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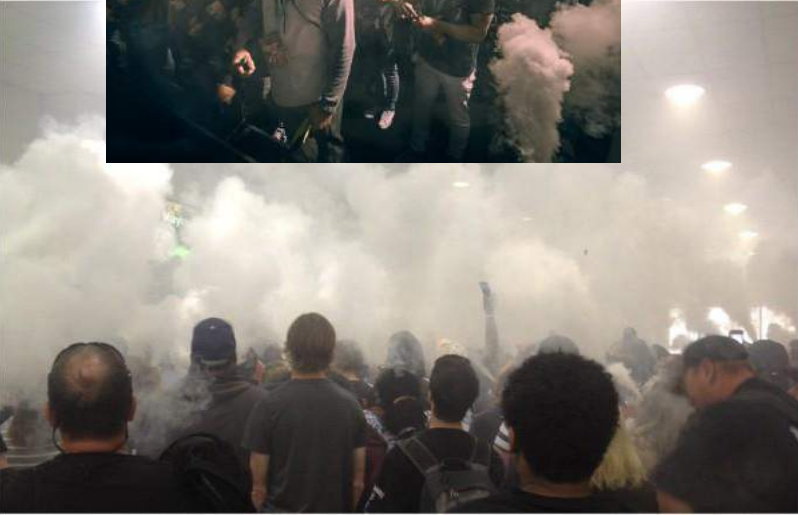
Vaping and E-cigarettes: The Good, The Bad and The Ugly

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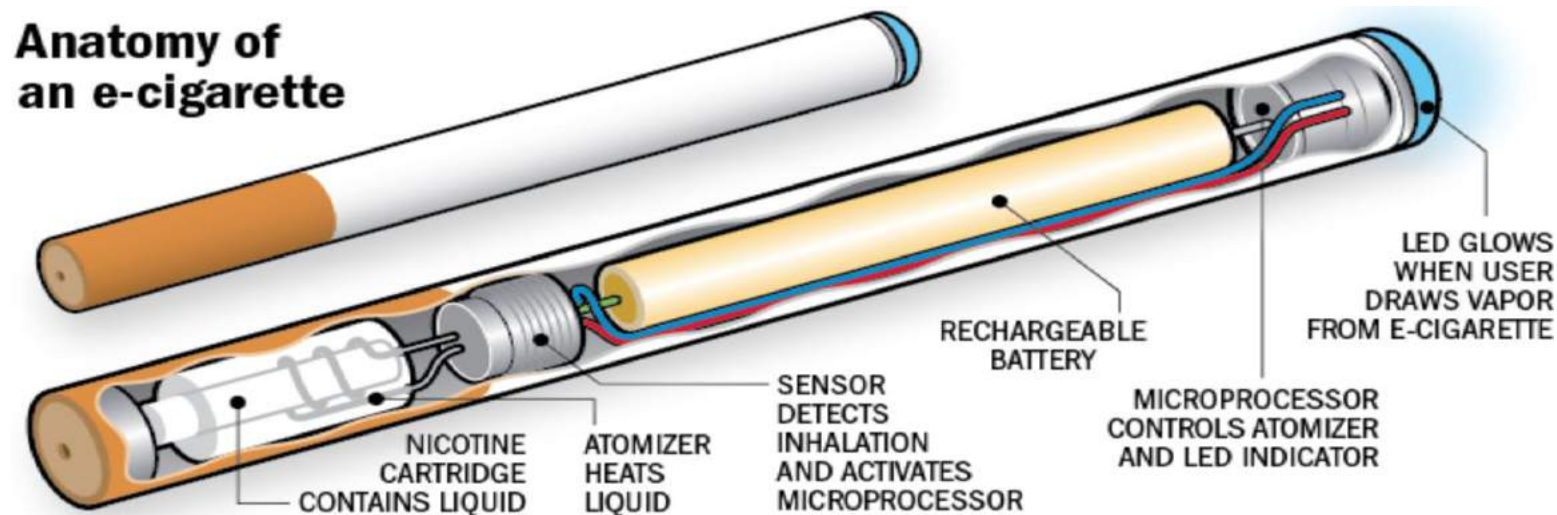
www.dilworthcenter.org/downloads





What are E-cigarettes?

