

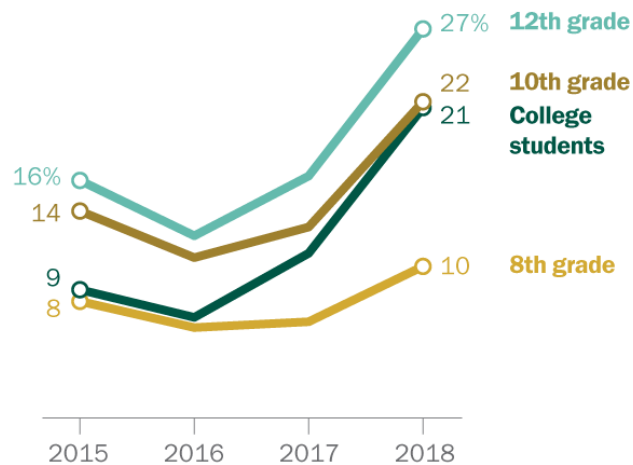


Vaping and the Adolescent Brain

Dr. Merrill Norton Pharm.D.,D.Ph.,CMAC,CCS
CEO
Chemical Health Associates, Inc.
mernor@gmail.com

Growing shares of U.S. secondary school, college students vape regularly

% who reported any vaping during the last 30 days



Note: Pre-2017 survey asked about “any vaping.” Data after 2017 based on separate questions about vaping nicotine, marijuana, and just flavoring.

Source: University of Michigan Monitoring the Future survey.

PEW RESEARCH CENTER

An Epidemic

- November 2014, Oxford Dictionaries word of the year is “vape.”
- Youth and young adult vaping increases exponentially
- Juuling considered an epidemic among high school and college students
- The FDA issued 1,300 warning letters to retailers who were illegally selling Juuls to minors
- It was found that Juul intentionally marketed products to teens
- Juul apologizes to parents of teens addicted to its vaping products



Most Recent Updates

- **CDC authored a new study, based on a January-May 2022 online survey of about 28,000 middle and high school students.**
 - **17% of teens reported vaping, 14% vaped recently**
 - **Of those who vape, 28% said they use every day**
 - **Of those who vape, about 85% used flavored products**
 - **Favored products included Puff Bar and Vuse, followed by Hyde and Smok**
- **The FDA recently took action against the makers of Puff Bar and Hyde.**
 - **Sent a warning letter to EVO Brands, stating that the company never obtained US permission to sell its products and they are being marketed illegally**

Most Recent Updates

- “In the last three years, federal and state laws and regulations have raised the purchase age for tobacco and vaping products and banned nearly all teen-preferred flavors from small, cartridge-based e-cigarettes.”
- In the recent survey, about 1/5 of teens who vape reported recently using Juul. In 2019, more than half of teens who vaped reported Juul as their usual brand.
- The U.S. Food and Drug Administration banned Juul products from being sold in the U.S. by issuing marketing denial orders (MDOs) on June 23, 2022, but the agency has since put an administrative hold on the ban until it can review Juul's marketing application again.





Resources

- American Lung Association. www.lung.org
 - CDC www.cdc.gov
 - American Academy of Pediatrics. www.aap
 - US Surgeon General. www.e-cigarettes.surgeongeneral.gov
 - Tool Kit for Schools. www.makesmokinghistory.org
 - E-Cigs/Vapes Toolkit. www.med.stanford.edu
 - ATTC Network. www.attcnetwork.org
 - PTTC Network. www.pttcnetwork.org
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What Do We Know?



- Cigarettes contain about 600 ingredients and create more than 7,000 chemicals when burned - at least 70 of these are cancer-causing.
- Some of the chemicals found in cigarettes include ammonia, carbon monoxide, formaldehyde, lead, nicotine, and tar.
- The FDA regulates the manufacture, import, packaging, labeling, advertising, promotion, sale, and distribution of cigarettes.

What Do We Know?

