E-cigarettes and Lung Health

Electronic cigarettes, or e-cigarettes, are a popular new tobacco product that have still largely unknown public and individual health effects. In fact, you may be surprised to learn that e-cigarettes are entirely unregulated by the U.S. Food and Drug Administration (FDA). Because of this, there are no safety checks or requirements for what can go into an e-cigarette.

The American Lung Association is concerned about the potential health consequences of e-cigarettes. Federal oversight and regulation of e-cigarettes is desperately needed to protect children and the public. This need becomes more urgent as e-cigarette use dramatically increases, especially among youth.

What Are E-cigarettes?

E-cigarettes, including e-pens, e-pipes, e-hookah and e-cigars, are known collectively as electronic nicotine delivery systems (ENDS). According to the FDA, e-cigarettes are devices that allow users to inhale an aerosol (vapor) containing nicotine or other substances.

Unlike traditional cigarettes, e-cigarettes generally are battery-operated and use a heating element to heat e-liquid from a refillable cartridge, releasing a chemical-filled aerosol.

What Is in E-cigarettes?

The main component of e-cigarettes is the e-liquid contained in cartridges. To create an e-liquid, nicotine is extracted from tobacco and mixed with a base (usually propylene glycol), and may also include flavorings, colorings and other chemicals.

Because there is no government oversight of these products, nearly 500 brands and 7,700 flavors of e-cigarettes are on the market, all without an FDA evaluation determining what’s in them. So there is no way for anyone—healthcare professionals or consumers—to know what chemicals are contained in e-liquids, or how e-cigarette use might affect health, whether in the short term or in the long run.

Early studies show that e-cigarettes contain nicotine and also may have other harmful chemicals, including carcinogens.

Nicotine

Nicotine is an addictive substance, and almost all e-cigarettes contain nicotine. Even some products that claim to be nicotine-free still may contain the drug. For instance, initial FDA lab tests conducted in 2009 found that cartridges labeled as nicotine-free had traceable levels of nicotine. A 2014 study found little consistency in the amount of nicotine delivered by e-cigarettes of the same brand and strength.\(^1\) Similarly, another 2014 study found that the amount of nicotine in e-liquid refills often is substantially different from the amount listed on the package.\(^2\) Experienced users learn how to use e-cigarettes in a way that
increases their exposure to nicotine. Newer e-cigarette devices, especially “tank” styles with higher voltage, also deliver a greater concentration of nicotine. This matters because the more nicotine used, the greater the potential for addiction.

Nicotine is not safe. The U.S. Surgeon General has found exposure to nicotine during pregnancy harms the developing fetus, and causes lasting consequences for developing brain and lung function in newborns. Nicotine exposure also affects maternal and fetal health during pregnancy, and can result in low birth weights, preterm delivery and stillbirth.

Nicotine also negatively impacts adolescent brain development. Human brain development continues far longer than was previously realized, and nicotine use during adolescence and young adulthood has been associated with lasting cognitive and behavioral impairments, including effects on working memory and attention.³

**Other chemicals**

Without FDA regulation and review, we simply don't know what is in e-cigarettes. However, in initial lab tests conducted in 2009, the FDA found detectable levels of toxic cancer-causing chemicals—including an ingredient used in antifreeze—in two leading brands of e-cigarettes and 18 various cartridges. A review of studies found that levels of toxins in e-cigarette aerosol varied considerably within and between brands. A 2014 study found that aerosol from e-cigarettes with a higher voltage level contains more formaldehyde, another carcinogen with the potential to cause cancer. The findings are alarming, and the American Lung Association urgently calls for FDA oversight of these products.

Flavors in e-cigarettes also cause concern. Not only are flavors used to target kids, but they may be harmful on their own. E-cigarette and flavor manufacturers and marketers may suggest that the flavor ingredients used in e-cigarettes are
safe because they have FEMA GRAS™ status for use in food, but such statements are false and misleading. The reality is that FEMA GRAS™ status does not apply to inhaled substances; it only applies to food, meaning that substances with FEMA GRAS™ status are safe to eat, but perhaps not to inhale.

