



Teen Vaping and Its Role in Caries and Drug Addiction

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Webpage

Pediatricdentalcontinuingeducation.com

PW: Musicscene



My wife asked me to come up with a pun about famous philosophers. I told her maybe I can and maybe I Kant.

GOALS

- **List the ingredients in Vape liquid**
- **Know the mechanism of addiction**
- **Know the links of Vaping to cigarette use, depression in teens, the risk of caries, and addiction**

Why am I talking about this?

- **The obvious health issues**
- **Potential to die – as Summer and Fall 2019 teen deaths**
- **2nd Hand smoke - You go from an ASA 1 to ASA 2 for GA**
- **Safety – fires and explosions**

- **Teens with depression more inclined to smoke (bidirectional)**
- **Smoking is a risk factor for caries (dries the mouth)**

Covey, LS et al J Addictive Dis 1998. 17(1):35-46.

Martini S. et al. J Substance Abuse and Misuse Nov 2002 237(14):1853-1867.

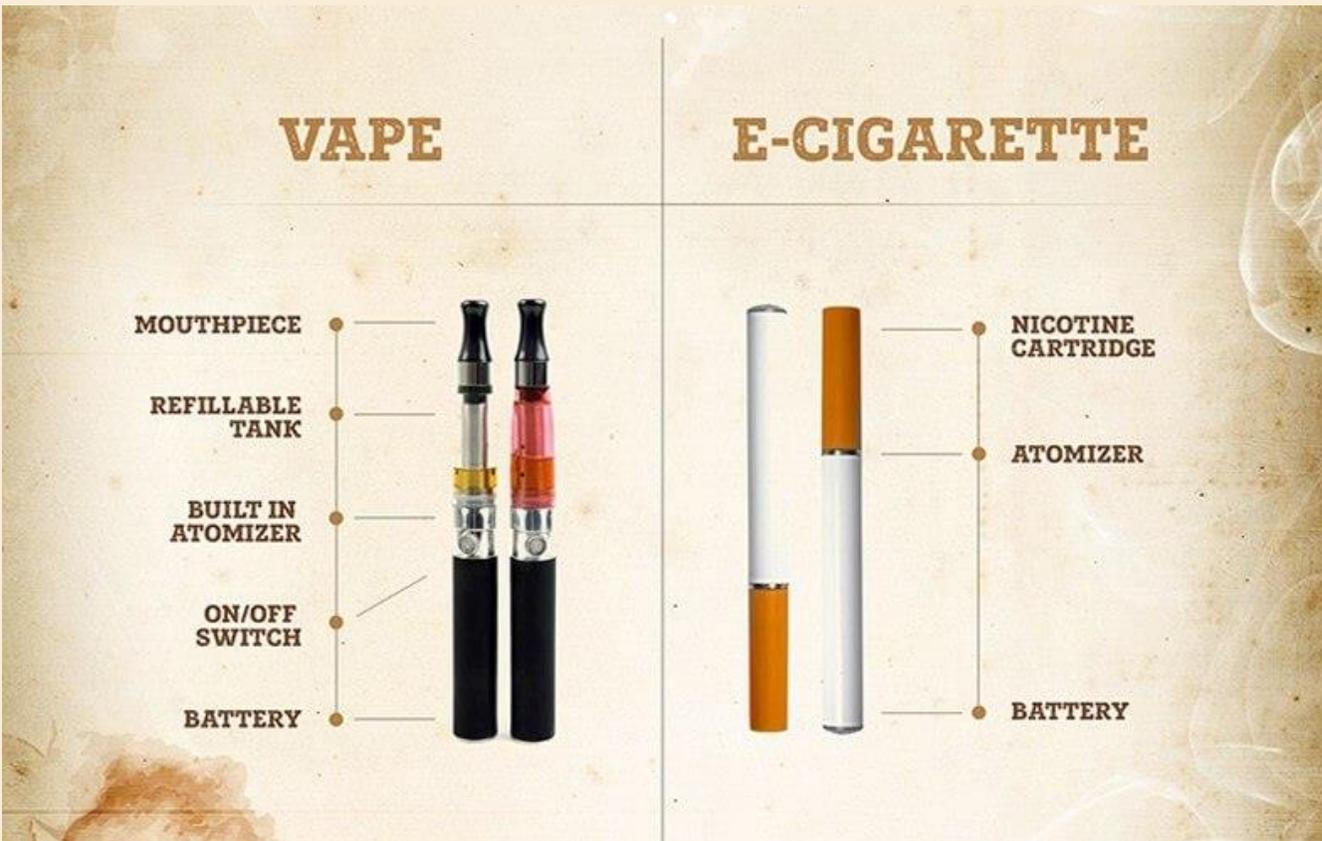
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- **Kelbauskas E, Kelbauskiene S, Nedzelskiene I. The influence of smoking on oral health. Medicina (Kaunas). 2005;41(5):418-26. (In Lithuanian.)**
- **Ludwick W, Massler M. Relation of dental caries experience and gingivitis to cigarette smoking in males 17 to 21 years old (at the Great Lakes Naval Training Center). J Dent Res. 1952 Jun;31(3):319-22.**
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E – cigarette vs Vaporizers



