AN UPDATED OVERVIEW OF *E-CIGARETTE* IMPACT ON smoking cessation

DR SEYED HAMZEH SEDDIGH

Electronic nicotine dispensing systems (ENDS)

commonly known as

Electronic cigarettes or *e-cigarettes*

have been popularly considered a less harmful alternative to conventional cigarette smoking since they first appeared on the market more than a decade ago

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Questions?

- What is it?
- What are its benefits?
- What are its disadvantages?

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- An electronic cigarette (e-cigarette) is an umbrella term for an electronic device that delivers usually nicotine and/or other products, including solvents and flavorings, to the user

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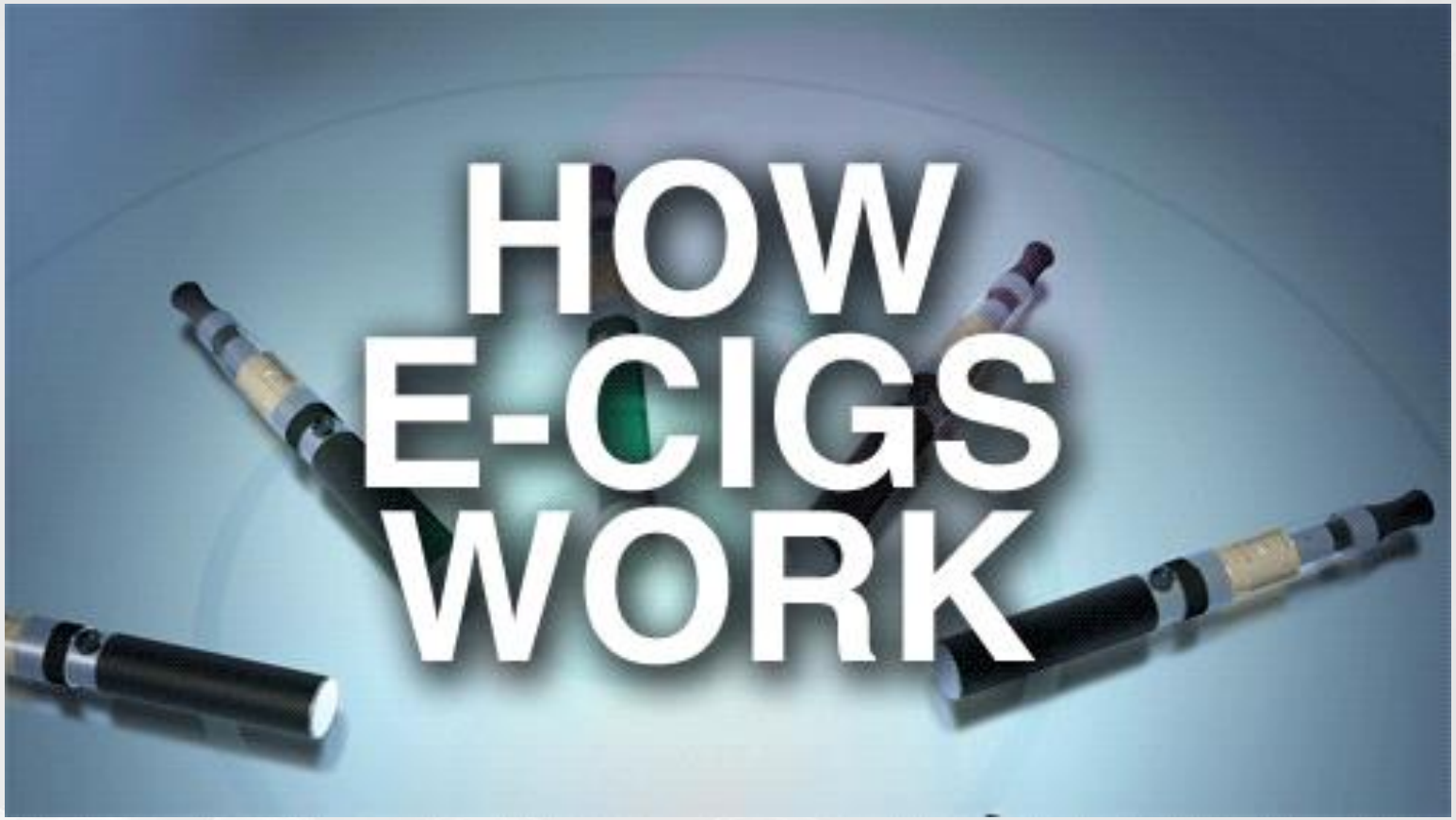