- E-cigarettes are electronic devices that heat a liquid and produce an aerosol, or mix of small particles in the air.
- E-cigarettes come in many shapes and sizes. Most have a battery, a heating element, and a place to hold a liquid.





What are E-cigarettes?

- Some e-cigarettes look like regular cigarettes, cigars, or pipes. Some look like USB flash drives, pens, and other everyday items. Larger devices such as tank systems, or “mods,” do not look like other tobacco products.





Current Research

- Most existing research investigates the short-term effects of vaping and e-cigarettes. The long-term effects on human health are still unclear and require further study.





Safety Concerns

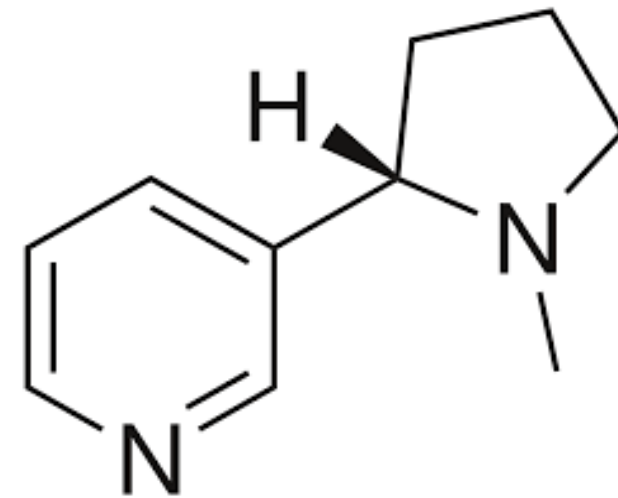
- The current safety concerns of vaping focus on four primary areas.
 - The drug, nicotine
 - Humectants, additives and adulterants in e-juice liquids
 - Vaping device hardware (i.e. pens, tanks, mods, batteries)
 - Drugs other than nicotine (i.e. THC, synthetic cannabinoids)





Nicotine

- The most commonly used drug in vaping devices is nicotine.
- When vaped, nicotine enters the body and is distributed quickly through the bloodstream. It then crosses the blood-brain barrier within 10-20 seconds after inhalation.





Nicotine

- Nicotine in its pure form is a colorless, odorless liquid.
- Nicotine has a stimulant effect in lower dosages and a sedative effect in higher dosages, which is unusual in comparison to most other drugs.
- Nicotine's half-life is 1-2 hours.
- Nicotine is addictive.





- Nicotine's effects on people who do not normally smoke or vape:

- Dizziness
- Headache
- Nausea
- Abdominal cramps
- Vomiting
- Weakness

- Nicotine's effects on people who smoke or vape regularly:

- Mild stimulation
- Increase in heart rate
- Perceived increased ability to concentrate
- Relaxation
- Tingling and numbness in fingers and toes
- Reduced appetite





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The Good



Harm Reduction?

- E-cigarettes may expose users to fewer harmful chemicals than burned cigarettes, although this is not consistently the case.
- E-cigarettes can be a harm reduction tool in helping people quit using burned cigarettes and other tobacco products. However, nicotine replacement products (gum and patches) are preferred over vaping by most health-care professionals.





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The Bad



Nicotine Dangers

- Nicotine is very addictive.
- It is well known that nicotine has a multitude of harmful effects. Nicotine has significant biologic activity and adversely affects several physiological systems including the cardiovascular, respiratory, immunological and reproductive systems, and can also compromise lung and kidney function.
- Nicotine can disrupt brain development in adolescents and young adults.





Nicotine Dangers



- Several studies have suggested that nicotine is potentially carcinogenic, but more work is needed to prove its carcinogenicity independently of the combustion products of tobacco.
- The lethal dose of nicotine for an adult is estimated at 30–60 mg. Given that nicotine easily diffuses from the skin to the bloodstream, acute nicotine exposure by *e-liquid* spilling can easily be toxic or even deadly. (5 mL of a 20 mg/mL nicotine-containing refill is equivalent to 100 mg of nicotine). 5mL is approximately one teaspoon.