- E Cigarette – one piece
 - 1 time use
- Vaporizer – 3 pieces
 - rechargeable battery
 - juice container
 - main unit

juice - water, nicotine, flavoring

Teen Tobacco Use

4.6%% of high school students

1.6%% middle school students

2020 National Youth Tobacco Survey

Gentzke AS et al. MMWR Morb Mortal Wkly Rep 2020;1881-88.

Statistics – Past yr Nico Vaping

12th Grade – 34.5%

10th Grade – 30.7%

8th Grade – 16.6%

NIDA Dec. 15, 2020

Statistics – Daily Nico Vaping

12th Grade - 8.6%

10th Grade – 5.6%

8th Grade – 2%

NIDA Dec. 15, 2020

Vaping Stats for 2020

39% of teens use an E-cigarette 20 days or less/month

22.5% of teens vape daily (about 4.47 million teens)

2020 National Youth Tobacco Survey

Gentzke AS et al. MMWR Morb Mortal Wkly Rep 2020;1881-88.

What do teens say is in their E-cigarette?

- **66% - flavoring only**
- **13.7% - don't know**
- **13.2% - nicotine**
- **5.8% - marijuana**
- **1.3% - other**

AM Leventhal et al. 2015. JAMA. 314(7):700-707.

TS Singh et al. Jan 8, 2016. CDC. 64(52):1403-8.

LD Johnston et al. NIDA. Monitoring the future. National Survey Results on Drug Abuse. 2015. 1-98.

Vaping is safer?

Vaping Smoke:

Cadmium

Formaldehyde

Lead

Nickel

Nicotine

Toluene

N-nitrosornicotine

2nd Hand Vape Smoke

Benzene

Formaldehyde

Nicotine

N-nitrosornicotine

Toluene



What problems with flavors?

Bad flavors

Vanilla

Mint

Cinnamon

Clove

*cinnaldehyde

Problems

- Thrombosis
- Arteriosclerosis
- Vascular pathology
- Can't inhibit inflammation
- No nitric oxide produced

Nicotine free Vape

DAP – diacetyl propionyl (artificial butter flavor)

AP – acetyl propionyl

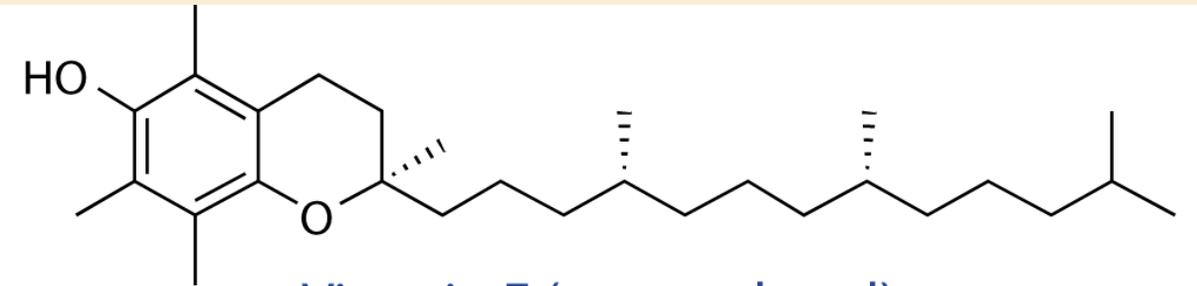
- **OK for food use BUT not to be inhaled**
- **Causes permanent, severe, and lethal lung problems**

What problems?