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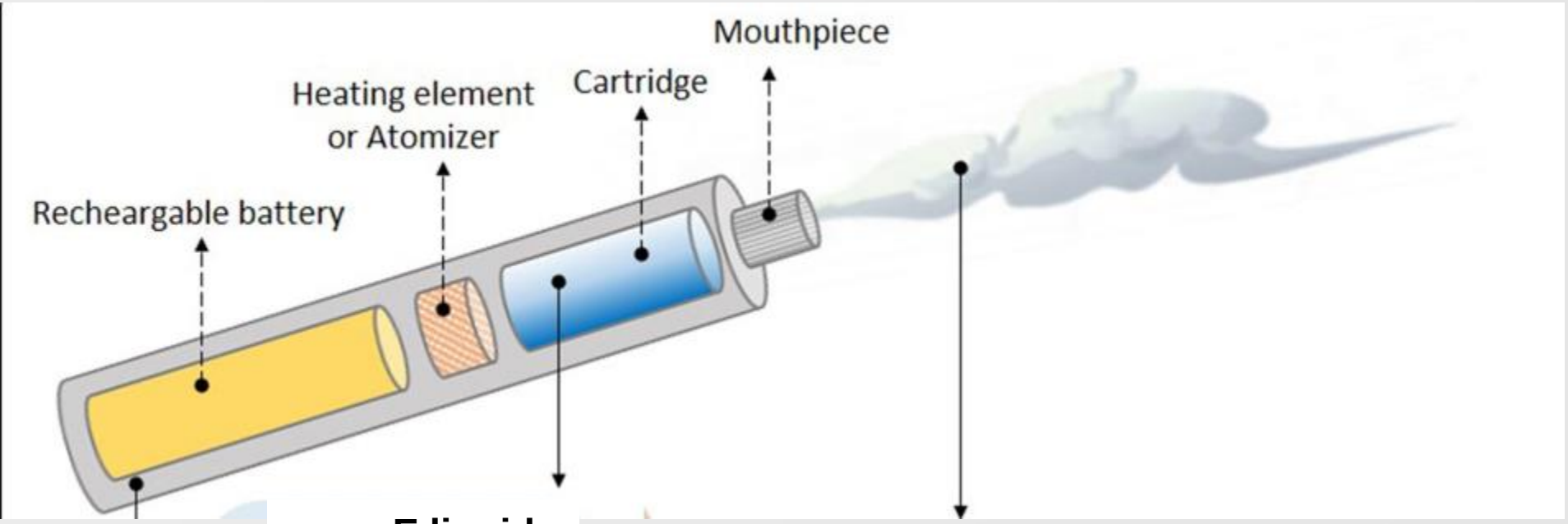
Mouthpiece
Heating element
or Atomizer
Cartridge
Recheargable battery
E liquid

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Electronic nicotine dispensing systems (ENDS)

e-liquid

- Propylene glycol
- Glycerol
- Nicotine
- Flavourings
- Others (tetrahydrocannabinol, vitamin E additives)