Sometimes, things are not what they seem to be.





Uncertain Nicotine Potency and Purity

- There are common inconsistencies in the nicotine content with respect to the manufacturer's declaration.
- One study detected the presence of nicotine (0.11–6.90 mg/mL) in 5 of 23 nicotine-free labelled *e-liquids*.
- *E-cigarettes* containing 20 mg/mL of nicotine are more equivalent to normal cigarettes.
- However, some commercial *e-liquids* have nicotine concentrations greater than 50 mg/mL.





E-liquid Additives

- Besides nicotine, ingredients of *e-liquids* are PG (Propylene Glycol) and/or VG (vegetable glycerin).
- Both types of compounds are used as humectants to prevent the *e-liquid* from drying out.
- Little is known about the effects of humectants when they are heated and chronically inhaled.
- Preliminary research indicates that aerosol generated from vaping devices likely impairs blood vessels' ability to function comparable to traditional cigarette smoke.





Vaping is Not Without Harm

“When you inhale a suspension of particles or a mist, whether it is from tobacco or marijuana, whether it's smoke or aerosol, it all has the same effect. Our research reinforces the previous findings that vaping is not without harm, and it underscores the importance of counseling patients about the risks of vaping because it does affect cardiovascular function.”

- Matthew L. Springer, Ph.D.,
Professor of Medicine
University of California, San Francisco
School of Medicine





E-liquid Additives

- Under heating conditions PG can produce acetaldehyde or formaldehyde (carcinogens) while VG can generate acrolein (lung irritant).
- The long-term effects of all flavor chemicals used in *e-liquids* remain unknown and are not usually included in the product label. 8000 flavors are on the market.
- Some flavored *e-liquids* can cause cell damage or death (cytotoxicity). Studies have found that the most cytotoxic flavors were cinnamon and butter.
- One study found that 47 out of 51 flavored *e-liquids* contained compounds that are associated with respiratory complications.

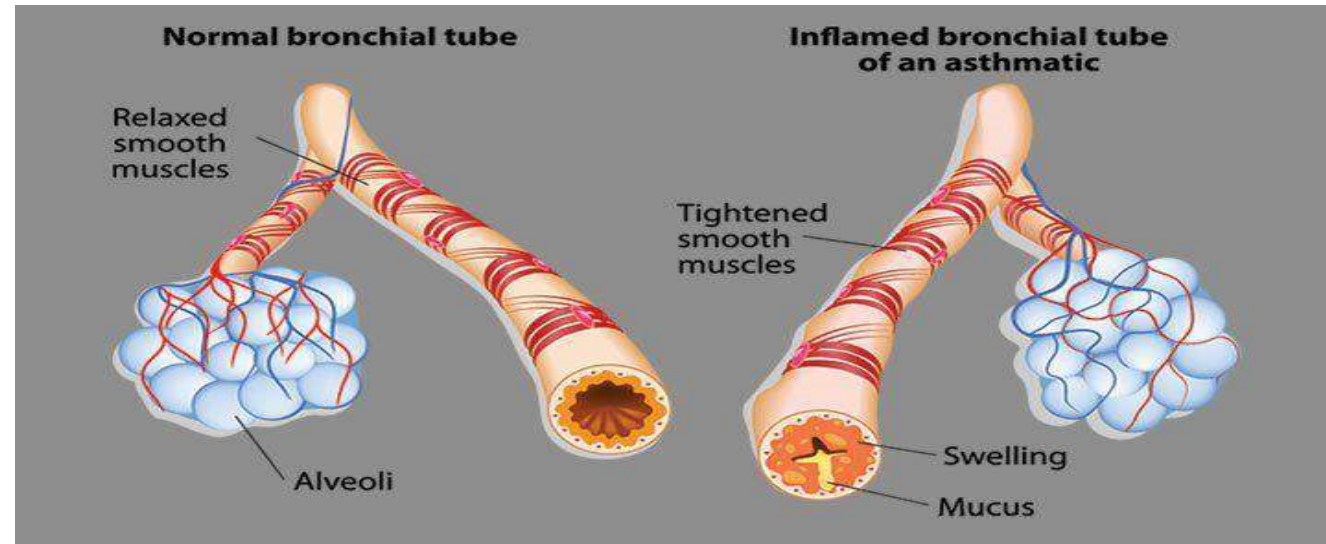
<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6910911/>
<https://respiratory-research.biomedcentral.com/articles/10.1186/s12931-020-01571-1>