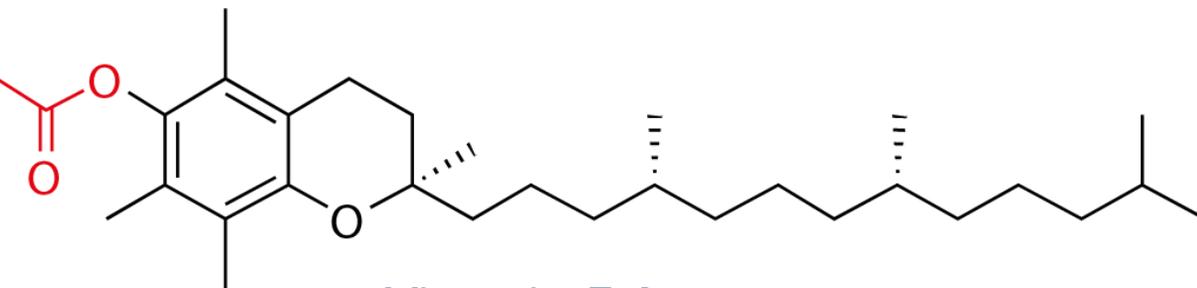
- Popcorn lung



Vitamin E Acetate and the lungs



Vitamin E (α -tocopherol)



Vitamin E Acetate

- well-known antioxidant occurs naturally in vegetables, vegetable oils, seeds, and fruits.
- Is stable hydrolyzed to vitamin E once it recently been used as a diluent for THC-containing vape or e-cigarette products.
- is used to help with appearance, taste, and production cost and 'cut' the marijuana
- Causes EVALI

EVALI (electronic-cigarette, or vaping, product use-associated lung injury)

**an acute lung illness that has spread rapidly
across the country**

median age of 24 years old



Why so bad?

- Lungs lined with polysurfactant (PS) a phospholipid
- VEA has an affinity for phospholipid layers like PS due to its nonpolar aliphatic carbon chain
- penetrate the PS layer, disrupting the organization of lipid molecules and changes the surface tension which can lead to lipoid pneumonia
- Heating element in vaping changes all chemistry!!!
- high temperatures act as a catalyst for unpredictable chemistries in the vaping mixture which lead to pyrolysis, or thermal decomposition, of molecules into potentially more hazardous chemicals.

References

Zuo, Y. Y., Veldhuizen, R. A. W., Neumann, A. W., Petersen, N. O. & Possmayer, F. Current perspectives in pulmonary surfactant – Inhibition, enhancement and evaluation. *Biochimica et Biophysica Acta – Biomembranes* 1778, 1947–1977 (2008).

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Wu, D. & O'Shea, D. Potential for Release of Pulmonary Toxic Ketene from Vaping Pyrolysis of Vitamin E Acetate. (2019).
doi:10.26434/CHEMRXIV.10058168.V2

More common behaviors of sole e-cigarette users compared with nonusers

- heavy drinking (7.4% vs 3.9%)
- binge drinking (26.3% vs 13.1%)
- drinking and driving (6.3% vs 3.3%)
- marijuana use (24.9% vs 4.2%)

Mirbolouk M, Charkhchi P, Orimoloye OA, et al. E-cigarette use without a history of combustible cigarette smoking among U.S. adults: Behavioral Risk Factor Surveillance System, 2016 [published online October 9, 2018]. *Ann Intern Med.* doi: 10.7326/M18-1826

Prolonged nicotine exposure

- **Causes abnormal cerebral dopamine transmission**
 - **dysregulates neural pathways underlying emotional processing**
 - **amplifies stress sensitivity**
- 

You should know....

- **cigarette smoking and depressive symptoms well documented in adolescent populations and appears to be bi-directional.**
- **Depressive symptoms predict onset and escalation of smoking**
- **smoking predicts increasing levels of depressive symptoms over time**

- **interferes with the development of adaptive coping strategies that buffer against the onset of depressive symptoms particularly during adolescence when the developing brain is more vulnerable to nicotine-induced neurobiological insults**
- **E-cigarettes has the same effect as cigarettes!***

***WV Lechner et al. Prev Med March 2017. 96:73-78.**

- **30.7% of teens who vape went to cigarettes in 6-18 mos**
- **8.1% of teens who did NOT vape went to cigarettes**

- **2X males more than females Vape**
- **Never underestimate the social acceptance of vape**
- **Marketing with flavors**

- **Cigarette smoking associated with depression, stress, psych disorders**

Oral Health Problems

Decreased bleeding

Increased anterior gingival recession

Increased furcation issues

Increased bone loss

Increased perio probing depths

Explodes

Increased collagenase

changes DNA in oral cells

***impaired healing around implants**

****NICOTINE CAUSES DRY MOUTH**

I like watching cooking shows on Saturdays. I just found out the best way to microwave fish is tuna-half minutes.



