

E-cigarettes and Vaping

E-cigarettes come in lots of shapes and sizes and are known by many different names. They are also a fairly new product. People sometimes find it hard to figure out what's in them and whether they are safe to use.

Here, we answer some of the most common questions about e-cigarettes (vaping), including the health risks and possible long-term effects.

- [What are e-cigarettes?](#)
- [What is vaping?](#)
- [How do e-cigarettes work?](#)
- [Do e-cigarettes contain nicotine?](#)
- [What is in the aerosol \("vapor"\) of an e-cigarette?](#)
- [What are the health risks of e-cigarettes?](#)
- [Does e-cigarette use cause cancer?](#)
- [Is exposure to secondhand e-cigarette aerosol harmful?](#)
- [What is known about the use of e-cigarettes by youth?](#)
- [Can e-cigarettes explode?](#)
- [Can e-cigarettes help people quit using tobacco?](#)
- [Dual use of cigarettes and e-cigarettes](#)
- [Where can I find more information?](#)

What are e-cigarettes?

E-cigarettes are known by many different names. This includes e-cigs, vapes, vape pens, electronic nicotine delivery systems (ENDS), alternative nicotine delivery systems (ANDS), e-hookahs, mods, vaporizers, and tank systems. E-cigarettes are also sometimes known by their brand names.

E-cigarettes are available in many shapes and sizes. They can look like cigarettes, cigars, pipes, pens, and USB flash drives. Or they can take other forms.

All e-cigarettes include a battery that turns the device on, a heating element that heats the e-liquid and turns it into an aerosol of tiny particles (sometimes called a “vapor”), a cartridge or tank that holds the e-liquid, and a mouthpiece or opening used to inhale the aerosol.

E-cigarettes don’t have tobacco, but many of them have nicotine, which comes from tobacco. Because of this, the U.S. Food and Drug Administration (FDA) classifies them as “tobacco products.”

What is vaping?

The use of e-cigarettes is often called “vaping” because many people believe it creates a vapor that is inhaled. But in fact, e-cigarettes create an aerosol made up of tiny particles. This is different from a vapor.

How do e-cigarettes work?

E-cigarettes heat a liquid (called e-liquid, e-juice, or vape juice) and to turn it into an aerosol (sometimes called a “vapor”). When a person uses an e-cigarette, they inhale this aerosol into their lungs.

Do e-cigarettes contain nicotine?

The e-liquid in most e-cigarettes has nicotine, the same addictive chemical in regular cigarettes, cigars, hookah, and other tobacco products. But nicotine levels aren’t the same in all types of e-cigarettes. Sometimes, product labels don’t list the true nicotine content.

There is evidence that nicotine harms the brain development of teenagers. If nicotine is used during pregnancy, it can also cause premature births and low birthweight babies.

There are some e-cigarette brands that have been found to contain nicotine even though they claim to be nicotine-free.

What is in the aerosol (“vapor”) of an e-cigarette?

The term “vapor” might sound harmless. But the aerosol that comes out of an e-cigarette is not water vapor, and it *can* be harmful. The aerosol from an e-cigarette can contain nicotine and other substances that are addictive. These chemicals can also cause lung disease, heart disease, and cancer.

In addition to nicotine, e-cigarettes and e-cigarette vapor may also have these chemicals or substances:

Propylene glycol and/or vegetable glycerin

These are considered safe if they are ingested (eaten) or applied to skin. They have not been rated as safe to breathe in, and they may cause lung irritation and allergic reactions. In some situations, they may turn into cancer-causing chemicals.

Volatile organic compounds (VOCs)

At certain levels, VOCs can cause eye, nose, and throat irritation, headaches, and nausea. They can damage the liver, kidneys, and nervous system.

One type of VOC is formaldehyde, which is known to cause cancer. Formaldehyde can form if e-liquid overheats, or if not enough liquid reaches the heating element (known as a “dry-puff”).

Flavoring chemicals

Some flavorings are more harmful than others. Studies show that some flavors have different levels of a chemical called diacetyl. Diacetyl has been linked to a serious lung disease called bronchiolitis obliterans, also known as popcorn lung.