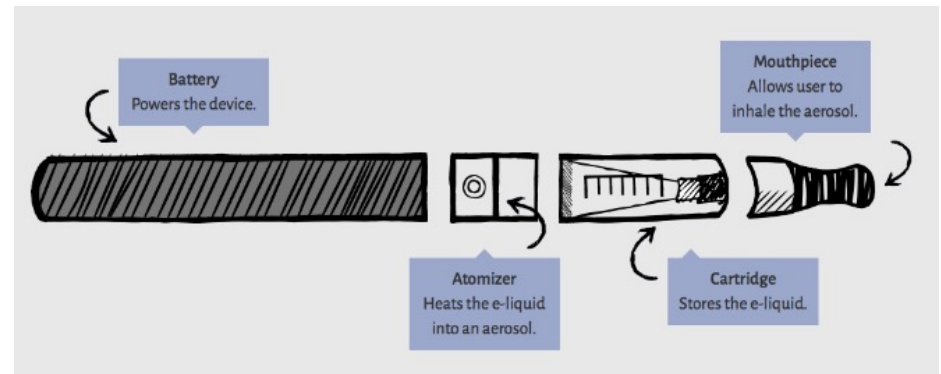


- ENDS use a battery to heat up a special liquid into an aerosol that users inhale; it's not just harmless water vapor.
- Some of the chemicals found in these include nicotine, propylene glycol, acrolein diacetyl, diethylene glycol, heavy metals, cadmium, benzene and other ultrafine particles.
- "E-juice" that fills the cartridges contains nicotine. Studies have shown that even products claiming to be "nicotine-free" contain trace amounts of nicotine.

What Is Vaping?

Vaping is the act of inhaling and exhaling the aerosol, often referred to as “vapor,” produced by an e-cigarette or similar device. Components include:

- Cartridge or reservoir to hold a e-liquid
- Heating element (atomizer)
- Power source (battery)
- Mouthpiece to inhale





Cig-a-Like	Variations	Vape Pens	Mods	Pod-Based
<p>E-cigarettes came onto the market around 2007. Most delivered nicotine and were disposable.</p>	<p>Variations on the first e-cigarettes included products like e-hookah and rechargeable versions.</p>	<p>These have batteries that can reach higher temperatures, have refillable e-liquid cartridges and allow users to control how often they inhale.</p>	<p>Large size modifiable e-cigarettes allow for more aerosol, nicotine and other chemicals to be breathed into the lungs at a faster rate.</p>	<p>These e-cigarettes look like USBs and contain disposable pods with higher amounts of nicotine than previous generations.</p>

Source: Science News for Students

JUUL: The iPhone of Vapes

- JUUL - \$14.99 plus \$15.99/pack of 4 pods
- Pod flavors: Menthol, Virginia and Classic Tobacco
- Contain 3% or 5% nicotine = 1+ pack of cigarettes or 200 puffs



Other Vape Devices



What Is Being Vaped?

- Flavored liquids including chemicals like glycerin and propylene glycol
- Flavored liquids with varying levels of nicotine
- Flavored liquids with vitamins and essential oils
- Leaf marijuana, THC oil/wax



Tobacco Product Use Among Middle and High School Students — United States, 2020

- In 2020, 23.6% (3.65 million) of high school and 6.7% (800,000) of middle school students reported current (past 30-day) use of any tobacco product. From 2019 to 2020, decreases among high school and middle school students occurred in current use of any tobacco product, combustible tobacco products, multiple tobacco products, e-cigarettes, cigars, and smokeless tobacco.
- Use of any tobacco product by youths declined by an estimated 1.73 million from 6.20 million in 2019 to 4.47 million in 2020. Despite this decline, in 2020 nearly one in four U.S. high school students and approximately one in 15 middle school students still reported current use of any tobacco product. Continued efforts are warranted to sustain this progress and to prevent and reduce all forms of tobacco product use among U.S. youths.
- Gentzke AS, Wang TW, Jamal A, et al. Tobacco Product Use Among Middle and High School Students — United States, 2020. *MMWR Morb Mortal Wkly Rep* 2020;69:1881–1888.
DOI: <http://dx.doi.org/10.15585/mmwr.mm6950a1external icon>.

Tetrahydrocannabinol- Containing E-cigarette, or Vaping, Products

- Among THC-containing product users, 501 (53%) provided the brand names of products they had used in the past 3 months. These 501 respondents reported using 732 THC-containing products with **220 different brand names**.
- **Dank Vapes**, the brand most frequently reported by survey respondents, was also the brand most frequently reported by EVALI patients in Illinois and nationally . To reduce the risk of EVALI, people should not use THC-containing e-cigarette, or vaping, products, particularly from informal sources such as friends, family, or in-person or online dealers.
- Medical Cannabis Patient Program accounted for 23% of reported products (169 of 732 products); survey respondents aged ≥ 35 years reported 63% (106 of 169) of these legally available products.