Vaping and Marijuana



Statistics – Past Yr marijuana use

12th Grade – 35.2%

10th Grade – 28%

8th Grade 11.4%

NIDA Dec. 15, 2020

Statistics – Daily marijuana use

12th Grade - 6.9%

10th Grade – 4.4%

8th Grade – 1.1%

Statistics – Past year Marijuana Vaping

12th Grade – 22.1%

• Get very high levels of THC!

10th Grade – 19.1%

8th Grade – 8.1%

NIDA Dec. 15, 2020

**KT Trivers et al. JAMA Pediatr Sept. 2018.
doi:10.1001/Jamapediatrics.2018.1920.**

Statistics – Daily Marijuana Vaping

12th Grade – 2.5%

10th Grade – 1.7%

8th Grade - .7%

What else?

- **9% of teens in High school – Vape marijuana**
- **Get very high levels of THC!!!!**

KT Trivers et al. JAMA Pediatr Sept. 2018. doi:10.1001/Jamapediatrics.2018.1920.

E-cigarettes and marijuana use

- **HS teens are 27X more likely to use E-cig to vaporize cannabis**
- **Males more than females**
- **Unrelated to SES**
- **No smell**
- **Results in increase concentration and thus increased mind altering effects**

bit.ly/2TrJhHk JAMA Pediatrics, online August 12, 2019.

E-cigarettes and ETOH

- **Enhances reinforcing effects of ETOH**
- **Increases the drinking episode**
- **Increases the higher levels for cravings for ETOH and E-cigs**

A termite walked into a bar and asked, "Where is the bar tender?"



Nicotine is a Gateway Drug to Cocaine

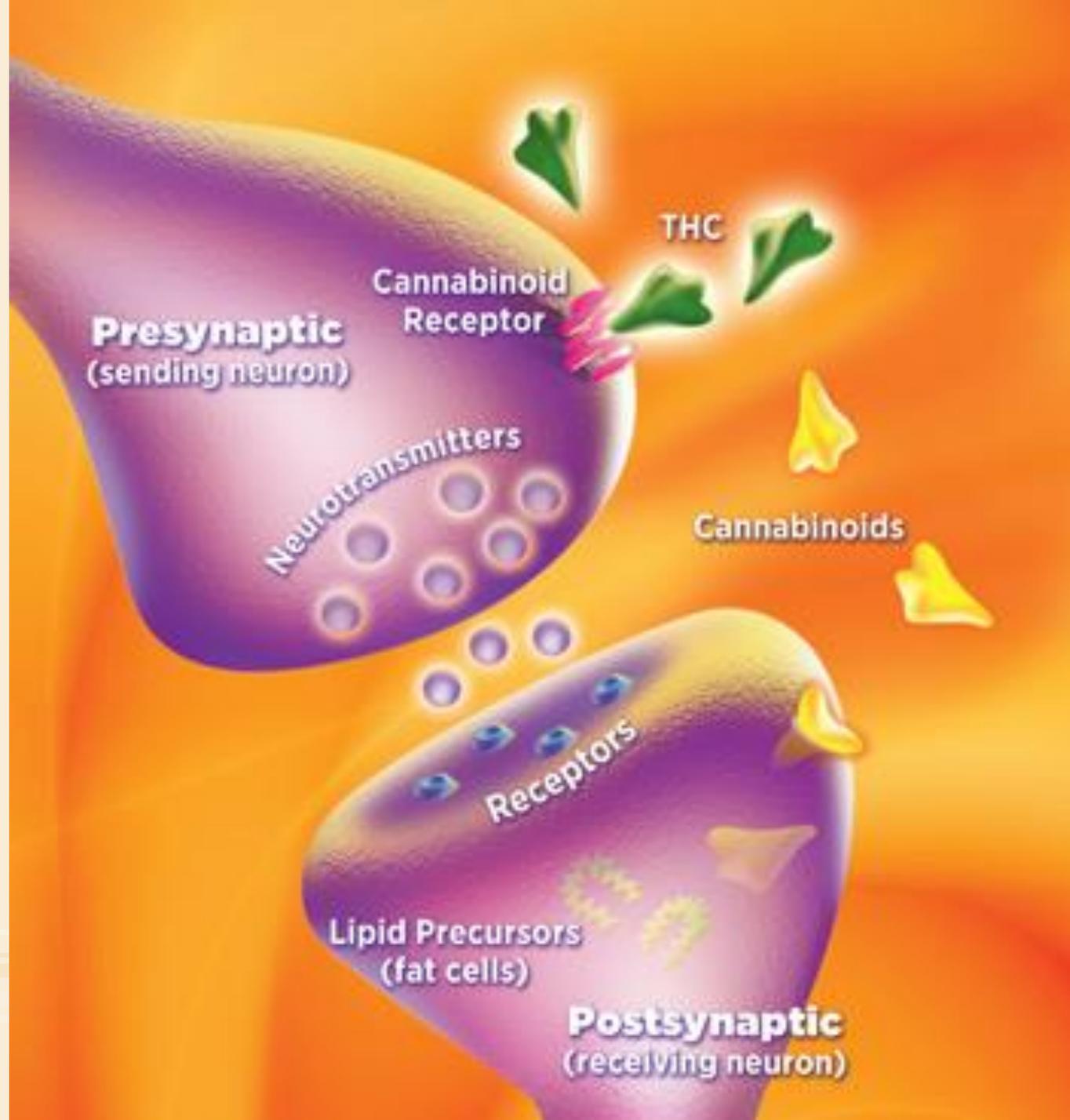
It's a form of neural learning.