Device Material

- Wires
- Atomizer
- Fiberglass wicks
- Poor solder joints

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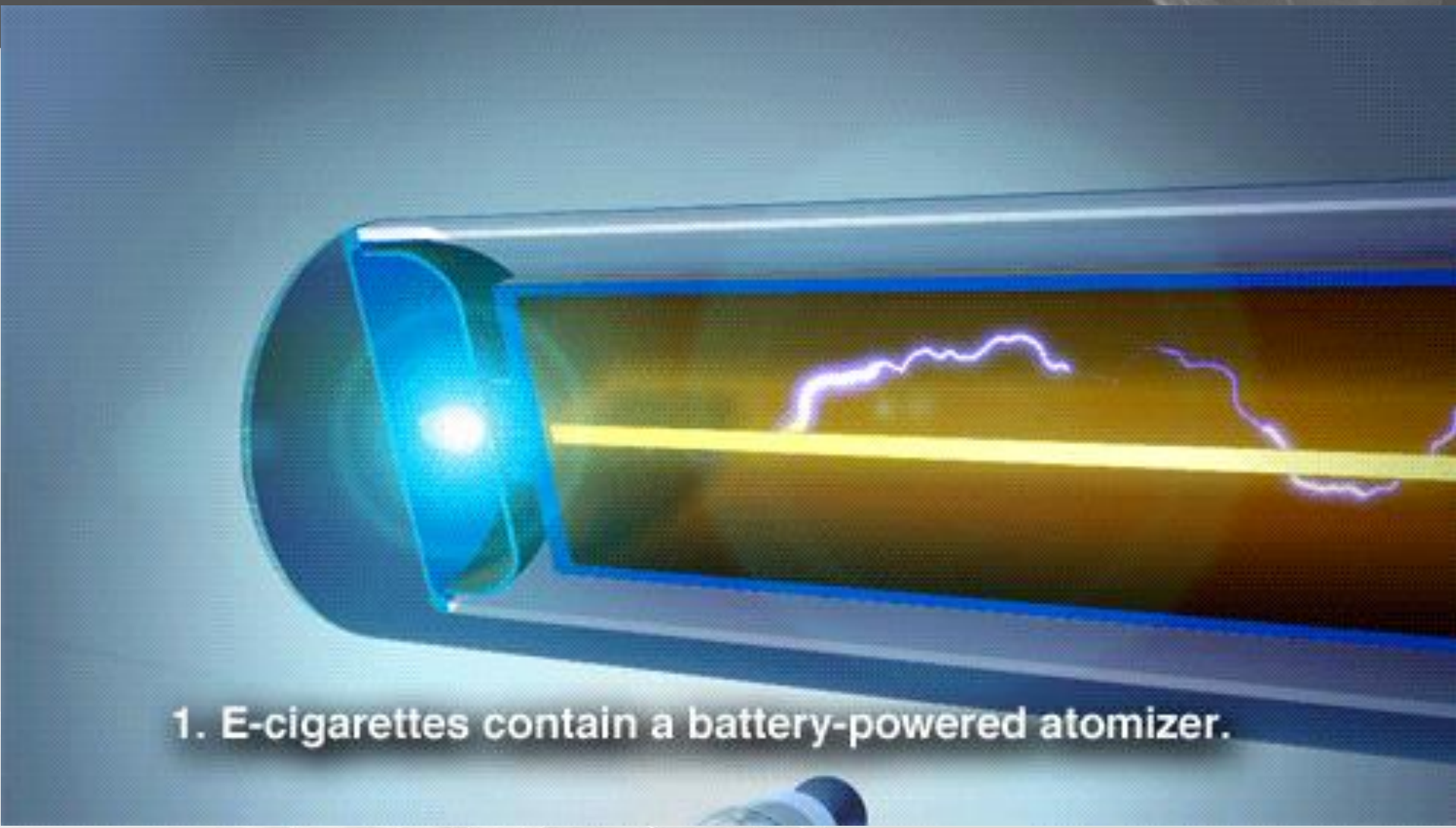