The Nicotine “Arms Race”

1 pack of Cigarettes
≈ 20 mg of inhaled nicotine



= 20

Cigarettes

1 JUUL pod
≈ 41.3 mg of nicotine



= 44

Cigarettes

1 PHIX pod
≈ 75 mg of nicotine



= 75

Cigarettes

1 Suorin pod
≈ 90 mg of nicotine



= 90

Cigarettes

Source: Science News for Students

Vape Devices for Marijuana and Oils



Disposable Marijuana Vape Pens and Cartridges

Delivered to your door by Eaze



Source: adai.uw.edu

A New Device: Philip Morris International's IQOS

IQOS is a “Heat, Not Burn” Device

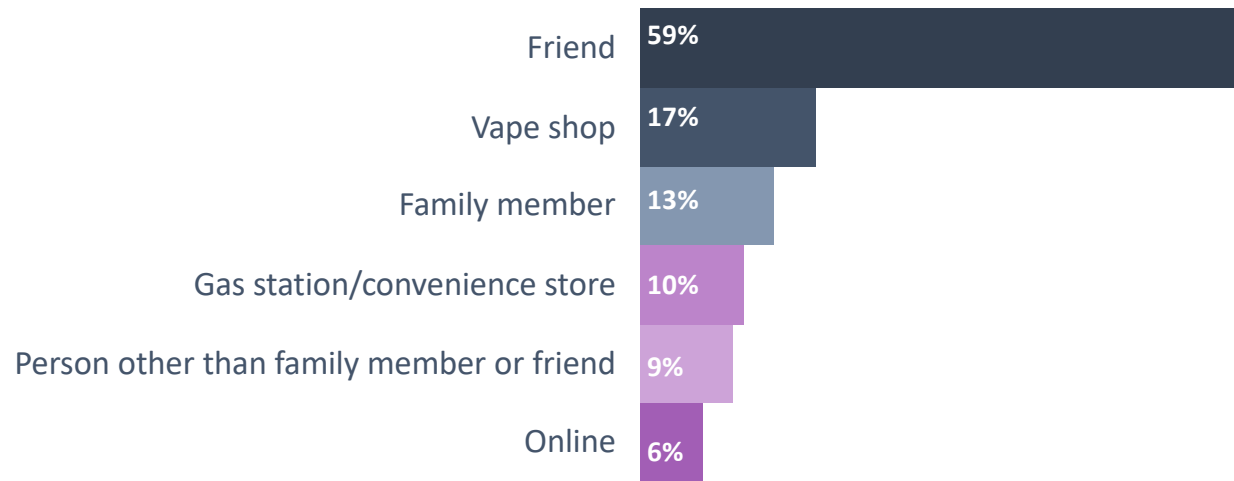


Overview

- **National and state data from patient reports and product sample testing show tetrahydrocannabinol (THC)-containing e-cigarette, or vaping, products, particularly from informal sources like friends, family, or in-person or online dealers, are linked to most EVALI cases and play a major role in the outbreak.**
- **Vitamin E acetate is strongly linked to the EVALI outbreak. Vitamin E acetate has been found in product samples tested by FDA and state laboratories and inpatient lung fluid samples tested by CDC from geographically diverse states. Vitamin E acetate has not been found in the lung fluid of people that do not have EVALI.**
- **Evidence is not sufficient to rule out the contribution of other chemicals of concern, including chemicals in either THC or non-THC products, in some of the reported EVALI cases.**

How Do Youth Get Vaping Products?

Sources of e-cigarettes among students who vaped in the past 30 days (2018)



U.S. law now prohibits the sale of tobacco products, including e-cigarettes, to anyone under age 21

Slang Terms

Analog: tobacco as the old physical or "analog" version

Juul, Pax, NJOY, Puff Bars, Stigs: styles/brands

Atty: atomizer to heat e-liquid

Cart: cartridge that holds the e-liquid

Carto: cartridge and atomizer combined into a single unit

Cloud chasing: e-cigarette/mod users tweak their hardware and liquid selections to produce ever bigger and thicker clouds of aerosol

Draw: amount of force required to accommodate inhalation through the mouthpiece of an e-cigarette

