

# Vaping Health Risks – Hidden Health Risks of E-Cigarettes

**Is Vaping Safe? E-cigarettes are battery powered devices that heat a liquid to form a vapor that you inhale. While that vapor does not contain the tars found in burning tobacco cigarettes, the vapor does contain other chemicals that could cause harm.**

The liquid typically contains combinations of propylene glycol and glycerin. Liquids may also come with varying levels of nicotine and flavors that are carried along with the vapor for inhalation.

And, while electronic cigarettes do not provide your lungs with all the tars or [alkaloids](#) of conventional tobacco cigarettes, they are not a safe way to obtain nicotine.

The market for e-cigs is booming. It is estimated that by 2023 the market will be worth [\\$48 billion](#). Because these devices are not traditional cigarettes, the tobacco companies have gotten back into advertising their brands of these nicotine delivery systems in a big way. Some of these [big tobacco electronic cigarette brands](#) include VUSE, Vype, Mark Ten, and Blu.

## **E-Cigarettes : Welcome Back, Big Tobacco – the fifth estate**

Big Tobacco is trying to clean up its image, moving into the booming e-cigarette business which continues to peddle the deadly tobacco products. This has left public health officials in Canada, the U.K. and the US concerned.



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Hundreds of studies have been done on e-cigarettes. Many are small clinical trials and many are trials that lack an adequate placebo.

Unfortunately, many of these studies have been sponsored by electronic cigarette manufacturers. They tend to study only one brand of electronic cigarette, and often only one model. The data that is analyzed tends to bias the results, favoring e-cigarettes and demonstrate a severe conflict of interest. This reduces the credibility of their findings.

In addition, since the vaping technology is relatively new, long term studies of its effects have not been done. For many years even traditional tobacco cigarettes were thought not to be harmful.

Nonetheless, a number of relevant facts about e-cigs have emerged.

## **Nicotine Dependence**

As in conventional tobacco cigarettes, nicotine is normally present in e-cigarettes. A typical tobacco cigarette allows about 2 mg of nicotine to be absorbed into a smoker's system. The strength of nicotine in an e-cigarette depends on the concentration of nicotine in the "e-liquid" to be vaporized. The strength of nicotine in the e-liquid is measured in mg/mL (milligrams of nicotine per milliliter of liquid) or sometimes percent by weight. E-liquid typically provide nicotine at concentrations between 0 mg/mL to 18 mg/mL. Your actual dose of nicotine will depend on the concentration of nicotine in the e-liquid, the frequency and depth of inhalation, and how long you "vape."

Nicotine provides stimulating effects with mood altering psychoactive effects and activates the brain chemical dopamine. These effects are produced in the brain and begin only seconds after inhaling nicotine in the lungs.

Since the half-life of nicotine in your system is about 2 hours, the pleasant effects of nicotine soon wear off and you need another dose or "fix" of nicotine. The almost immediate effects and the inevitable pleasurable reduction in those effects are what produce the addictive, compulsive desire for further exposure to nicotine.

Your cravings for nicotine will continue whether you use conventional tobacco cigarettes or e-cigs.

The Food and Drug Administration (FDA) requires the following warning label statement on all electronic cigarette packages:

**"WARNING: This product contains nicotine. Nicotine is an addictive chemical."**

## **Vaping: A Way to Stop Smoking or a Way to Start a Nicotine Habit**

A review study of 38 scientific investigations into the relationship between using electronic cigarettes and smoking cessation provided some surprising findings. These studies found that the odds of actually quitting smoking

through the use of e-cigarettes was 28% lower compared to those who did not use e-cigarettes.

In other words, the use of electronic cigarettes caused significantly less quitting among smokers.

A recent study looked at 1357 hospitalized adult cigarette smokers who planned to stop smoking. Followup of the patients after release from the hospital showed that those who used e-cigarettes were less likely to have actually quit smoking than those who did not use electronic cigarettes.

The [Mark Ten](#) site has a clear indication that e-cigarettes have not been shown to help people quit the nicotine habit:

**WARNING:** This product is not a smoking cessation product and has not been tested as such. This product is intended for use by persons of legal age or older, and not by children, women who are pregnant or breast feeding, or persons with or at risk of heart disease, high blood pressure, diabetes, or taking medicine for depression or asthma. Nicotine is addictive and habit forming, and it is very toxic by inhalation, in contact with the skin, or if swallowed. Nicotine can increase your heart rate and blood pressure and cause dizziness, nausea, and stomach pain. Inhalation of this product may aggravate existing respiratory conditions. Ingestion of the non-vaporized concentrated ingredients in the cartridges can be poisonous.