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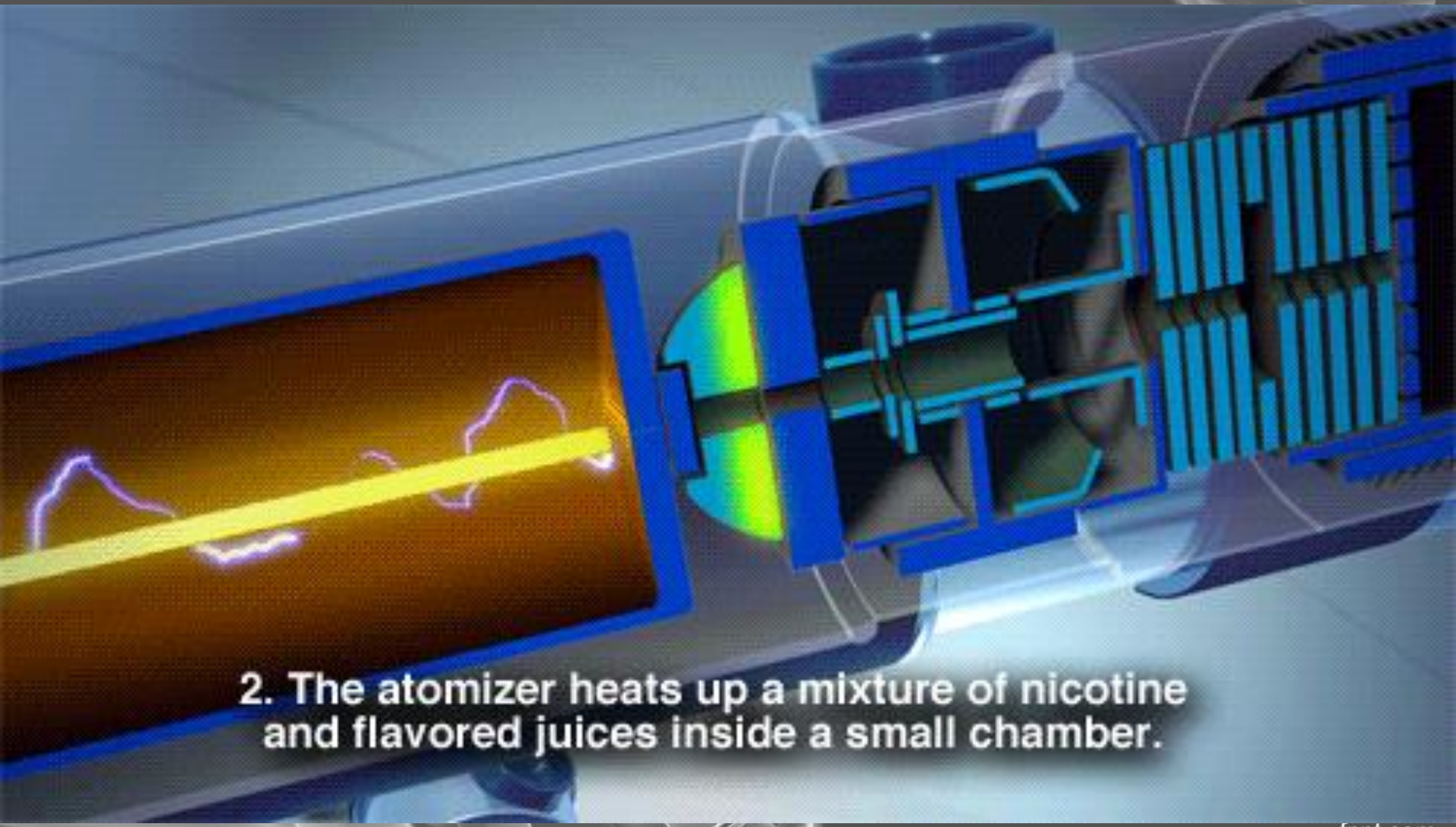
2. The atomizer heats up a mixture of nicotine
and flavored juices inside a small chamber.

