Smoking Traditional Cigarettes?

The key difference between traditional cigarettes and e-cigarettes and related products is that the latter don't contain tobacco. But, it isn't just the tobacco in cigarettes that causes cancer. Traditional cigarettes contain a laundry list of chemicals that are proven harmful, and e-cigarettes have some of these same chemicals.

Since 2009, FDA has pointed out that e-cigarettes contain “detectable levels of known carcinogens and toxic chemicals to which users could be exposed.” For example, in e-cigarette cartridges marketed as “tobacco-free,” the FDA detected a toxic compound found in antifreeze, tobacco-specific compounds that have been shown to cause cancer in humans, and other toxic tobacco-specific impurities.^[2] Another study looked at 42 of these liquid cartridges and determined that they contained formaldehyde, a chemical known to cause cancer in humans.^[3] Formaldehyde was found in several of the cartridges at levels much higher than the maximum EPA recommends for humans. In 2017, a study published in the Public Library of Science Journal showed that significant levels of

benzene, a well-known carcinogen, were found in the vapor produced by several popular brands of e-cigarettes.^[4]

The body's reaction to many of the chemicals in traditional cigarette smoke causes long-lasting inflammation, which in turn leads to chronic diseases like bronchitis, emphysema, and heart disease.^[5] Since e-cigarettes also contain many of the same toxic chemicals, there is no reason to believe that they will significantly reduce the risks for these diseases.

In fact, a preliminary study presented at the 2018 annual meeting of the American Chemical Society found that vaping could damage DNA [16]. The study examined the saliva of 5 adults before and after a 15-minute vaping session. The saliva had an increase in potentially dangerous chemicals, such as formaldehyde and acrolein. Acrolein has been proven to be associated with DNA damage, for example, and DNA damage can eventually cause cancer.^[18]

A study of mice funded by the National Institutes of Health found that e-cigarette smoke could cause mutations in DNA that could increase the risk of cancer. These specific mutations have been shown to potentially contribute to the development of lung and bladder cancer in mice exposed to electronic cigarette smoke. The researchers claim that these chemicals could also induce mutations leading to cancer in humans. Although mice studies aren't always relevant to human health, this study seems to confirm the studies of human health and e-cigarettes.^[19]

Because they are smokeless, many incorrectly assume that e-cigarettes are safer for non-smokers and the environment than traditional cigarettes. However, a study published in the International Journal of Hygiene and Environmental Health found that the use of e-cigarettes results in increased concentrations of volatile organic compounds (VOCs) and airborne particles, both of which are potentially harmful when inhaled.^[6] Although e-cigarette vapor may not result in the obvious smell and visible smoke of traditional cigarettes, it still has a negative impact on air quality, especially when vaping indoors.

There are no long-term studies to back up claims that the vapor from e-cigarettes is less harmful than conventional smoke. Cancer takes years to develop, and e-cigarettes were only very recently introduced to the United States. It is almost impossible to determine if a product increases a person's risk of cancer or not until the product has been around for at least 15-20 years. Despite positive reviews from e-cigarette users who enjoy being able to smoke them where regular cigarettes are prohibited, very little is known about their safety and long-term health effects.

Can Vaping Help to Cut Down or Quit Smoking Regular Cigarettes?

If a company makes a claim that its product can be used to treat a disease or addiction, like nicotine addiction, it must provide studies to the FDA showing that its product is safe and effective for that use. On the basis of those studies, the FDA approves or doesn't approve the product. So far, there are no large, high-quality studies looking at whether e-cigarettes can be used to cut down or quit smoking long-term. Most of the studies have been either very short term (6 months or less) or the participants were not randomly assigned to different methods to quit smoking, including e-cigarettes. Many of the studies are based on self-reported use of e-cigarettes. For example, a study done in four countries found that e-cigarette users were no more likely to quit than regular smokers even though 85% of them said they were using them to quit.^[7] Other year-long studies, conducted in the U.S., had similar findings. A study published in a prestigious medical journal in 2014 found that although smokers may believe they are vaping e-cigarettes to help them quit, 6-12 months after being first interviewed, nearly all of them are still smoking regular cigarettes.^[8] Similarly, a year-long study published in 2018 compared smokers who used e-cigarettes to traditional cigarette smokers,

and concluded that e-cigarette users were more likely to say they were trying to quit but no more likely to successfully kick the smoking habit, with 90% of e-cigarette users still smoking regular cigarettes at the end of the study. Until there are results from well-conducted studies, the FDA has not approved e-cigarettes for use in quitting smoking.^[9]

