

Youth E-Cigarette Usage & the Pandemic: *How to Manage E- Cigarette Addiction*

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Session Learning Objectives

At the end of the session, you will be able to:

- Understand role of electronic cigarettes in delivery of nicotine.
- Assess absolute risk of electronic cigarettes.
- Understand electronic cigarettes' role during the pandemic.



The Perfect Storm

PANDEMIC

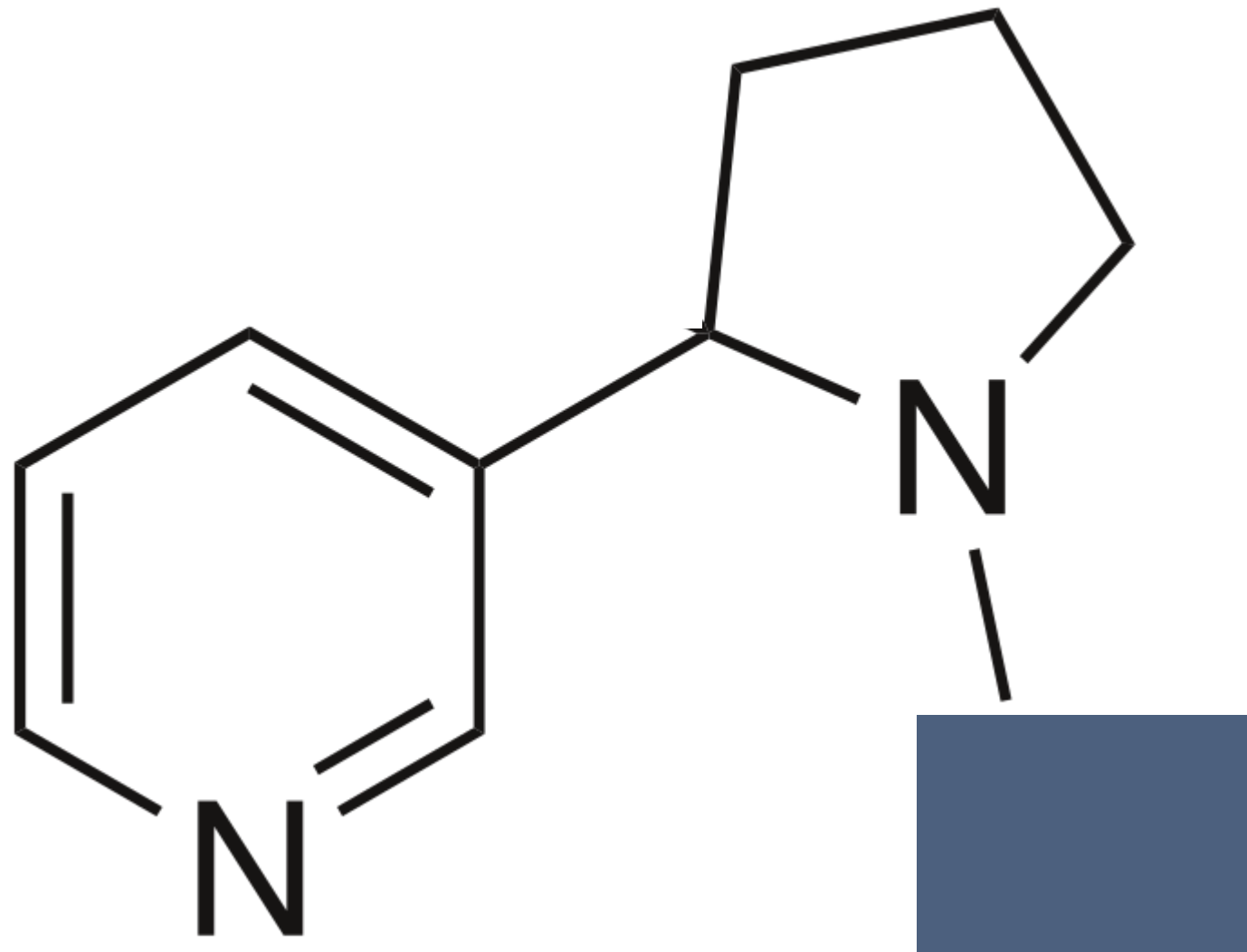
Substance that has such properties:

- Anxiolytic
- Rewarding
- Enhancement of Behaviors
- Insidious in Usage

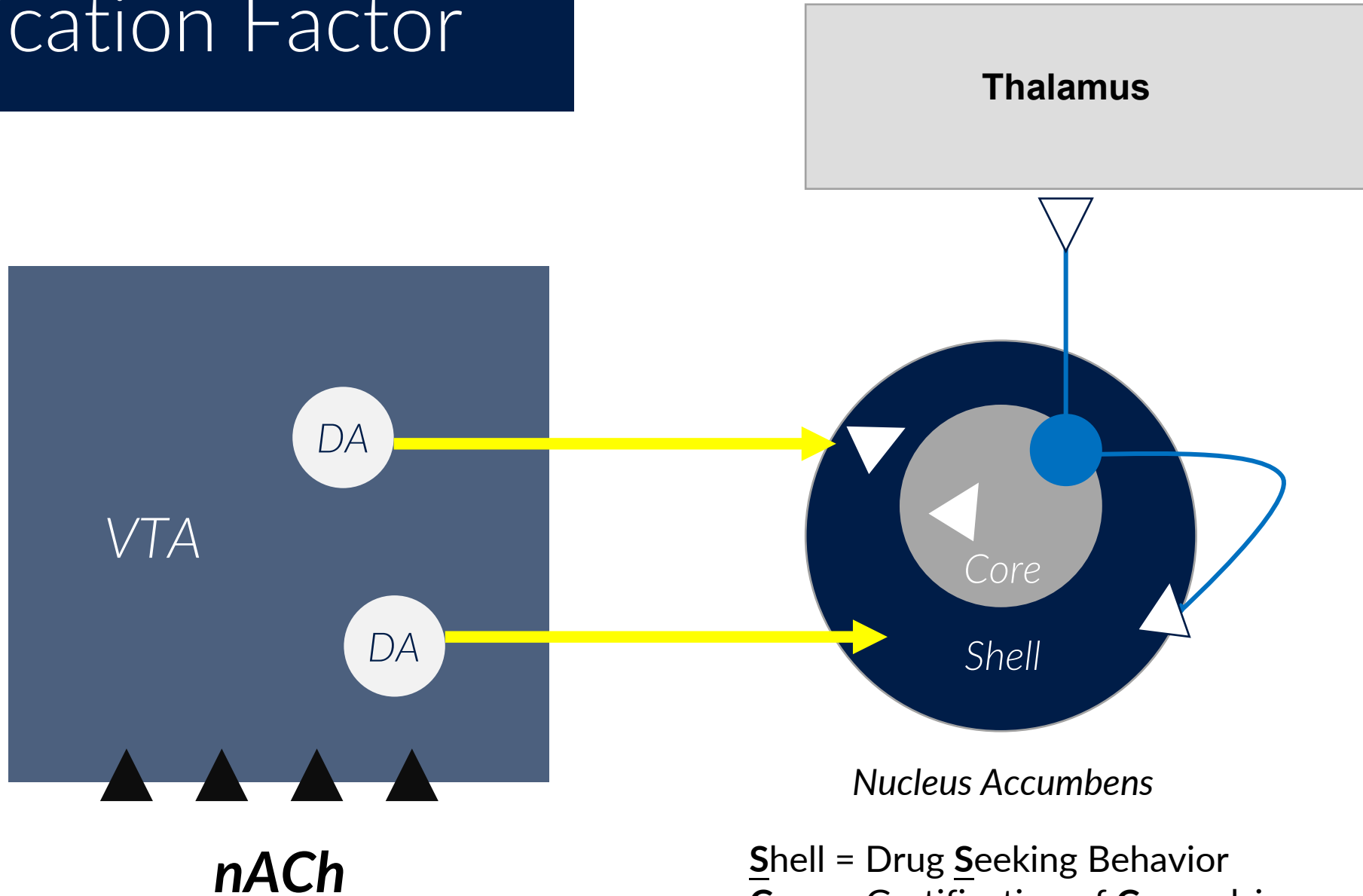
Proper Setting:

- Anxiety
- Social Isolation
- Mitigates Boredom
- Insidious in Usage

Why Do People Vape?



Gratification Factor



Shell = Drug Seeking Behavior
Core = Gratification of Compulsion

Why is Nicotine Addictive?