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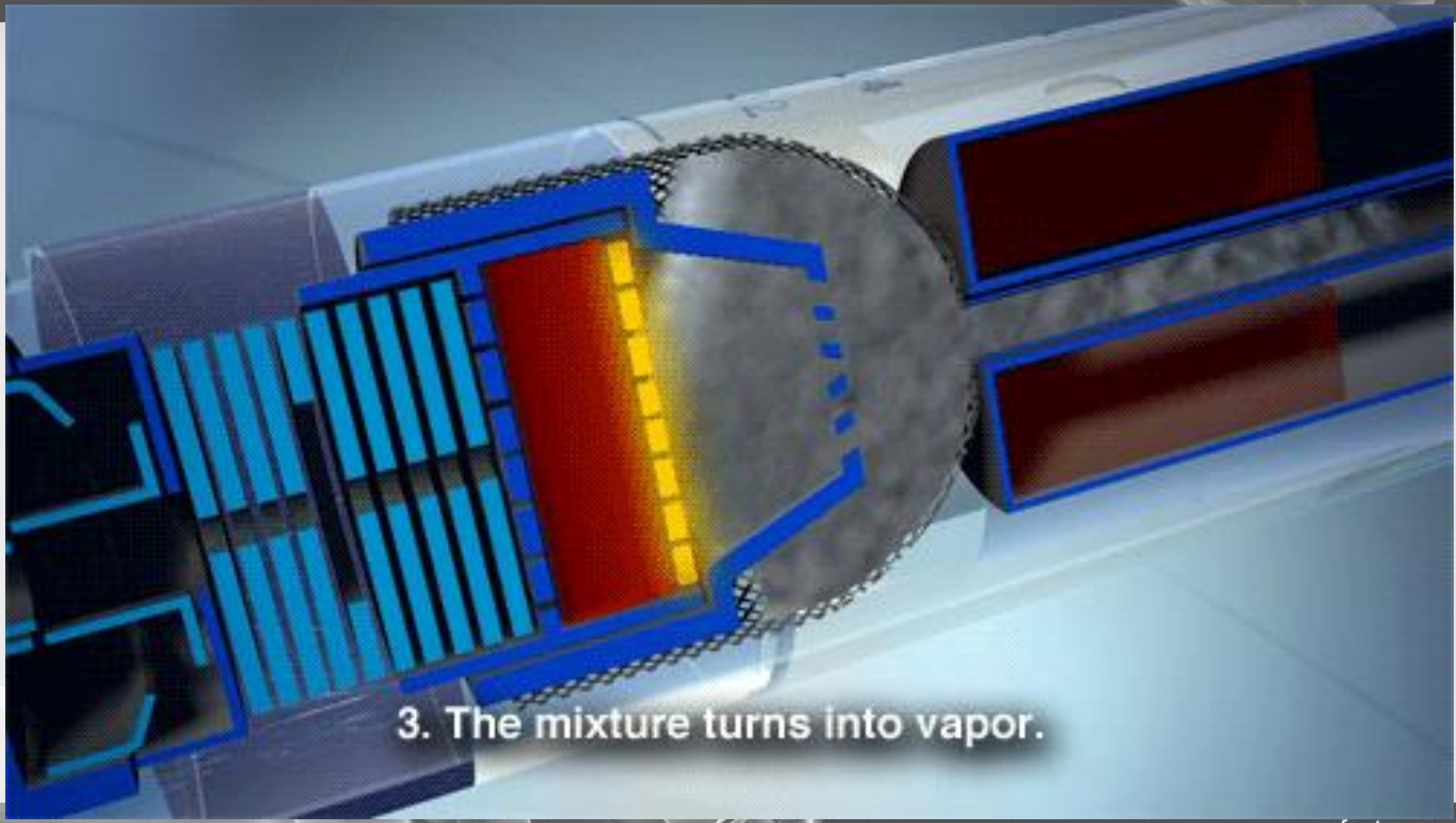

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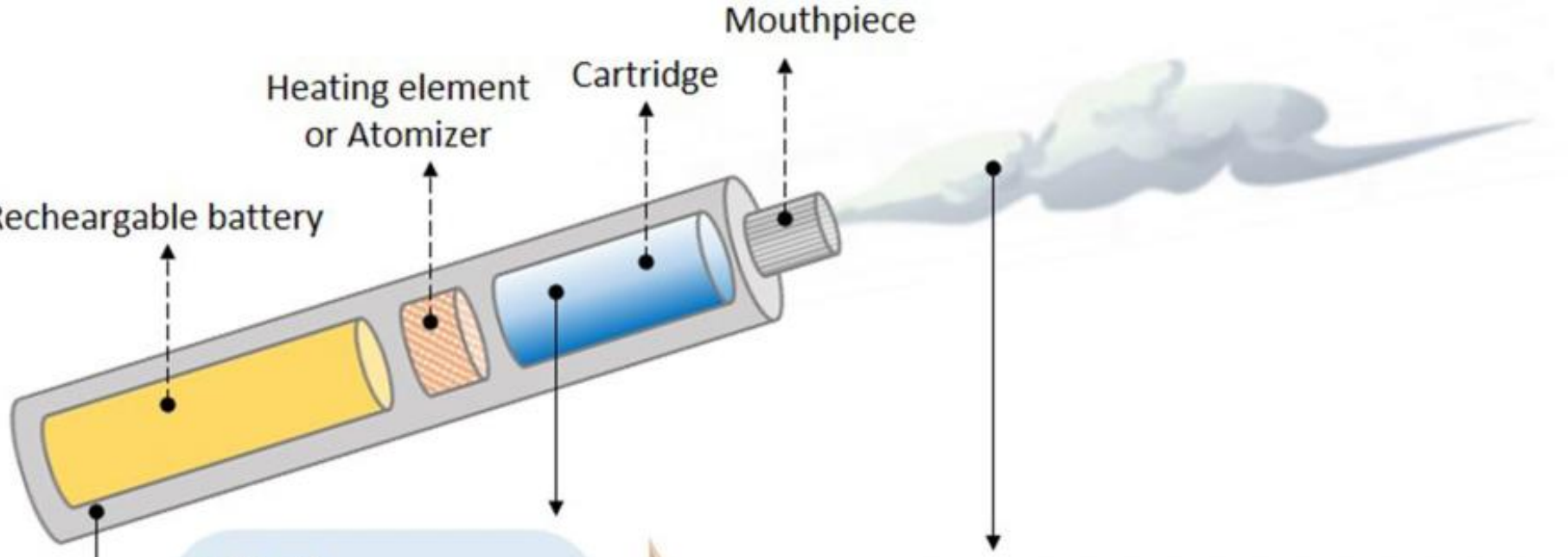