The FDA does not currently require safety testing for all the substances in e-cigarettes. It's also hard to know exactly what chemicals are in an e-cigarette because most products don't list everything that's in them. Some products are also labeled incorrectly.

People who vape also need to check and make sure the products they buy haven't been changed or modified. This can lead to exposure to possibly harmful or illegal substances from unknown sources and raise the risk of health problems, like lung damage.

What are the health risks of e-cigarettes?

The long-term health risks of e-cigarettes are still being studied. But health problems have been found in people who use them. Children and teenagers are at greater risk for these problems.

Health problems found in people who use e-cigarettes include:

Nicotine addiction

Most e-cigarettes have nicotine, which is addictive. Quitting e-cigarettes is just as hard as quitting other types of tobacco.

Nicotine might also harm brain development in children and teenagers who use e-cigarettes and other vaping products. This can lead to problems with thinking, focusing, and behavior control.

Lung and heart problems

E-cigarettes and other similar products have been linked to lung problems. Using them can increase your risk of breathing problems. This includes worsening asthma symptoms, more frequent bronchitis, and lung infections.

The nicotine in e-cigarettes also increases heart rate, raises blood pressure, and might irritate blood vessels.

We still don't fully understand the health problems people might have if they use e-cigarettes for a long time. But it's concerning that things like irritated blood vessels, and increased heart rate and blood pressure, are also seen in people who [smoke regular cigarettes](#)¹.

E-cigarette or vaping product use-associated lung injury (EVALI)

In 2019 there were many reports of **serious lung disease** in some people using e-cigarettes or other vaping devices. Symptoms included:

- Cough, trouble breathing, or chest pain
- Nausea, vomiting, or diarrhea
- Fatigue, fever, or weight loss

Some people had to be hospitalized, and some died from their illness. Some of these lung injuries were linked to products that were changed, including products that had

vitamin E acetate. But there were also many EVALI cases that didn't involve added vitamin E.

The number of EVALI cases has since dropped, but there are still people being diagnosed with EVALI. More studies are being done to look for other possible causes.

Other health problems

There have been reports of people having seizures after vaping. This has been reported most often in young people. These seizures are thought to be caused by nicotine, but more studies are being done.

Studies are also starting to show a link between e-cigarette use and damage to teeth and other oral tissues. This includes cavities in the teeth and irritation of gums and other membranes in the mouth.

Does e-cigarette use cause cancer?

Scientists are still learning about how e-cigarettes affect health when they are used for long periods of time. It's important to know that the aerosol ("vapor") from an e-cigarette has some cancer-causing chemicals.

Is exposure to secondhand e-cigarette aerosol harmful?

E-cigarettes expose people to secondhand aerosol or "vapor" that can contain harmful chemicals.

Scientists are still learning about the health effects of being exposed to secondhand e-cigarette aerosol. But the U.S. Surgeon General has said that e-cigarette aerosol is not harmless. Secondhand aerosol can expose others to nicotine and possibly to other harmful chemicals.

The smoke-free and tobacco-free policies at schools, businesses, healthcare institutions, and other organizations should also cover e-cigarettes. This will help non-users avoid being exposed to potentially harmful e-cigarette aerosol.

What is known about the use of e-cigarettes by youth?

No youth should use e-cigarettes or any tobacco product. This includes middle schoolers and high schoolers.

The addictive nicotine found in most e-cigarettes can harm the brain development of teenagers. Studies also show that young people who vape are more likely to become regular users of cigarettes and other, more harmful tobacco products.

According to the FDA 2024 National Youth Tobacco Survey, the use of e-cigarettes dropped among middle and high schoolers during the previous year. However, there are still millions of young people using these products on an ongoing basis.

The FDA has the authority to regulate all tobacco products, including e-cigarettes. The FDA is working on several options to prevent youth access to e-cigarettes. For example, federal law prohibits the sale of any tobacco product, including e-cigarettes, to anyone younger than 21 years of age.

Can e-cigarettes explode?