Nicotine is able to activate the mesocorticolimbic dopamine system, a portion of the brain that is capable of inducing emotions of reward, survival, and aversion.

Why is Nicotine Addictive?

Meaning:

- Nicotine releases DA in “gratification” centers of the brain.
- These are addictive properties related to the rate of delivery of nicotine to the brain.



Why is Nicotine Addictive?

- Nicotine acts directly on the reward circuitry as a type of reward-related sensory input, resulting in dopamine neuronal phasic bursts and inducing dopamine release.



Why is Nicotine Addictive?

- These reward circuits that experience significant neuroplasticity related to nicotine manifest clinically in patients with nicotine addiction as conditional responses.

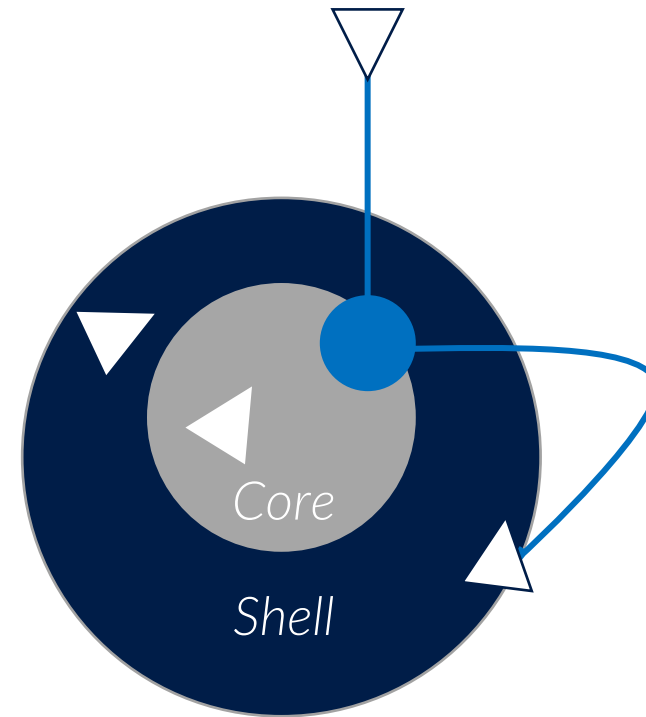
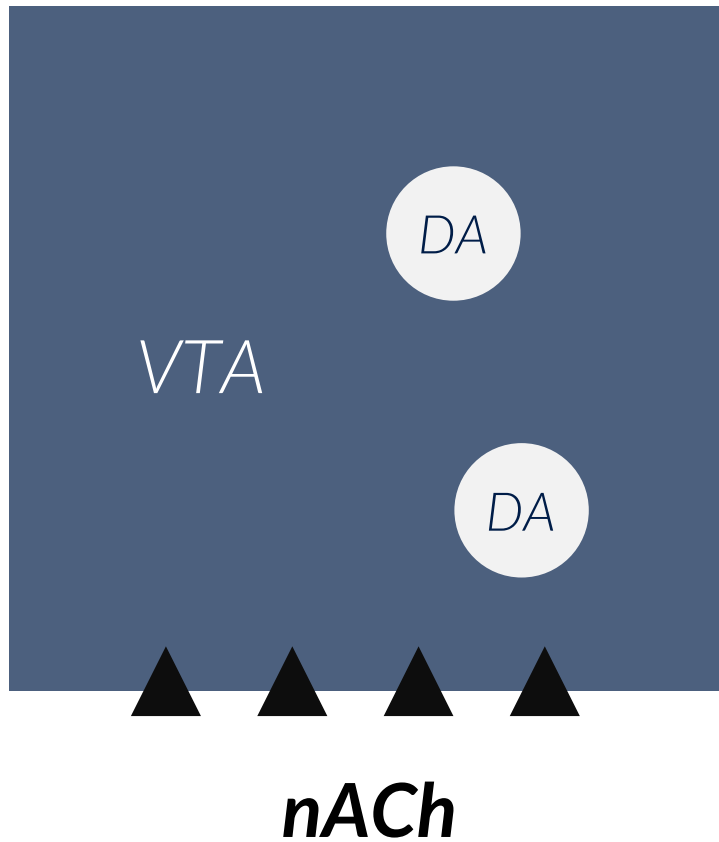


Why is Nicotine Addictive?