e-liquid

- Propylene glycol
- Glycerol
- Nicotine
- Flavourings
- Others
  (tetrahydrocannabinol, vitamin E additives)

Device Material

- Wires
- Atomizer
- Fiberglass wicks
- Poor solder joints

Heating

Aerosol

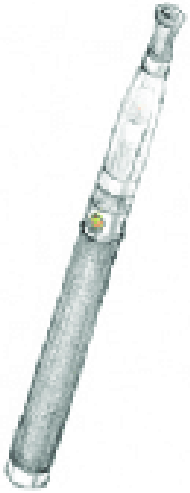
<u>*e-liquid* components</u>

- Propylene glycol
- Glycerol
- Nicotine
- Flavourings
- Others
  (tetrahydrocannabinol, vitamin E additives)

<u>New components</u>

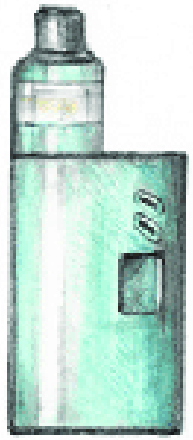
- Propylene oxide*
- Acrolein
- Acetaldehyde*
- Formaldehyde*
- Acetamide*
- Metal particles
  - Copper
  - Nickel
  - Silver
- Silicate particles

First generation
(Cig-a-Like)



Second generation
(Vape-Pen)

Third generation
(Box Mod)



Fourth generation
(Temperature
control Box Mod)

Design	CC Style	Pen Style	Tank Style	Tank Style
Battery Voltage	~ 3,7 - 4,2 V	~ 3,7 - 6 V	~ 6 - 8 V	~ 3 - 8 V
Disposable	✓	✗	✗	✗
Refillable cartridge	✗	✓	✓	✓
Components customization	✗	✗	✓	✓
Voltage-Wattage setup	✗	✗	✓	✓
Temperature control system	✗	✗	✗	✓

Electronic cigarettes for smoking cessation

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PMCID: PMC4752870
NIHMSID: NIHMS752765
PMID: 26776875

E-cigarettes and smoking cessation in real-world and clinical settings: a systematic review and meta-analysis

Sara Kalkhoran, MD and Prof Stanton A Glantz, PhD

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According to the results of our systematic review and meta-analysis, e-cigarettes should not be recommended as effective smoking cessation aids until there is evidence that, as promoted and used, they assist smoking cessation

Lancet Respir Med. 2016 Feb; 4(2): 116–128.
Published online 2016 Jan 14. doi: 10.1016/S2213-2600(15)00521-4

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Review > Nicotine Tob Res. 2016 Oct;18(10):1926-1936. doi: 10.1093/ntr/ntw119.
Epub 2016 Apr 25.