There have been reports of e-cigarettes exploding and causing serious injuries. The explosions are thought to be caused by faulty batteries or because the batteries were not handled as they should be. Visit the [FDA website](#)² for safety tips to help avoid an e-cigarette battery explosion.

Can e-cigarettes help people quit using tobacco?

E-cigarettes are not approved by the FDA as aids to help people stop smoking. This is because there is not enough research to show they help people stop using tobacco.

On the other hand, there are other proven methods that can help you [quit using tobacco](#)³. This includes FDA-approved nicotine replacement and other medicines. There is a lot of evidence showing that these methods work. They are safe and effective, especially when combined with counseling.

Some people choose to try e-cigarettes to help them stop smoking. But e-cigarettes have as much if not more nicotine as regular cigarettes and other tobacco products.

If you switch to e-cigarettes, you will still be dealing with nicotine and other health risks. And quitting e-cigarettes is just as hard as quitting other tobacco products.

Dual use of cigarettes and e-cigarettes

People who have switched completely from cigarettes to e-cigarettes **should not** switch back to smoking cigarettes (either solely or along with e-cigarettes). This could expose

them to even worse health effects.

Some people who smoke use both cigarettes and e-cigarettes at the same time. This is known as “dual use.” The dual use of e-cigarettes and tobacco cigarettes can lead to significant health risks.

Recent research indicates that people who use both cigarettes and e-cigarettes have a higher risk of getting lung cancer than people who only use cigarettes.

People should not use both products at the same time and are strongly encouraged to completely stop using all tobacco products.

Where can I find more information?

These resources can help you learn more about e-cigarettes:

[CDC: E-Cigarettes \(Vapes\)](#) ⁴

Information from the U.S. Centers for Disease Control and Prevention on the health effects of e-cigarettes, plus resources for quitting.

[FDA: E-cigarettes, Vapes, and Other ENDS Products](#) ⁵

Information and resources from the Food and Drug Administration about electronic nicotine delivery systems (ENDS), including e-cigarettes, e-cigars, and vape pens.

[American Cancer Society: Tobacco and Cancer](#) ⁶

Learn more about tobacco and its health effects, including cigarettes, smokeless tobacco, and e-cigarettes.

Hyperlinks

1. www.cancer.org/cancer/risk-prevention/tobacco/health-risks-of-smoking-tobacco.html
2. www.fda.gov/tobacco-products/products-ingredients-components/tips-help-avoid-vape-battery-fires-or-explosions
3. www.cancer.org/cancer/risk-prevention/tobacco/guide-quitting-smoking.html
4. www.cdc.gov/tobacco/e-cigarettes
5. www.fda.gov/tobacco-products/products-ingredients-components/e-cigarettes-

[vapes-and-other-electronic-nicotine-delivery-systems-ends](#)

6. www.cancer.org/cancer/risk-prevention/tobacco.html

References

Banks E, Yazidjoglou A, Brown S, et al. Electronic cigarettes and health outcomes: umbrella and systematic review of the global evidence. *Med J Aust*. 2023;218(6):267-275. doi:10.5694/mja2.51890

Bittoni MA, Carbone DP, Harris RE (2024) Vaping, Smoking and Lung Cancer Risk. *J Oncol Res Ther*; 9: 10229. <https://doi.org/10.29011/2574-710X.10229>.

Cao DJ, Aldy K, Hsu S, et al. Review of Health Consequences of Electronic Cigarettes and the Outbreak of Electronic Cigarette, or Vaping, Product Use-Associated Lung Injury. *J Med Toxicol*. 2020;16(3):295-310. doi:10.1007/s13181-020-00772-w

Douglas CE, Henson R, Drope J, Wender RC. The American Cancer Society public health statement on eliminating combustible tobacco use in the United States. *CA Cancer J Clin*. 2018;68(4):240-245. doi:10.3322/caac.21455

Irusa KF, Finkelman M, Magnuson B, Donovan T, Eisen SE. A comparison of the caries risk between patients who use vapes or electronic cigarettes and those who do not: A cross-sectional study. *J Am Dent Assoc*. 2022;153(12):1179-1183. doi:10.1016/j.adaj.2022.09.013

Jidong, H, Duan, Z, Kwok, J, Binns S, Vera LE, Kim Y, Szczypka G, Emery SL. Vaping versus JUULing: How the Extraordinary Growth and Marketing of JUUL Transformed the US Retail e-Cigarette Market. *Tobacco Control*. May 2018, Accessed at <https://doi.org/10.1136/tobaccocontrol-2018-054382> on November 15, 2018.