- Learned responses become conditional responses for persons with nicotine addiction, resulting in cigarette cravings when prompted by external and/or internal cues.



Gratification Factor



Nucleus Accumbens

Shell = Drug Seeking Behavior
Core = Gratification of Compulsion

Interventions for Tobacco Dependence

- Behavioral Change
 - Not a focus on quitting
 - Focus of un-smoking and becoming a non-smoker
 - Managing cravings and motivations



Why Pursue Electronic Cigarettes?

- Relative risk argument – flaws.
 - Relative risk:
 - Ratio of the probability of an event occurring
 - From exposure
 - Without exposure
 - Failure of absolute risk:
 - Argument against health
 - Lack of time variable and impact on risk

Electronic Cigarettes

- Electronic cigarettes (e-cigarettes) reached the market without either extensive preclinical toxicology testing or long-term safety trials that would be required of conventional therapeutics or medical devices.
- There are currently neither manufacturing standards nor regulation on contents of electronic cigarette products.

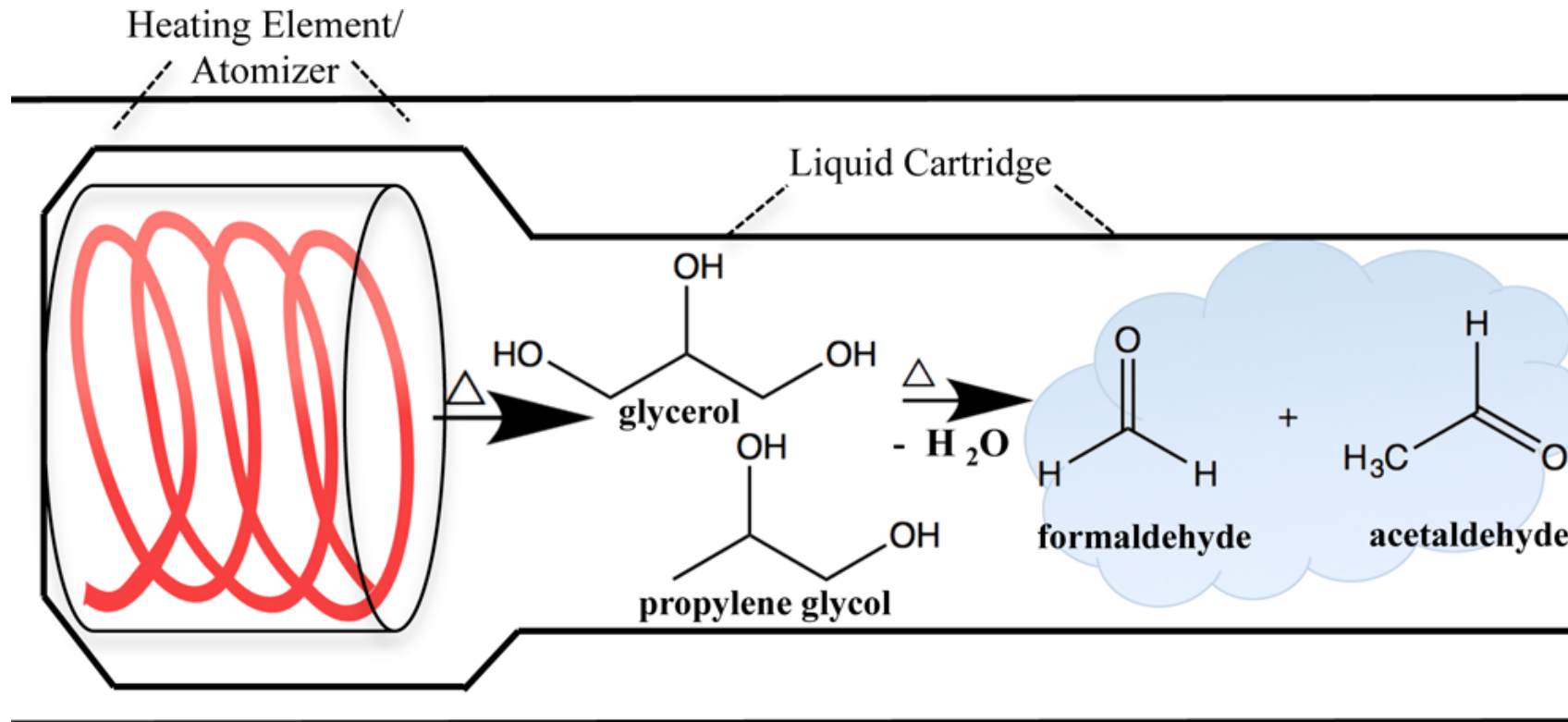
Electronic Cigarettes

- E-cigarettes are considered a tobacco product
- Contain substances that have known pulmonary toxicity
- Are not U.S. Food and Drug Administration (FDA) approved for the treatment of any disease.



Anatomy of an Electronic Cigarette

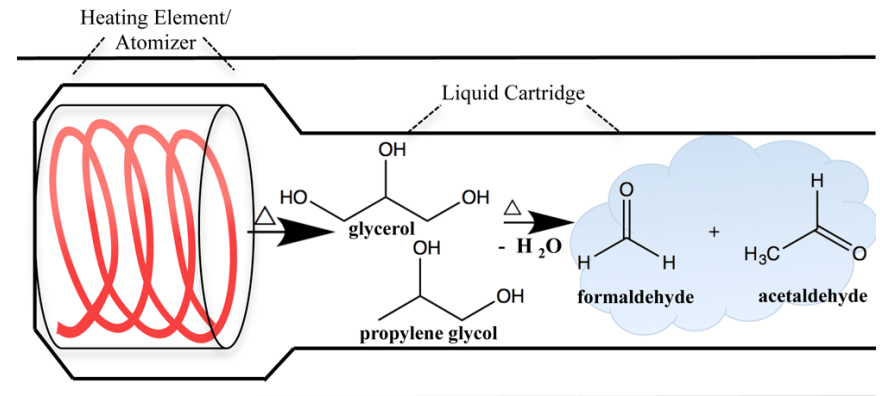
An e-cigarette is a battery-operated nicotine delivery device consisting of a heating chamber and a liquid-containing cartridge.



Anatomy of an Electronic Cigarette

Contents

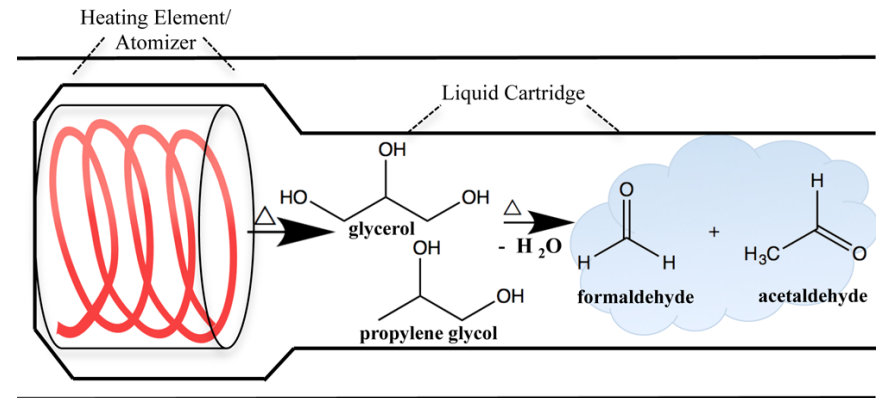
- E cigarette liquids are composed of nicotine and flavorings dissolved in a propylene glycol and/or glycerol vehicle.
- Propylene glycol and glycerol base are the major constituents of e-cigarette liquid.
- *When a user draws air through the e-cigarette, the liquid in the e-cigarette is heated, creating an aerosol to inhale.*



Anatomy of an Electronic Cigarette

Contents

- Diacetyl – a flavoring used in electronic cigarettes.
- *Used in popcorn flavoring, Pop Tarts, candy corn.*