Electronic Cigarettes for Smoking Cessation: A Systematic Review

Muhannad Malas [1], Jan van der Tempel [2], Robert Schwartz [3], Alexa Minichiello [4], Clayton Lightfoot [4], Aliya Noormohamed [5], Jaklyn Andrews [4], Laurie Zawertailo [5], Roberta Ferrence [6]

Affiliations + expand

PMID: 27113014 DOI: 10.1093/ntr/ntw119

Abstract

Background and aims: Electronic cigarettes (e-cigarettes) have been steadily increasing in popularity among smokers, most of whom report using them to quit smoking. This study systematically reviews the current literature on the effectiveness of e-cigarettes as cessation aids.

Methods: We searched PubMed, MEDLINE, PsycINFO, CINAHL, ERIC, ROVER, Scopus, ISI Web of Science, Cochrane Library, the Ontario Tobacco Research Unit (OTRU) library catalogue, and various gray literature sources. We included all English-language, empirical quantitative and qualitative papers that investigated primary cessation outcomes (smoking abstinence or reduction) or secondary outcomes (abstinence-related withdrawal symptoms and craving reductions) and were published on or before February 1, 2016.

Results: Literature searches identified 2855 references. After removing duplicates and screening for

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Key messages

overall the existing literature suggests e-cigarettes may be helpful for some smokers for quitting or reducing smoking

Electronic Cigarettes and Smoking Cessation.Bauld L.Nicotine Tob Res. 2016 Oct;18(10):1925. doi: 10.1093/ntr/ntw207. Epub 2016 Aug 18.PMID: 27613958

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Meta-Analysis > Am J Public Health. 2021 Feb;111(2):230-246. doi: 10.2105/AJPH.2020.305999. Epub 2020 Dec 22.

E-Cigarette Use and Adult Cigarette Smoking Cessation: A Meta-Analysis

Richard J Wang [1], Sudhamayi Bhadriraju [1], Stanton A Glantz [1]

Affiliations + expand

PMID: 33351653 PMCID: PMC7811087 DOI: 10.2105/AJPH.2020.305999

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Key messages

As consumer products, in observational studies, e-cigarettes were not associated with increased smoking cessation in the adult population. In RCTs, provision of free e-cigarettes as a therapeutic intervention was associated with increased smoking cessatio

Am J Public Health. 2021 February; 111(2): 230–246.
Published online 2021 February. doi: 10.2105/AJPH.2020.305999

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Cochrane Database of Systematic Reviews | Review - Intervention

Electronic cigarettes for smoking cessation

Jamie Hartmann-Boyce, Hayden McRobbie, Ailsa R Butler, Nicola Lindson, Chris Bullen, Rachna Begh, Annika Theodoulou, Caitlin Notley, Nancy A Rigotti, Tari Turner, Thomas R Fanshawe, Peter Hajek Authors' declarations of interest

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Abstract

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PICOs

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Key messages

Nicotine e-cigarettes probably do help people to stop smoking for at least six months. They probably work better than nicotine replacement therapy and nicotine-free e-cigarettes.

Cochrane Database Syst Rev. 2021 Sep 14;9(9):CD010216. doi: 10.1002/14651858.CD010216.pub6

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Effectiveness of e-cigarettes as aids for smoking cessation: evidence from the PATH Study cohort, 2017-2019

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The use of e-cigarettes as a therapeutic intervention for smoking cessation may lead to permanent nicotine dependence.

Hanewinkel R, Niederberger K, Pedersen A, et al. E-cigarettes and nicotine abstinence: a meta-analysis of randomised controlled trials. Eur Respir Rev 2022; 31: 210215 [DOI: 10.1183/16000617.0215-2021].

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› Tob Control. 2022 Feb 7;tobaccocontrol-2021-056901. doi: 10.1136/tobaccocontrol-2021-056901. Online ahead of print.

Effectiveness of e-cigarettes as aids for smoking cessation: evidence from the PATH Study cohort, 2017-2019

Ruifeng Chen [1], John P Pierce [2 3], Eric C Leas [1], Tarik Benmarhnia [4], David R Strong [1 3], Martha M White [3], Matthew Stone [1], Dennis R Trinidad [1], Sara B McMenamin [1], Karen Messer [1 3]

Affiliations + expand

PMID: 35131948 DOI: 10.1136/tobaccocontrol-2021-056901

Free article

Abstract

Objective: To assess the effectiveness of e-cigarettes in smoking cessation in the USA from 2017 to 2019, given the 2017 increase in high nicotine e-cigarette sales.