E.R. Kandel and DB Kandel. NE J Med. Sept 2014. 371(10):932-943.



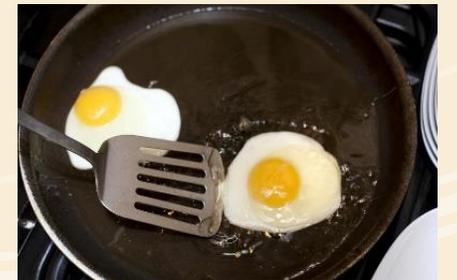
Study on those that used cocaine 18-34 yo

- **87.9% smoked cigarettes before using cocaine**
- **5.7% used cigarettes and cocaine at the same time**
- **3.5% used cocaine first**
- **2.9% never smoked cigarettes before using cocaine**



The Teen brain and marijuana

- Lower grades
- Learning problems
- Drop out of HS
- Reduced intellectual level most or all the time
- Greater chance to be unemployed
- Lower income as adults
- Decrease motivation
- Attention problems

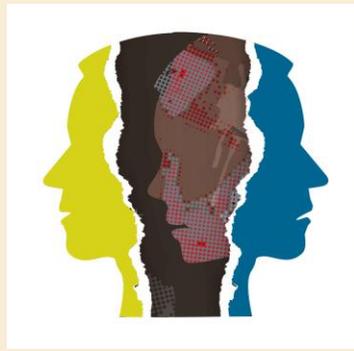


Drug Interactions with Marijuana

Any med that changes the activity of CYP3A4 and CYP2C9:

- 1. Clarithromycin**
- 2. Erythromycin**
- 3. Cyclosporine**
- 4. Zoloft**
- 5. Lyrica**
- 6. BP meds**
- 7. warfarin and heparin**
- 8. Hydrocodone**

READY???



Chronic marijuana use = 2 or more joints a week

Chronic marijuana use increases chance of developing Schizophrenia especially in teens!!!!

Patel, S., Khan, S., M, S., & Hamid, P. (2020). The Association Between Cannabis Use and Schizophrenia: Causative or Curative? A Systematic Review. *Cureus*, 12(7), e9309. <https://doi.org/10.7759/cureus.9309>

On that happy note.....

Q: which is heavier: a gallon of water or a gallon of butane?

A: Water. Because butane is a lighter fluid.

Key Points

- **Vaping in pre-teen and teens leads to cigarette smoking**
- **Which leads to marijuana smoking**
- **Which leads to heroin and cocaine use by age 25**
- **Increase chance of being dead by age 30**
- **Health risks with vaping including an increase in caries**





THANK YOU!

The bottom of the slide features several decorative, wavy lines in shades of light beige and cream, creating a soft, flowing effect.



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