E-liquid, smoke juice: the liquids that are vaporized when using an e-cigarette

PV: personal vaporizer, often the mod style

More Slang - Dripping

- Apply nicotine liquid directly to heated coils of e-cig or vaporizer
- Produces thick clouds of nicotine vapor and a stronger “throat hit”



More Slang Terms

- **O/Ohm**: standard unit of electrical resistance
- **PG**: propylene glycol is used as a diluent (a filler and diluting agent)
- **TH**: throat hit is the sensation an e-cigarette user (and tobacco smoker) may experience when the aerosol hits the back of their throat
- **VG**: vegetable glycerin acts as a diluent, or filler, and is a common ingredient found in e-liquid

The Latest on Vaping Deaths and Lung Injury

- There are **2800*** lung injury cases reported from 50 states, DC, and 2 U.S. territories. Seventy deaths have been confirmed in 29 states.
- CDC has received sex and age data on 771 patients.
 - About 69% of patients are male.
 - Nearly two thirds (62%) of patients are 18 to 34 years old; with 22% of patients between 18-21.
 - 16% of patients are under 18 years.
- All reported patients have a history of e-cigarette product use or vaping.
- The latest findings from the investigation into lung injuries associated with e-cigarette use, or vaping, suggest products containing THC play a role in the outbreak.
 - CDC has received data on substances used in e-cigarettes or vaping products in the 30 days prior to symptom onset among 514 patients.
 - About 77% reported using THC-containing products; 36% reported exclusive use of THC-containing products.
 - About 57% reported using nicotine-containing products; 16% reported exclusive use of nicotine-containing products.

The Latest on Vaping Deaths and Lung Injury

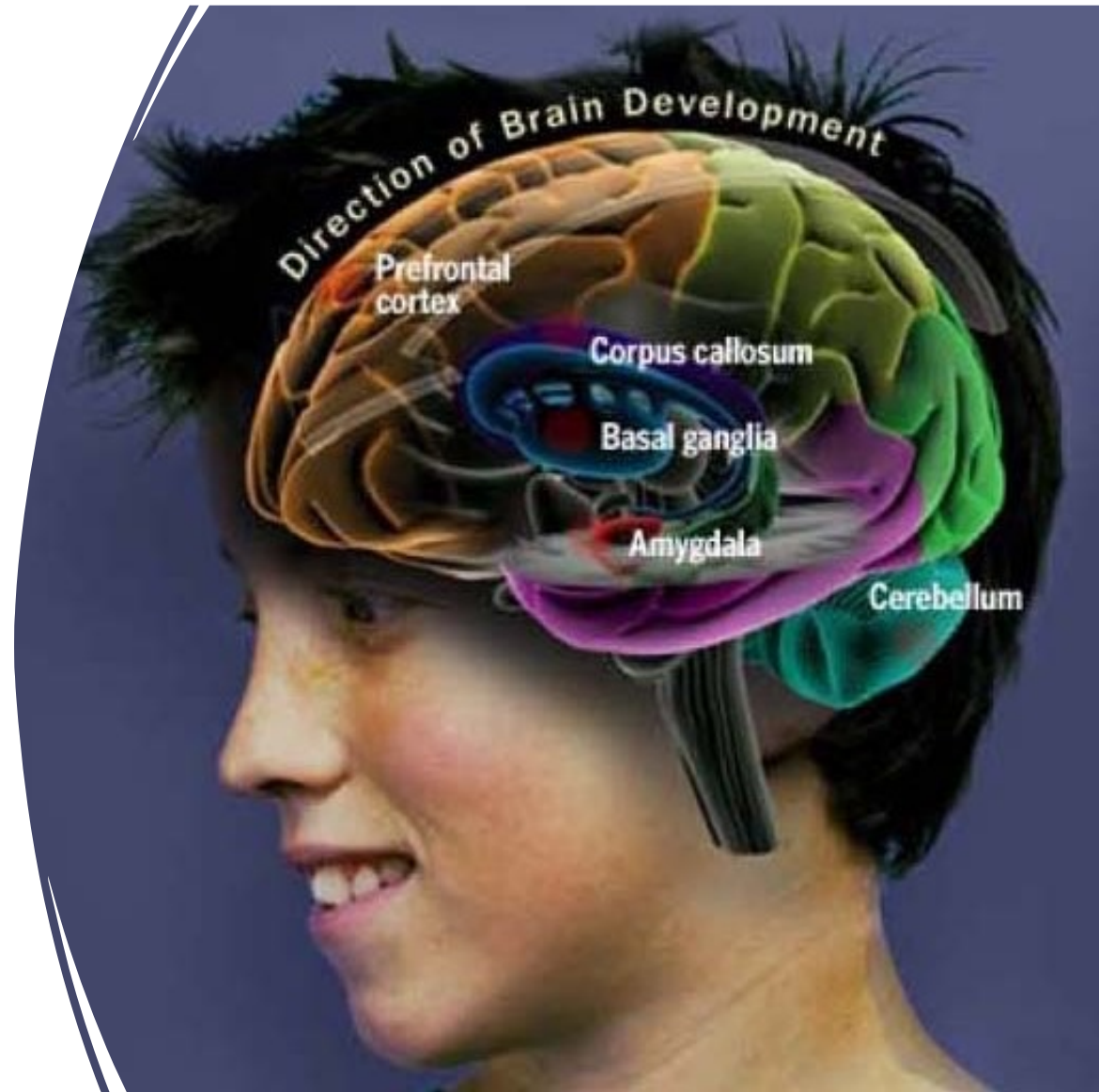
- The specific chemical exposure(s) causing lung injuries associated with e-cigarette product use, or vaping, remains unknown at this time.
- No single product or substance has been linked to all lung injury cases.
- More information is needed to know whether one or more e-cigarette or vaping products, substances, or brand is responsible for the outbreak.