Langel SN, Kelly FL, Brass DM, et al. E-cigarette and food flavoring diacetyl alters airway cell morphology, inflammatory and antiviral response, and susceptibility to SARS-CoV-2. *Cell Death Discov*. 2022;8(1):64. Published 2022 Feb 15. doi:10.1038/s41420-022-00855-3

Lanspa M, Callahan SJ, Harris DL, Eve J, Collingridge D, Blagev D. Clinical presentation and outcome differences in e-cigarette or vaping product use associated lung injury (EVALIL) during the initial epidemic vs during the covid-19 pandemic. Presented at Chest 2023 of the American College of Chest Physicians; October 10, 2023; Honolulu, HI.

Liu-Zarzuela JA, Sun R. Three Seizures Provoked by E-cigarette Use in a Five-Year Period: A Case Report. *Cureus*. 2022;14(8):e27616. Published 2022 Aug 2. doi:10.7759/cureus.27616

Lyzwinski LN, Naslund JA, Miller CJ, Eisenberg MJ. Global youth vaping and respiratory health: epidemiology, interventions, and policies. *NPJ Prim Care Respir Med*. 2022;32(1):14. Published 2022 Apr 11. doi:10.1038/s41533-022-00277-9

Neczypor EW, Mears MJ, Ghosh A, et al. E-Cigarettes and Cardiopulmonary Health: Review for Clinicians. *Circulation*. 2022;145(3):219-232. doi:10.1161/CIRCULATIONAHA.121.056777

Owotomo O, Stritzel H, McCabe SE, Boyd CJ, Maslowsky J. Smoking Intention and Progression From E-Cigarette Use to Cigarette Smoking. *Pediatrics*. 2020;146(6):e2020002881. doi:10.1542/peds.2020-002881

Papaefstathiou E, Stylianou M, Agapiou A. Main and side stream effects of electronic cigarettes. *J Environ Manage*. 2019;238:10-17. doi:10.1016/j.jenvman.2019.01.030

Rose JJ, Krishnan-Sarin S, Exil VJ, et al. Cardiopulmonary Impact of Electronic Cigarettes and Vaping Products: A Scientific Statement From the American Heart Association. *Circulation*. 2023;148(8):703-728. doi:10.1161/CIR.0000000000001160

Sahu R, Shah K, Malviya R, et al. E-Cigarettes and Associated Health Risks: An Update on Cancer Potential. *Adv Respir Med*. 2023;91(6):516-531. Published 2023 Nov 14. doi:10.3390/arm91060038

U.S. Department of Health and Human Services, Office of the Surgeon General. *E-Cigarette Use Among Youth and Young Adults: A Report of the Surgeon General*. 2016. Accessed at <https://www.ncbi.nlm.nih.gov/books/NBK538680/> on October 3, 2024.

US Food and Drug Administration. *Products, Ingredients & Components*. Accessed at <https://www.fda.gov/tobacco-products/products-guidance-regulations/products-ingredients-components> on September 25, 2024.

US Food and Drug Administration. *Results from the Annual National Youth Tobacco Survey*. Accessed at <https://www.fda.gov/tobacco-products/youth-and-tobacco/results-annual-national-youth-tobacco-survey> on October 11, 2024.

Last Revised: November 19, 2024

Written by

American Cancer Society medical and editorial content team
(<https://www.cancer.org/cancer/acs-medical-content-and-news-staff.html>)

Developed by the with medical review and contribution by the American Society of Clinical Oncology (ASCO).

American Cancer Society medical information is copyrighted material. For reprint requests, please see our Content Usage Policy (www.cancer.org/about-us/policies/content-usage.html).

cancer.org | 1.800.227.2345