Teenagers, Children, and Vaping

The percentage of teenagers who have tried e-cigarettes almost quadrupled over just four years, from 5% in 2011 to 19% in 2015. Three million U.S. students in middle school and high school tried e-cigarettes in 2015, according to the National Youth Tobacco Survey. And, 1 in 5 middle schoolers who said they had tried e-cigarettes also said they had never smoked conventional cigarettes.^[10]

E-cigarette and juul use by young people is worrisome for a number of reasons:

1. The younger people are when they begin smoking, the more likely it is they will develop the habit: nearly 9 out of 10 smokers started before they were 18.^[11]
2. Nicotine and other chemicals found in e-cigarettes, juuls, etc. might harm brain development in younger people.^[12]
3. Vaping may introduce many more young people to smoking who might otherwise never have tried it, and once they are addicted to nicotine, some may decide to get their “fix” from regular cigarettes. Whether vaping or juuling is a “gateway” to regular cigarettes or not, young people who use them risk becoming addicted to nicotine and exposing their lungs to harmful chemicals.

The sharp rise in vaping among youth highlights the need to stop manufacturers from targeting teenagers with candy-like flavors and advertising campaigns.

Even children who are too young to smoke have been harmed by e-cigarettes and related products. The liquid is highly concentrated, so absorbing it through the skin or swallowing it is far more likely to require an emergency room visit than eating or swallowing regular cigarettes. In 2012, less than 50 kids under the age of six were reported to poison control hotlines per month because of e-cigarettes. In 2015, that number had skyrocketed to about 200 children a month, almost half of which were under the age of two!^[13]

How are these products regulated?

The FDA was given the power to regulate the manufacturing, labeling, distribution and marketing of all tobacco products in 2009 when President Obama signed into law the **Family Smoking Prevention and Tobacco Control Act** and in 2010 a court ruled that the FDA could regulate e-cigarettes as tobacco products.^[14]

It wasn't until 2016 that the FDA finalized a rule to regulate e-cigarettes, which would ban the sale of e-cigarettes to anyone under the age of 18 and would require all e-cigarettes that hit shelves after February 15, 2007 to go through a “premarket review,” the process that the FDA uses to determine whether potentially risky products are safe.^[15] Companies were to be given from 18 months to two years to comply with this rule and prepare their applications. However, in 2017, the Trump administration appointed a new FDA Commissioner, Dr. Scott Gottlieb, who defended the safety of e-cigarettes and delayed implementing the rules until 2022.^[16] However, as the epidemic of e-cigarette use among youth became obvious, in 2018, Commissioner Gottlieb has threatened to crack down on the advertising of e-cigarettes to children under 18.^[17] Critics have questioned whether sales and ads can be effectively restricted.

In the meantime, individual states have always had the power to pass laws restricting the sale and use of e-cigarettes. For example, in May 2013, the California state senate proposed a law making all e-cigarettes subject to the same regulations and restrictions as traditional cigarettes and tobacco products. However, that did not become law.

The Bottom Line

E-cigarettes, juuls, and other similar products have not been around long enough to determine the extent to which they may be harmful to users in the long run. Unfortunately, many people, including teenagers, are under the impression that e-cigarettes are safe or that they are effective in helping people quit smoking regular cigarettes. Studies by the FDA show that e-cigarettes contain some of the same toxic chemicals as regular cigarettes, even though they don't have tobacco. There is evidence that some of these toxic chemicals can cause DNA damage that can cause cancer. The big three tobacco companies—Lorillard, Reynolds American, and Altria Group—all have their own e-cigarette brands, so it's not surprising that e-cigarettes are being marketed and advertised much the way regular cigarettes used to be. Here are the [7 Ways E-Cigarette Companies Are Copying Big Tobacco's Playbook](#).

Although there are studies that raise serious concerns about vaping, more research is needed to reinforce the impact of vaping on DNA damage, especially in children. Meanwhile, claims that e-cigarettes are an effective strategy to quit smoking are not supported by the evidence thus far. In addition, more toxicological studies are needed to understand the short-term impact and epidemiological studies are needed to study long-term harm. Overall, what is needed is research to compare the risks of e-cigarettes with tobacco products, as well as to neither smoking nor vaping.

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