The Adolescent Brain

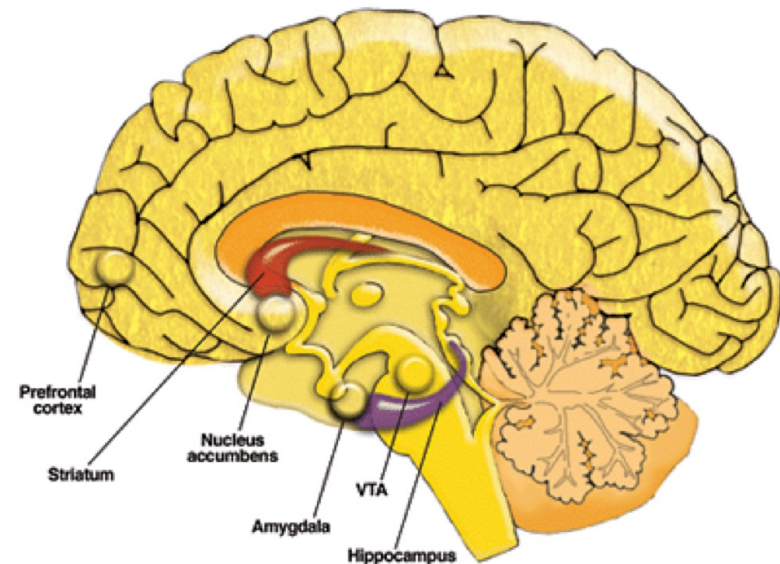
• *A teenager's brain "has a well-developed accelerator but only a partly developed brake."*