E-liquid Additives

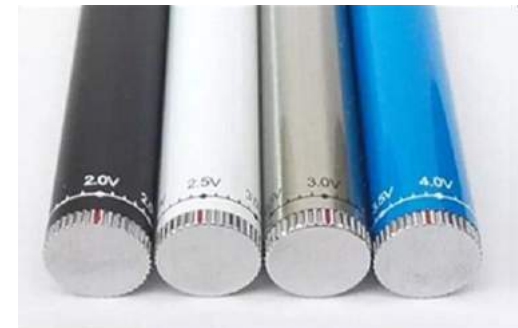
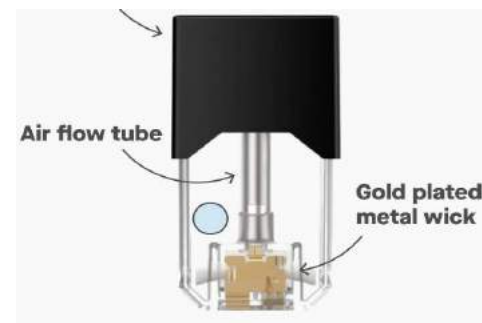
- Airway epithelial injury (asthma and related conditions) induced by acute vaping of PG and VG aerosols, with or without nicotine, has been reported in at least two randomized clinical trials.





Vaping Devices

- Silicate or silicone particles from the fiberglass wicks are known to cause abnormalities in respiratory function and respiratory diseases.
- Battery output voltage also seems to have an impact on the cytotoxicity of the aerosol vapors, with *e-liquids* from a higher battery output voltage showing more toxicity to cells.



Twist the bottom to adjust the voltage.

2.0V-2.5V-3.0V-4.0V



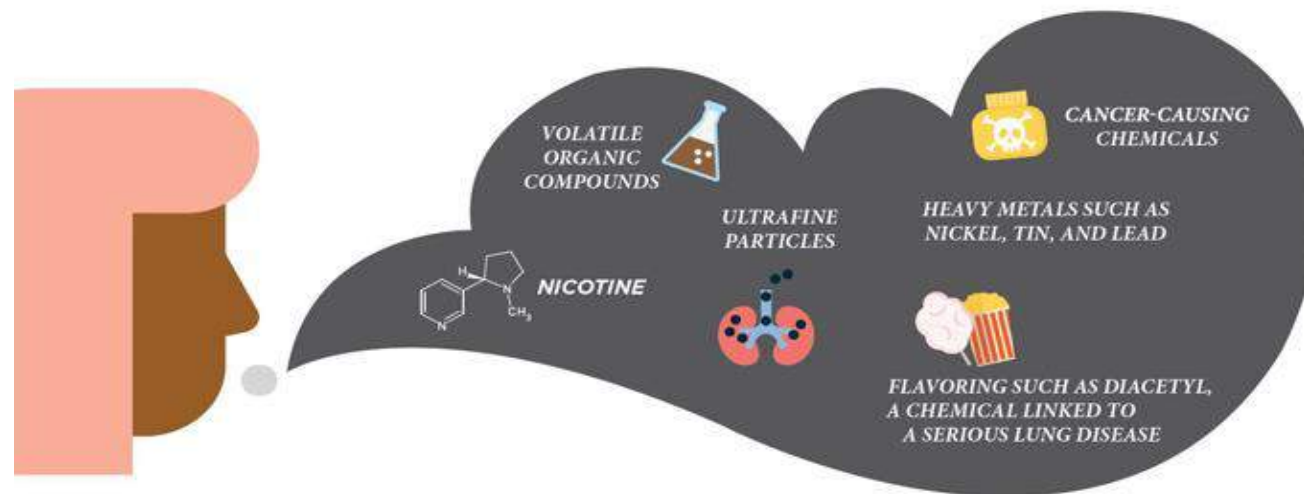
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The Ugly



No Quality Control

- Regulatory oversight and quality control for vaping products are typically inconsistent if not nonexistent. The result is not knowing exactly what you're getting.
- Some products are more dangerous than others. There is no reliable way to tell.