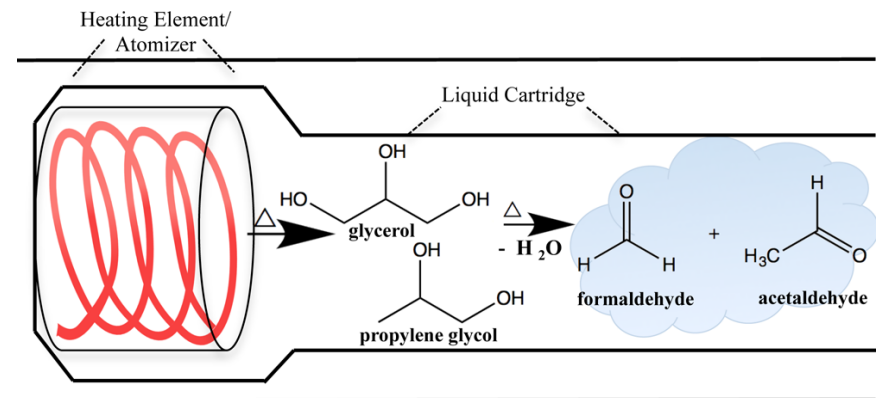
**Fixed Obstructive Lung Disease in Workers at a
Microwave Popcorn Factory --- Missouri, 2000—2002**
CDC MMWR April 2002

Anatomy of an Electronic Cigarette

Contents

Formaldehyde

- Immediate health issues: asthma, reactive airway disease
- Chronic exposure: lung injury and fibrosis, as well as cancers



Health Consequences of E-Cigarettes

- Cardiovascular
- Respiratory
- Cancer – *mouse studies*
- Dual use
- And...

Health Consequences of E-Cigarettes

- Cardiovascular
- Respiratory
- Cancer – *mouse studies*
- Dual use

› [Tob Control](#). 2021 Sep 15;tobaccocontrol-2020-056448. doi: 10.1136/tobaccocontrol-2020-056448. Online ahead of print.

Effectiveness of ENDS, NRT and medication for smoking cessation among cigarette-only users: a longitudinal analysis of PATH Study wave 3 (2015–2016) and 4 (2016–2017), adult data

Bekir Kaplan ¹, Panagis Galiatsatos ², Alison Breland ³, Thomas Eissenberg ³, Joanna E Cohen ⁴

Health Consequences of E-Cigarettes

- Cardiovascular
- Respiratory
- Cancer – mouse studies
- Dual use
- And...
 - Real-world observational studies of e-cigarettes suggest that rather than treating tobacco dependence, e-cigarette use perpetuates it
 - Youth usage epidemic

Health Consequences of E-Cigarettes

Comparative Study > [JAMA Netw Open. 2020 Nov 2;3\(11\):e2020816.](#)

doi: [10.1001/jamanetworkopen.2020.20816.](#)

Association of Electronic Cigarette Use With Incident Respiratory Conditions Among US Adults From 2013 to 2018

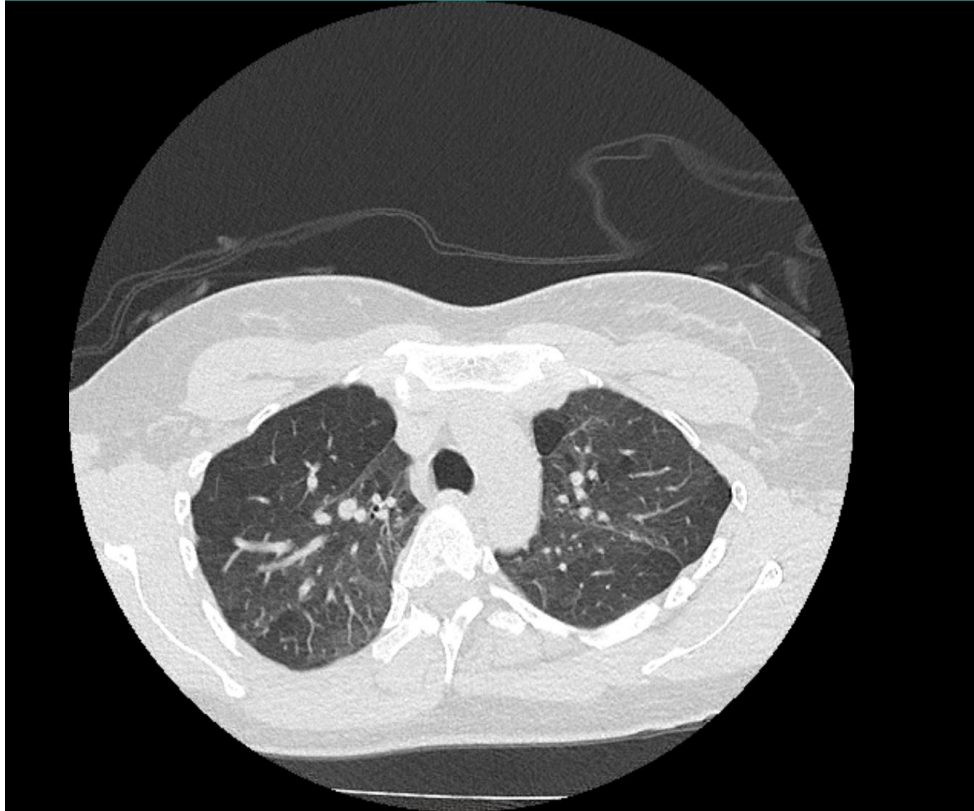
Wubin Xie ¹, Hasmeena Kathuria ², Panagis Galiatsatos ³, Michael J Blaha ^{4 5},
Naomi M Hamburg ⁶, Rose Marie Robertson ^{7 8}, Aruni Bhatnagar ⁹, Emelia J Benjamin ^{6 10},
Andrew C Stokes ¹