- Laurence
- Steinberg

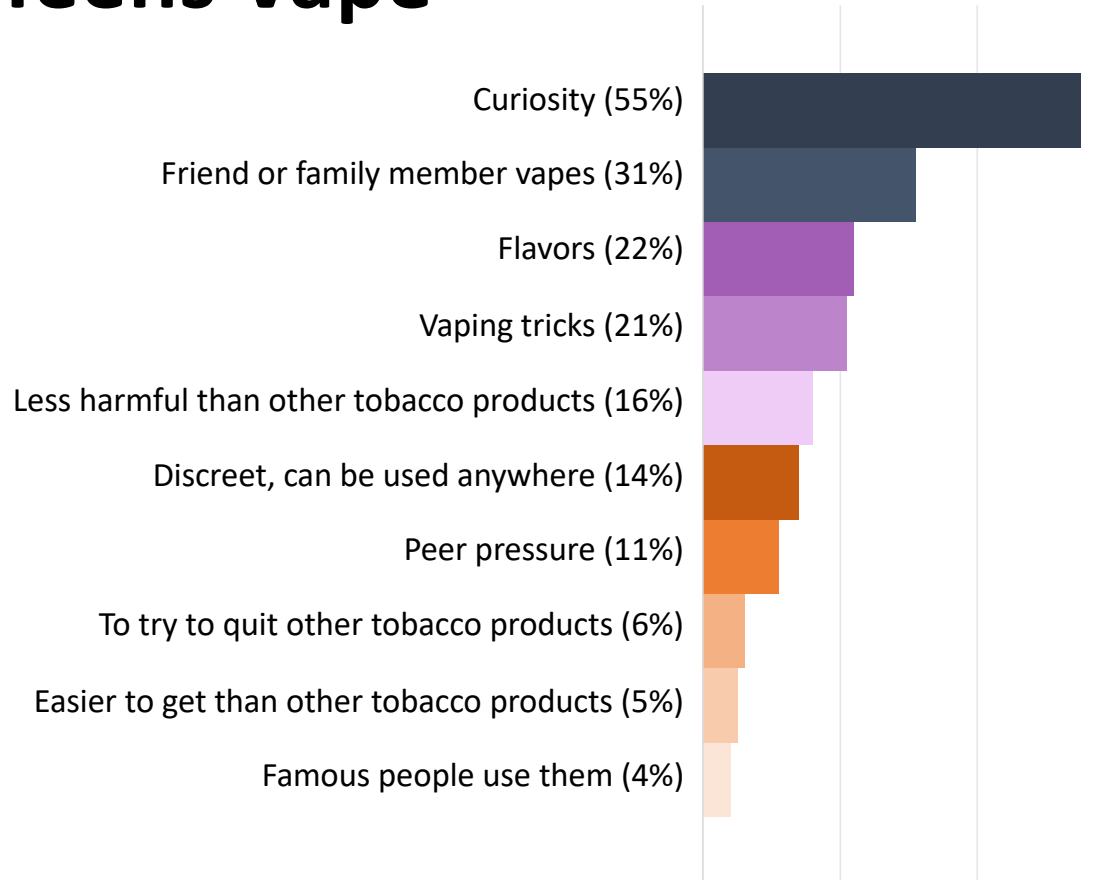


The Accelerator Vs. The Brake

- **Prefrontal Cortex:** Directs our judgment & decision-making (rational, mature thinking)
- **Amygdala:** Directs our emotional response (immaturity)
- **Delay, Deny, Discourage!**