Nearly 2,000 Chemicals—Some Potentially Harmful—Found in Vaping Aerosols



- Scientists at Johns Hopkins University discovered that vaping aerosols contain thousands of unknown chemicals and substances not disclosed by manufacturers, including industrial chemicals and caffeine.
- Researchers in Australia came up with similar results in a recent examination of 65 vape liquids. Every sample contained at least one potentially harmful chemical, including benzaldehyde, an airway irritant, and trans-cinnamaldehyde, an immunosuppressive agent.



Battery Explosions

2035 reported incidents in the US between 2015 and 2017, including fatalities.



<https://www.washingtonpost.com/nation/2019/06/20/teens-injuries-looked-like-he-was-high-speed-crash-instead-vape-pen-exploded-his-mouth/>
<https://www.nbcnews.com/health/health-news/battery-behind-dangerous-deadly-e-cigarette-explosions-n1032901>
<https://tobaccocontrol.bmj.com/content/28/4/472>
https://youtu.be/XeKLMcM8_V0



Increased Risks, No Benefits

- “There are millions of middle school and high school students vaping that would not otherwise think of smoking. For them there is no risk reduction, only increased risk.”

- Ana M. Rule, an expert in metals exposures from vaping at the Johns Hopkins Bloomberg School of Public Health



JOHNS HOPKINS

BLOOMBERG SCHOOL
of PUBLIC HEALTH



UCLA study finds even short-term vaping poses significant risk to health

- The study published Aug. 9 found that puffing on a vaping device for 30 minutes causes a measurable increase in the oxidative stress levels of nonhabitual e-cigarette or tobacco cigarette users.
- Oxidative stress is a well-known risk factor for heart disease, lung disease, cancer and accelerated aging.
- This study shows that it only takes a short vaping session to increase one's risk of developing harmful diseases.

The UCLA logo, consisting of the letters "UCLA" in white, bold, sans-serif font on a blue rectangular background.



Drugs Other Than Nicotine

- THC/Marijuana
- CBD
- Synthetic Cannabinoids
- Poisons



THC/Marijuana

- Teen vaping of marijuana doubled between 2013 and 2020, indicating that young people may be swapping out joints, pipes or bongs for vape pens, according to a new study.
- Researchers also found that adolescents who say they vaped cannabis within the last 30 days increased 7-fold during the same period.
- Carol Boyd, co-director of the Center for the Study of Drugs, Alcohol, Smoking and Health at the University of Michigan, told NPR "vaping marijuana appears even worse" for young people than vaping nicotine products.
- THC levels are commonly higher in cannabis oils found in vapes compared to traditional marijuana, thus increasing the potential for side-effects.

[https://jamanetwork.com/journals/jamapediatrics/fullarticle/2785376?guestAccessKey=4df985fe-e703-49cc-a46f-da461093574e&utm_source=For The Media&utm_medium=referral&utm_campaign=ftm_links&utm_content=tf1&utm_term=102521](https://jamanetwork.com/journals/jamapediatrics/fullarticle/2785376?guestAccessKey=4df985fe-e703-49cc-a46f-da461093574e&utm_source=For%20The%20Media&utm_medium=referral&utm_campaign=ftm_links&utm_content=tf1&utm_term=102521)

<https://www.npr.org/2021/10/25/1049127183/marijuana-vaping-cannabis-teens-growth-risks>



CBD

- A 2017 study in the Journal of the American Medical Association found 70% of CBD products were mislabeled.
- Some operators are cashing in on the CBD craze by substituting cheap and illegal synthetic cannabinoids for natural CBD in vapes and edibles such as gummy bears.
- The American Association of Poison Control Centers considers CBD an “emerging hazard” due to the potential for mislabeling and contamination.



