Risks and Harms of Electronic Nicotine Delivery Systems (ENDS)

Odds & ENDs E4

What are the potential risks & harms of nicotine?

There is disagreement about the link between nicotine and cancer.

- Some research suggests nicotine is not associated with increased cancer risk.
- However, some research has found that mice who are exposed to nicotine-containing vapor from ENDS are more likely to develop lung cancer.

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Risks and Harms of ENDS

Learning Objectives:

1. *Cite major findings surrounding potential risks and harms associated with nicotine.*
2. *Review the health risks associated with other components in ENDS.*
3. *Discuss the risks of injury or overdose related to ENDS use.*

Nicotine In the Body

Nicotine stimulates the release of neurotransmitters, hormones, and catecholamines, which leads to the narrowing of blood vessels and increased heart rate, which could have important cardiovascular health implications.

Meta-analytic findings have also established a link between nicotine exposure in adults and gastrointestinal symptoms.

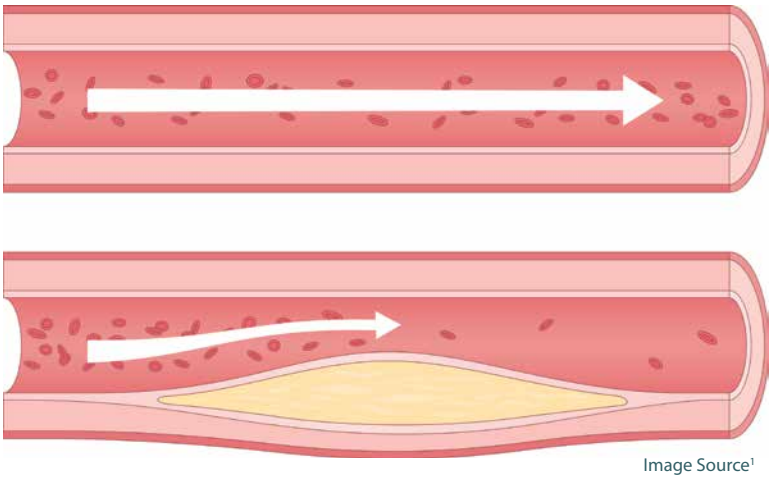


Image Source[1]

What are the health risks associated with other components in ENDS?

The liquid solution in ENDS also contains a solvent—usually vegetable glycerin or propylene glycol, as well as flavoring.

- Preliminary findings from animal studies suggest there may be a link between inhaling these substances and a thickening of the walls of the small airways, which is common among smokers and is implicated in chronic obstructive pulmonary disease (COPD).

The risks of many electronic cigarette flavorings have not been analyzed, but here's what we know:

- Many sweet-flavored liquids contain other compounds called diacetyl and/or acetyl propionyl, which are associated with respiratory disease when inhaled.
- Cinnamon-flavored e-liquid has been linked to cell damage.

In summary, we know that nicotine is related to changes in the body—such as cardiovascular changes and gastrointestinal symptoms.

Nicotine use may also be related to cancer risk, but further research is needed.

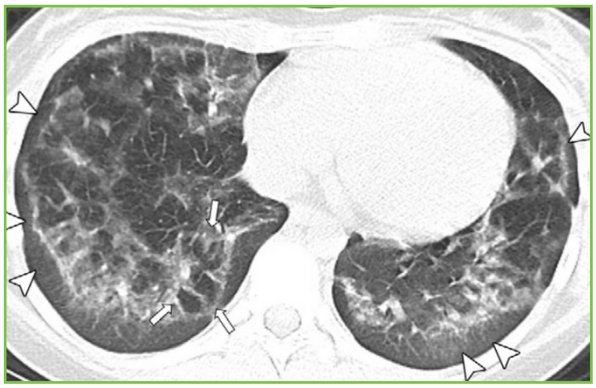
1. https://www.istockphoto.com/vector/atherosclerosis-gm502738849-44331286
2. https://pubs.rsna.org/doi/10.1148/radiol.2020192778?url_ver=Z39.88-2003&rfr_id=ori:rid:crossref.org&rfr_dat=cr_pub%20%200pubmed

Researchers have found compounds other than those listed in the ingredients in the liquid and/or aerosols produced by ENDS. This could be due to inappropriate manufacturing practices.

- For example, ethylene glycol, which is not approved for use in products for human consumption, has been found in e-cigarette liquids.
- Formaldehyde is found in the liquid and aerosol from e-cigarettes, which could lead to airway irritation, and it is a carcinogen.

Some ENDS users develop a condition called VALI or EVALI (short for e-cigarette- or vaping-associated lung injury). Symptoms include fever, difficulty breathing, unproductive cough, nausea, vomiting, diarrhea, and chest pain.

EVALI may require hospitalization and result in death.



Pediatric chest radiographic and CT findings of electronic cigarette or vaping product use–associated lung injury (EVALI)

Image Source[2]

What are the risks of injury or overdose with ENDS?

The most common type of injury caused by ENDS is a thermal burn.

- There were estimated to be 2,035 ENDS burn- and explosion-related injuries seen at emergency departments throughout the U.S. between 2015 and 2017.

Other mechanisms of injury that have been reported include: blast lesions secondary to explosion, chemical alkali burns, and thermal burns due to overheating without flames.

The most common area of injury is the waist or groin area. There have also been reports of injuries to users' hands and face.

Deaths of children who have ingested nicotine-containing liquid have been reported, and there have been adult deaths in individuals who intentionally ingested nicotine-containing liquid.

> E-liquids should be closely monitored and not be stored in easily accessible places, particularly in households with children.

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