And, while the idea is that vaping is less harmful than smoking, there seems to be some equivalent harm. A study showed that nearly equal harm was caused by cigarette smoke and e-cig vapor within the body causing vascular injury and inflammation and other negative effects on blood flow. Like traditional cigarettes, the vapor from e-cigs has also been shown to contain the carcinogen formaldehyde.

## **Teen Vaping**

While there are age limits for purchasing electronic cigarettes, this does not seem to hinder young teens from obtaining these devices. During the last 5 years their use by underage teens (and even pre-teens) has grown dramatically. Way back in 2015, 1 in 6 high school students reported vaping in the previous month.

Of the teens in one survey who were non-smokers before using e-cigarettes, a fifth had “graduated” to smoking traditional tobacco cigarettes.

## **Juuling: New high-tech fad among teens**

While we might like to think of teens as young adults, they are not adults. The teen body and brain are still developing. In fact, brain development continues until about age 25. Exposure to substances like nicotine as a teen

can harm the teen's developing brain.

Even in zero nicotine e-liquids there are flavorings that are popular with teens. Some of the flavoring chemicals in e-liquids like diacetyl (providing an intense buttery flavor) have been linked to lung disease. The [National Institute for Occupational Safety and Health](#) indicates diacetyl is hazardous when heated and inhaled. Other flavorings such as cinnamon have been found to have cytotoxic effects.

## Heavy Metals and Pollutants in E-Cigarette Vapor

The electronic cigarette is a mechanical device with a heating coil and fiberglass wicks that vaporizes a fluid so it can be inhaled. Various metals (probably from wires and solder joints) are found in these vaporizers.

So, it's no surprise that metallic compounds are found in the vapor. Studies have found lead, chromium, nickel, mercury, zinc, tin, silver and aluminum in the vapor of various electronic cigarettes. A study found cadmium, nickel and lead in the vapors of all the electronic cigarettes tested. Another study found a doubling of aluminum in indoor air after vaping.

Some of these particles (tin, chromium, and nickel) have been detected as ultrafine particles, often called nanoparticles. The small size of these particles can allow them to pass into cell membranes. The large surface area for a given weight makes them more reactive with material they contact. For many such particles there has been little or no clinical investigations into their effects. The long term effects have not been made clear, but many believe the effects may be toxic.

A [recent study](#) found vaping in a thoroughly ventilated room found high concentrations of particulate matter, volatile organic compounds, a 20% increase in carcinogenic polycyclic aromatic hydrocarbon, and a 2.4 fold increase in airborne aluminum. Vaping is not emission-free and does pollute the air.

## Conclusions You Can Use

Vaping is a trend among teens and adults. Thousands of harmful chemicals in traditional tobacco smoke are not found in the vapor of electronic cigarettes. However, a number of chemicals and particulates are found in vapor. And, many of these have not been tested for their long term effects.

Because of harmful chemicals in e-cigarette vapor, vaping cannot be considered a healthful activity. Studies have shown that e-cig vapor contains respiratory irritants and toxicants.

Nor does using e-cigs appear to help a smoker quit smoking. And, for non-smokers, vaping may lead to actual smoking of traditional tobacco cigarettes.

The best healthful advice is to avoid using electronic cigarettes.

## References

- [Use of electronic cigarettes \(e-cigarettes\) impairs indoor air quality and increases FeNO levels of e-cigarette consumers](#) as published in the *International Journal of Hygiene and Environmental Health*
- [E-cigarettes and smoking cessation in real-world and clinical settings: a systematic review and meta-analysis](#) as published in *The Lancet Respiratory Medicine*
- [Use of E-Cigarettes Among Smokers Who Plan to Quit After a Hospitalization](#) as published in the *Annals of Internal Medicine*
- [Know the Risks: E-cigarettes & Young People](#) from the Surgeon General
- [A systematic review of health effects of electronic cigarettes](#) as published in *Preventive Medicine*
- [Increase Of Circulating Endothelial Progenitor Cells Following E-Cigarette Inhalation In Human Subjects](#) as published in the *American Journal of Respiratory and Critical Care Medicine*
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- [Hidden Formaldehyde in E-Cigarette Aerosols](#) as published in the *New England Journal of Medicine*