Synthetic Cannabinoids

- Chemicals that bind to the cannabinoid receptors in the brain.
- Thousands of HU (Hebrew University), JWH (John W. Huffman), AM (Alexandros Makriyannis) and CP (Charles Pfizer) compounds.
- Street names - fake pot, fake weed, K2, Spice.
- Most of these compounds have never been tested on humans. The side-effect profiles are largely unknown.
- No way to know what you're purchasing. Content and purity are always questionable.





Poisons



- Fake marijuana in five States was found to contain brodifacoum which is used in rat poison. Brodifacoum is a “superwarfarin” and causes a depletion of vitamin K in the blood which is responsible for blood clotting. The result is uncontrollable bleeding, and the effects can last for months (half-life 24 days). In Illinois, 164 cases including three deaths were reported from March 7, 2018 – May 9, 2018.



Vaping Deaths

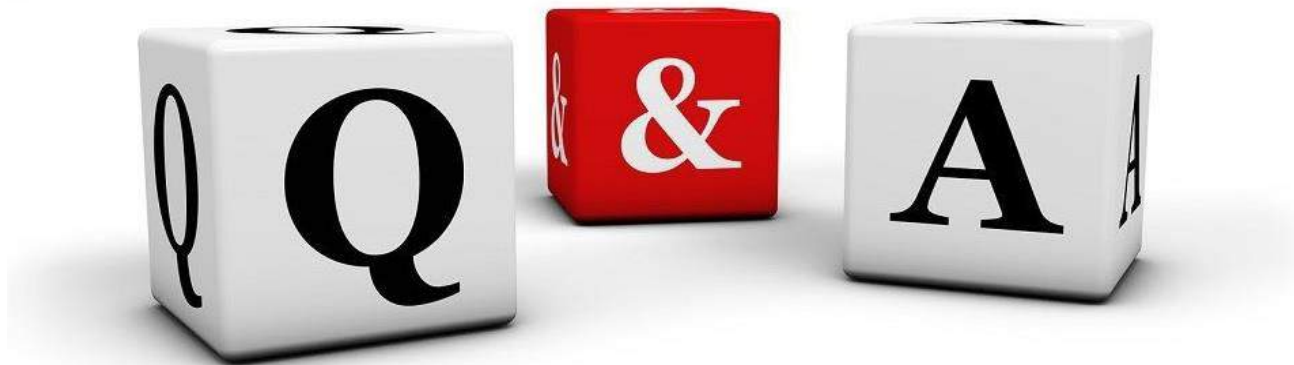
- As of January 21, 2020, 2111 cases of e-cigarette or vaping product use associated lung injury (EVALI) have been reported to CDC from all 50 states, the District of Columbia, and 2 U.S. territories.
- 60 deaths have been confirmed in 27 states and the District of Columbia.



- THC vaping products called Dank, Lion's Breath and KRT are linked to many of the cases of lung illnesses.
- Vitamin E acetate is strongly linked to the EVALI outbreak.



Questions and Answers





That's all Folks!



About the Presenter

Charles Odell, MSW, MAC, LCAS

Mr. Odell has worked in the field of substance use disorder treatment since 1983. He is the Chief Executive Officer and President of Dilworth Center where he has worked since 1995. Dilworth Center is a private, non-profit organization providing substance use disorder treatment programs for adults, young adults, adolescents and families.

Mr. Odell is an alumnus of LAS. He received a Bachelor of Arts from the University of North Carolina at Charlotte and a Master of Social Work from the University of North Carolina at Chapel Hill. Mr. Odell is Master Addiction Counselor and a Licensed Clinical Addictions Specialist. He serves on the Board of Directors of the National Association of Addiction Treatment Providers and the Advisory Board of the Jonnie McLeod Institute on Substance Abuse at UNC-Charlotte. He is also an Adjunct Instructor at UNC-Chapel Hill. Mr. Odell is married to Sydney, and they have two sons, Alex and Andy.



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