**Poisoning concern**

Aside from concerns about e-cigarette use and emissions alone, calls to the nation’s poison centers related to e-cigarette exposure poisonings are rapidly increasing, according to data released by the Centers for Disease Control and Prevention (CDC). One study found that while most calls involving e-cigarette liquid poisoning came from accidental ingestion of the e-cigarette or its liquid, about one-sixth of the calls related to someone inhaling these items. Exposure through the eye and the skin were also reported.

Large doses of nicotine have a potential for poisoning, with symptoms beginning with nausea and vomiting in cases of acute toxicity and progressing to seizures and respiratory depression in cases of severe nicotine poisoning. This is particularly true in children; calls to poison control centers related to children and nicotine have spiked nationwide. Tragically, one child died from acute e-cigarette poisoning in 2014, attributed to the ingestion of liquid nicotine from an e-cigarette.

**Secondhand Emissions from E-cigarettes**

As public spaces increasingly become smokefree, anecdotal reports show some people are using e-cigarettes indoors and in smokefree public spaces, including bars, restaurants and on public transportation.

While e-cigarettes do not produce smoke, they do expose others to secondhand emissions. Little is known about these emissions or the potential harm they may cause. Two initial studies have found formaldehyde, benzene and tobacco-
specific nitrosamines (all carcinogens) coming from those secondhand emissions. Other studies have shown that chemicals exhaled by users also contain formaldehyde, acetaldehyde and other potential toxins. There is no evidence that shows e-cigarettes emissions (secondhand aerosol) are safe for non-users to inhale.

The Lung Association supports prohibiting the use of e-cigarettes in worksites and public places, and including e-cigarettes under smokefree laws with other tobacco products. Currently, three states and hundreds of communities have prohibited e-cigarette use in the same places where smoking already is prohibited.

**Can E-cigarettes Help Someone Quit Smoking?**

Many e-cigarette companies market their product as a tool to help smokers quit. However, the FDA's Center for Drug Evaluation and Research has not approved any e-cigarette as a safe or effective method to help smokers quit.

Instead of quitting, many e-cigarette users are continuing to use e-cigarettes while still using conventional cigarettes. In 2013, 76.8 percent of the people who recently used e-cigarettes also currently smoked conventional cigarettes. The U.S. Surgeon General has found that even smoking a few cigarettes a day is dangerous to your health.

The U.S. Public Health Service has found that the seven therapies approved by the U.S. Food and Drug Administration in combination with individual, group or phone cessation counseling are the most effective way to help smokers quit. Until and unless the FDA approves a specific electronic nicotine delivery system or e-cigarette as safe and effective for use as a tobacco cessation aid, the Lung Association does not support using them for cessation, nor does it support any direct or implied claims that e-cigarettes help smokers quit.
Youth and E-cigarettes

Youth are using e-cigarettes at increasing and alarming rates. According to the CDC, e-cigarette use among both high school and middle school students tripled in one year, increasing from 4.5 percent in 2013 to 13.4 percent in 2014 among high school students, and from 1.1 percent in 2013 to 3.9 percent in 2014 among middle school students. Youth use of e-cigarettes has now surpassed youth cigarette smoking.¹

The tobacco industry aggressively markets e-cigarettes to youth, glamorizing e-cigarette use in advertisements and offering e-cigarettes in candy flavors such as bubble gum and gummy bears. Kids also can easily buy e-cigarettes online, according to a March 2015 study published in the Journal of JAMA Pediatrics. Learn more about youth e-cigarette use. Basic FDA oversight, which would include youth access restrictions, is needed to protect kids from becoming the next generation hooked on nicotine.

Bottom Line

Without regulation by the FDA and despite being on the market for several years, there still is a lot we do not know about e-cigarettes. Initial tests have found e-cigarettes contain varying levels of the addictive substance nicotine as well as cancer-causing chemicals, such as formaldehyde.

The American Lung Association is concerned about the potential health consequences of e-cigarettes. It is urgent for FDA to begin regulatory oversight of e-cigarettes, which would require ingredient disclosure to FDA, warning labels and youth access restrictions. Learn more about why FDA regulation is needed.

Learn more: Read the American Lung Association's statement on e-cigarettes.
Sources


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