

Both tobacco cigarettes and **electronic cigarettes** (e-cigarettes) contain harmful chemicals that may affect a person's blood.

The American Lung Association claim that a burning cigarette produces **more than 7,000** chemicals, including carbon monoxide, ammonia, and arsenic. Several of these chemicals are toxic, and 69 of them can cause cancer.

In addition to **nicotine**, e-cigarettes may contain the following harmful substances:

- propylene glycol, which is present in paint solvents, antifreeze, and some foods (as an additive)
- acetaldehyde, which is a toxic product of ethanol alcohol
- formaldehyde, which is a chemical preservative present in disinfectants, glue, and plywood
- diacetyl, which is a flavouring agent that tastes like butter
- heavy metals, including nickel and lead
 - benzene, which is a chemical

compound present in car exhaust

Are e-cigarettes a safe alternative to smoking?

The safety and long term health effects of using electronic cigarettes or other vaping products are still not well known. In September 2019, federal and state health authorities began investigating an [outbreak of a severe lung disease associated with e-cigarettes and other vaping products](#)

An electronic cigarette is a battery-operated device that emits doses of vaporised nicotine, or non-nicotine solutions, for the user to inhale. It aims to provide a similar sensation to inhaling tobacco smoke, without the smoke.

Also known as e-cigarettes, e-cigs, electronic nicotine delivery systems, vaporiser cigarettes, and vape pens,

they are marketed as a way to stop or cut down on smoking.

E-cigarettes have been taken up by millions around the world since they first appeared on the Chinese market in 2004. In 2016, **3.2 percent** of adults in the United States were using them.

"Vaping" is now the **most popular** form of tobacco use among teenagers in the U.S. E-cigarette use rose by **900 percent** among high school students from 2011 to 2015.

In 2016, **over 2 million**

Trusted Source

middle and high school students had tried e-cigarettes. For those aged 18 to 24 years, 40 percent of vapers had not been smokers before using the device.

A growing body of research **suggests** that vaping may be hazardous.

While it may help existing smokers to give up, there is concern that young people are starting to vape for its own sake, and not to replace tobacco use.

In 2016, the U.S. Food and Drug Administration (FDA) started to enforce rules about the sales, marketing, and production of these products.

Fast facts on e-cigarettes:

Here are some key points about e-cigarettes. More detail is in the main article.

- E-cigarettes aim to resemble cigarettes, but without burning

tobacco.

- They are sold as aids to reduce or **quit smoking**, and some people find them helpful for this.
- However, research shows that they may have a negative impact on health.
- Health authorities are trying to tighten up regulations to discourage young people from using e-cigarettes.

What are e-cigarettes?



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Vaping: Is it really safer than smoking?

An e-cigarette is a long tube that usually resembles a

cigarette, a cigar, a pipe, or a pen. Most are reusable, with replaceable and refillable cartridges, but some are disposable.

The first patent for a "smokeless, non-tobacco cigarette" was requested by Herbert A. Gilbert in 1963, but the current device did not appear until 2003.

The e-cigarette as we know it was invented by Hon Lik, a Chinese pharmacist, working for Golden Dragon Holdings, now known as Ruyan. The company started exporting into major markets in 2005 to 2006. There are now over 460 different brands on the market.

How they work

Most e-cigarettes have:

- a mouthpiece, or cartridge
- a heating element
- a rechargeable battery
- electronic circuits

As the user sucks on the mouthpiece, a sensor activates a heating element that vaporises a flavoured, liquid solution held in the mouthpiece. The person then "vapes," or inhales, the aerosol solution.

The nicotine content varies from zero to "extra-high," or 24 to 36 milligrams (mg) per millilitre (ml).

The mouthpiece is a cartridge that is fixed to the end of a tube. A small plastic cup within the mouthpiece holds an absorbent material drenched in the liquid solution. The cartridge can either be refilled or replaced with another pre-filled cartridge when necessary.

The atomiser is a heating element that heats the liquid, causing it to vaporise. The solution can then be

breathed in, or inhaled.

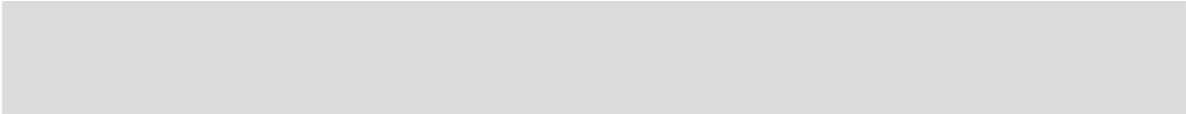
The battery powers the heating element. This is normally a rechargeable, lithium-ion battery.

The sensor activates the heater when the user sucks on the device. An LED may show when it is activated.

The solution, also known as e-liquid or e-juice, is made by extracting nicotine from tobacco and mixing it with a base, usually propylene glycol, and flavoring. Propylene glycol is used in inhalers, for example, for [asthma](#).