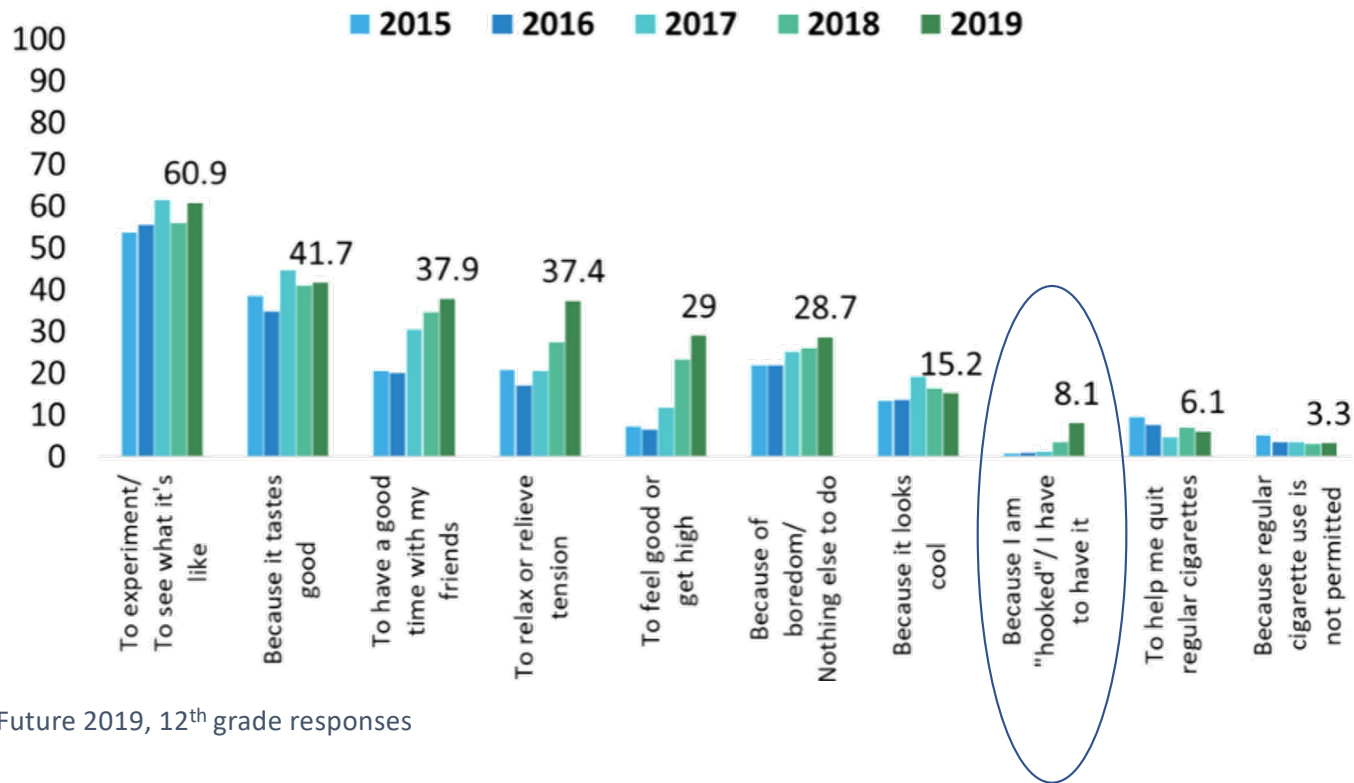
Why Teens Vape



Source: CDC, 2019



Reasons for Vaping



Source: Monitoring the Future 2019, 12th grade responses

General Principles of Brain Development

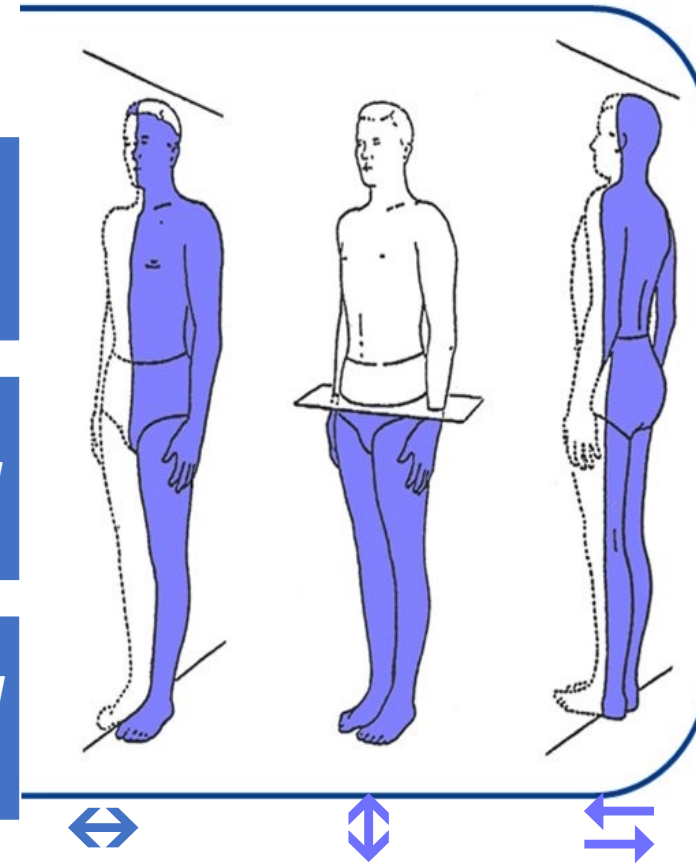
People develop at different rates. Female vs Male