Methods: In 2017, the PATH Cohort Study included data on 3578 previous year smokers with a recent quit attempt and 1323 recent former smokers. Respondents reported e-cigarettes or other products used to quit cigarettes and many covariates associated with e-cigarette use. Study outcomes were 12+ months of cigarette abstinence and tobacco abstinence in 2019. We report weighted unadjusted

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Sales increases in high nicotine e-cigarettes in 2017 did not translate to more smokers using these e-cigarettes to quit smoking. On average, using e-cigarettes for cessation in 2017 did not improve successful quitting or prevent relapse

. 2022 Feb 7;tobaccocontrol-2021-056901. doi: 10.1136/tobaccocontrol-2021-056901

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Harmful effects

Respiratory system

- Respiratory irritation [55, 57, 88, 100]
- Abnormalities in respiratory function [10, 56, 81-85, 89-91]
- Lung oedema [22]
- Airway epithelial injury [32]
- Sustained tissue hypoxia [31]
- *e-cigarette* or vaping product use-associated lung injury (EVALI) [21]

Others

- Cytotoxicity [22-24, 29, 30, 59, 79, 80, 86-88]
- Oxidative stress [8, 13, 14, 17, 24, 86, 88]
- Increased inflammatory markers [12, 17, 21, 22, 28, 42, 43, 86]
- Impairment of endothelial function [13-17]
- Increased platelet and leukocyte activation [11, 12]
- Increased platelet aggregation [11]
- Increased arterial stiffness [15]
- *Human carcinogen (or potential human carcinogen) [5, 63-67]

Increased respiratory complications

Systemic inflammation
Endothelial dysfunction
Increased cardiovascular risk

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Marques *et al. Respir Res* (2021) 22:151
https://doi.org/10.1186/s12931-021-01737-5

Respiratory Research

REVIEW Open Access

An updated overview of *e-cigarette* impact on human health

Patrice Marques[1,2], Laura Piqueras[1,2,3] and Maria-Jesus Sanz[1,2,3*]

Abstract

The electronic cigarette (*e-cigarette*), for many considered as a safe alternative to conventional cigarettes, has revolutionised the tobacco industry in the last decades. In *e-cigarettes*, tobacco combustion is replaced by *e-liquid* heating, leading some manufacturers to propose that *e-cigarettes* have less harmful respiratory effects than tobacco consumption. Other innovative features such as the adjustment of nicotine content and the choice of pleasant flavours have won over many users. Nevertheless, the safety of *e-cigarette* consumption and its potential as a smoking cessation method remain controversial due to limited evidence. Moreover, it has been reported that the heating process itself can lead to the formation of new decomposition compounds of questionable toxicity. Numerous in vivo and in vitro studies have been performed to better understand the impact of these new inhalable compounds on human health. Results of toxicological analyses suggest that *e-cigarettes* can be safer than conventional cigarettes, although harmful effects from short-term *e-cigarette* use have been described. Worryingly, the potential long-term effects of *e-cigarette* consumption have been scarcely investigated. In this review, we take stock of the main findings in this field and their consequences for human health including coronavirus disease 2019 (COVID-19).

Keywords: Electronic cigarette, E-cigarette, Nicotine, Tobacco, Humectants, Flavourings, Toxicity, Smoking cessation tool, COVID-19

THR

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Tobacco harm reduction

(THR) is **a public health strategy to lower the health risks to individuals and wider society associated with using tobacco products**.

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More studies and long-term data are needed to assess potential benefits and harms. What is known is that prevention efforts and policy are needed to avoid adolescents and

other vulnerable populations from initiating tobacco or e-cigarette use

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E-Cigarettes—a review of the evidence—harm versus harm reducti on

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ADVANTAGE

- Smoking cessation
- Number of cigarettes
- Craving
- Mortality and morbidity
- Minor complication
- Imitation of the senses
- Cost
- Prevalence

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DISADVANTAGES

- Serious complications
- Mislabeling
- Addiction
- High risk population
- Nicotine Toxication
- Long-term complications

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