There is a wide range of flavours to choose from, with names such as traditional, watermelon, menthol, and lava flow.

Some flavours, such as a combination of tobacco and menthol, try to resemble traditional cigarettes. A number of them claim to mimic specific brands.



Benefits



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The e-cigarette may be less hazardous than tobacco for existing smokers, but it appears to bring dangers of its own.

E-cigarettes claim to bypass many of the health risks of tobacco smoking, and to offer a more healthful alternative to cigarettes and other conventional forms of nicotine intake.

Some studies have [found](#)

that using e-cigarettes can help some smokers quit.

Others [suggest](#)

they offer "modest" benefits for those who want to quit smoking, but "good potential" for those who are cutting down.

The Centres for Disease Control and Prevention (CDC) [conclude that](#)

e-cigarettes can benefit adult smokers who are not pregnant, as long as they completely replace any other nicotine or tobacco products.

However, in 2015, **58.8 percent**

of adult users continued to smoke regular cigarettes. They did not use vaping as a complete substitute for tobacco.

The CDC add that vaping is not suitable:

- for young people
- for those who have never smoked before
- during pregnancy

There is an argument that it is better for young people to start vaping instead of smoking.

Marketing the activity as cool and safe, and offering a variety of flavours, manufacturers are keen to attract teens and adolescents.

However, vaping is probably not risk-free, and in 2016, the Surgeon General **declared** e-cigarette use a "significant public health concern."

Risks

While e-cigarettes may help some people quit, there is growing evidence that vaping may be harmful in some cases, and more harmful than avoiding smoking altogether.

Here are 10 reasons why the authorities are concerned:

- 1 Most e-cigarettes **contain** nicotine, which is addictive and triggers changes in the adolescent brain. It is hazardous during pregnancy as it can

affect foetal development.

- 2 The aerosol contains solvents, flavourings, and toxicants, which the Surgeon General describes as either "harmful" or "potentially harmful."
- 3 E-cigarettes expose the lungs to different substances. One of these is diacetyl, which **can cause** "popcorn lung," a severe and irreversible lung disease.
- 4 Potentially fatal poisoning **has resulted** from accidentally swallowing and from inhaling e-cigarette liquid.
- 5 People who seek to quit smoking will stop using conventional and medically monitored methods of doing so.
- 6 Those who use or who have used e-cigarettes are **less likely** to stop smoking altogether.
- 7 Teens who use e-cigarette products are **more likely** to start using regular tobacco as well.
- 8 Continued use of nicotine **can make other drugs**, such as cocaine, more pleasurable.
- 9 The flavourings, the marketing, and the concept that it is not harmful all tempt teenagers to start vaping. There is concern that this increases the chance that they will smoke conventional cigarettes later.
- 10 Second-hand smoking is not eliminated by vaping, as vaping **releases** carcinogenic emissions.

In addition, experimental use of vaping materials may put teens at higher risk.

The National Institute on Drug Abuse (NIDA) **point to** the practice of "dripping," which involves inhaling solutions

that are dripped directly onto the heater coil, as one such risk practice. Reasons include "to produce a stronger throat hit."

Recent research

In January 2018, [results were published](#) of lab and animal studies assessing how nitrosamines, present in e-cigarettes, can damage DNA.

The researchers found that the ability of lung cells to repair after exposure to e-cigarette smoke was significantly reduced. In addition, the smoke damaged the lungs, bladder, and heart in mice.

They conclude: "It is therefore possible that E-cigarette smoke may contribute to lung and bladder [cancer](#), as well as [heart disease](#), in humans."

Meanwhile, a report published in The BMJ in February 2018, [urged doctors](#)

in the United Kingdom to tell smokers that "vaping is at least 95 percent less harmful than smoking."

In the U.S., the FDA [have not approved](#)

e-cigarettes as a smoking aid.

The debate rages on.

"E-juice" contains solvents, flavourings, and varying amounts of nicotine.

Even if vaping can help people quit smoking, it has not been certified as safe and effective by the FDA, and there is no evidence that it works in the long term.

According to [NIDA](#), "Research so far suggests that e-

cigarettes might be less harmful than cigarettes when people who regularly smoke switch to them as a complete replacement."

However, they add, "nicotine in any form is a highly addictive drug."

The Surgeon General's report calls for action to reduce the risk of vaping.

"Actions could include incorporating e-cigarettes into smoke-free policies, preventing access to e-cigarettes by youth, price and tax policies, retail licensure, regulation of e-cigarette marketing likely to attract youth, and educational initiatives targeting youth and young adults."

U.S. Department of Health and Human Services

In 2016, the FDA made e-cigarettes **subject to the same rules** as tobacco products. One result of this is that purchasers must be at least 18 years of age.

The American Academy of Paediatrics (AAP) strongly recommend that the minimum age to purchase any tobacco product, including e-cigarettes, be raised to **21 years** in all states.

Nine states have **already banned** e-cigarette use in the same places where smoking is not allowed, and there is a growing call for vaping regulations to be stricter.