> [Am J Respir Crit Care Med. 2022 Jan 28. doi: 10.1164/rccm.202107-1718OC. Online ahead of print.](#)

Association of Electronic Cigarette Use with Respiratory Symptom Development among US Young Adults

Wubin Xie ¹, Alayna P Tackett ², Jonathan B Berlowitz ¹, Alyssa F Harlow ³, Hasmeena Kathuria ⁴,
Panagis Galiatsatos ⁵, Jessica L Fetterman ⁶, Junhan Cho ⁷, Michael J Blaha ^{8 9},
Naomi M Hamburg ^{6 10}, Rose Marie Robertson ¹⁰, Andrew P DeFilippis ¹¹, Michael E Hall ¹²,
Aruni Bhatnagar ¹³, Emelia J Benjamin ^{3 6 10}, Andrew C Stokes ¹⁴

Electronic Cigarettes – Pulmonary Issues



Secondhand smoke from electronic cigarettes and hypersensitivity pneumonitis.

The Perfect Storm

PANDEMIC

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The Perfect Storm

- Cross-sectional study from Italy
 - Prevalence of e-cigarette usage in adults doubled during lockdown: 20% → 40%
 - Consistent with USA and UK studies as well

***Among established users*



The Perfect Storm

- New user uptake of electronic cigarettes
 - Mostly young men
 - Established addictive behaviors
 - Behaviors that were not accessible during lockdowns
 - And many who went on to use electronic cigarettes also went on to use combustible cigarettes

The Perfect Storm

- New users of electronic cigarettes
 - Anxiety
 - Stress
 - Concerns about the pandemic



The Perfect Storm & Repeat of History

- Number one cause of death for persons with mental health disorders
 - Smoking-related diseases
- Persons with a diagnosis of a mental health disorder, (mood disorders, anxiety disorders, substance use disorder, and psychoses) are more likely to use tobacco than those without a diagnosis of mental health disorder

Concluding Thoughts

- Electronic cigarettes are not a safe product.
- As an as-yet largely unregulated product, electronic cigarettes have no manufacturing or safety standards.
- Electronic cigarette products usually contain propylene glycol/vegetable glycerin plus flavoring agents plus nicotine or nicotine salts .

Concluding Thoughts

- Heating of the solution leads to generation of additional toxins and carcinogens.
- Electronic cigarettes use has caused severe injuries from product explosions, nicotine poisoning, and severe lung diseases.

Concluding Thoughts

- Accumulating evidence demonstrates that electronic cigarette use serves to maintain nicotine addiction
- E-cigarettes are associated with decreased rates of cessation in smokers and increased rates of relapse to smoking in former smokers.
- In adolescents, electronic cigarettes are introducing a new generation to nicotine and tobacco addiction – and prime them for other drug abuse.

Concluding Thoughts

- The public health response to the pandemic may have had unintentional consequences on tobacco usage with electronic cigarettes.
 - This must be considered moving forward, for other public health responses during global health crises.

Thank you!
Questions?
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<https://www.nature.com/articles/s41598-021-04438-7.pdf>