Development is relatively orderly. Bottom to Top

Development takes place gradually. 0-28 years

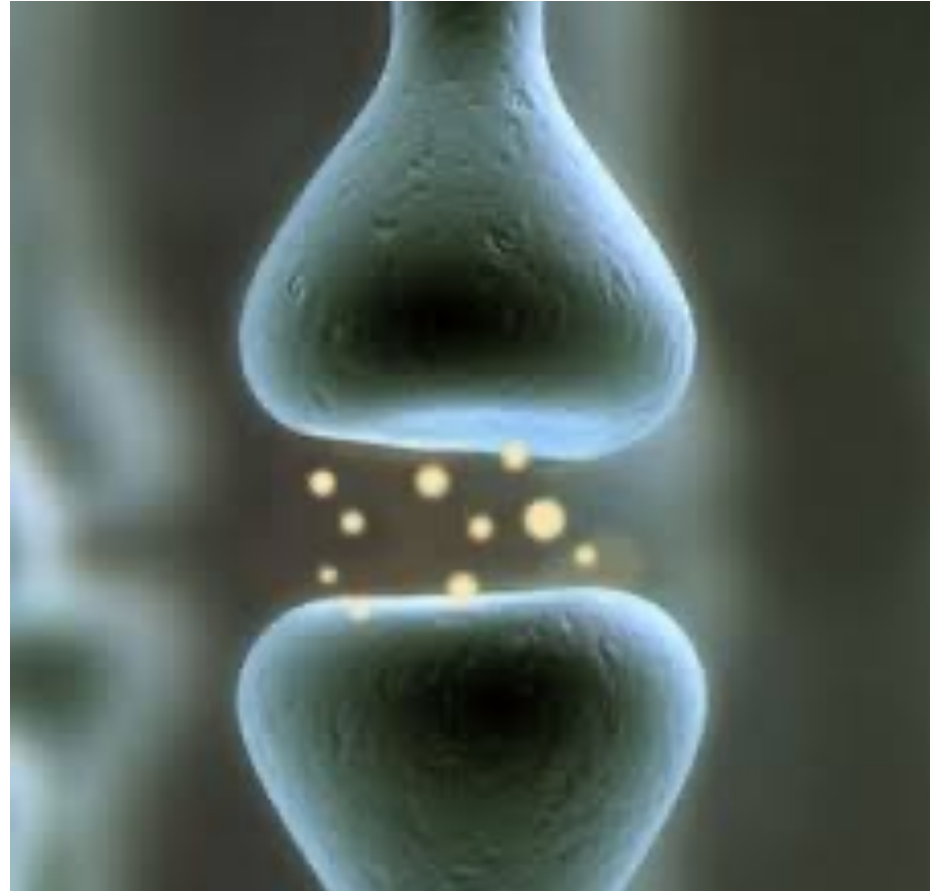
Brain Function: 3 Dimensions

LATERALITY: Left & Right	read, write, listen, or speak	INTEGRATION
CENTERING: Top & Bottom	feelings & emotions	ORGANIZATION
FOCUS: Front & Back	comprehension (blend details for meaning)	COORDINATION & FOCUS



The Developing Brain: Synapse

- **The dendrites:** receive messages.
- **The axons:** send out messages.
- The axons and dendrites do not actually touch.
- Information transmission across neurons takes place in the **synapse** (space between neurons). Neurons release chemicals that jump across the synapses.



The Developing Brain: Neurogenesis

As opposed to the prior belief that all the neurons a person would ever have were present at birth, but now we know that the production of new neurons, **neurogenesis**, continues into adulthood.

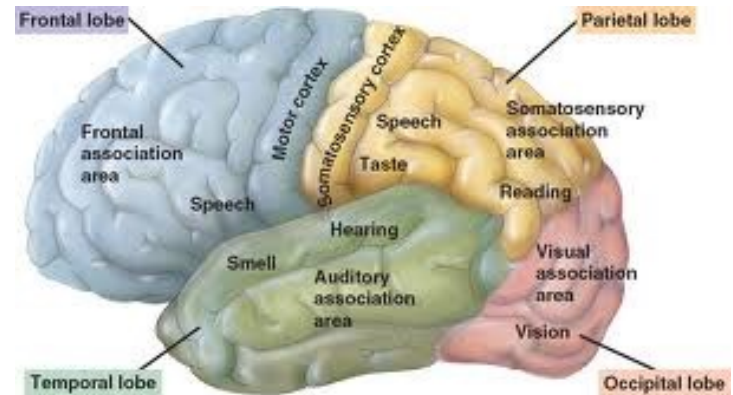
The Development of the Adolescent Brain- Overproduction and Pruning: Two types

Experience-expectant: Synapses are overproduced in certain parts of the brain during specific developmental periods, expecting to be stimulated. Unused neurons are gradually pruned.

Experience-dependent: Synaptic connections are formed based on the individual's experiences. New synapses are formed in response to neural activity in very localized areas of the brain when a person is unsuccessful in processing information. Again, more synapses are produced than will be kept after pruning.

The Cerebral Cortex

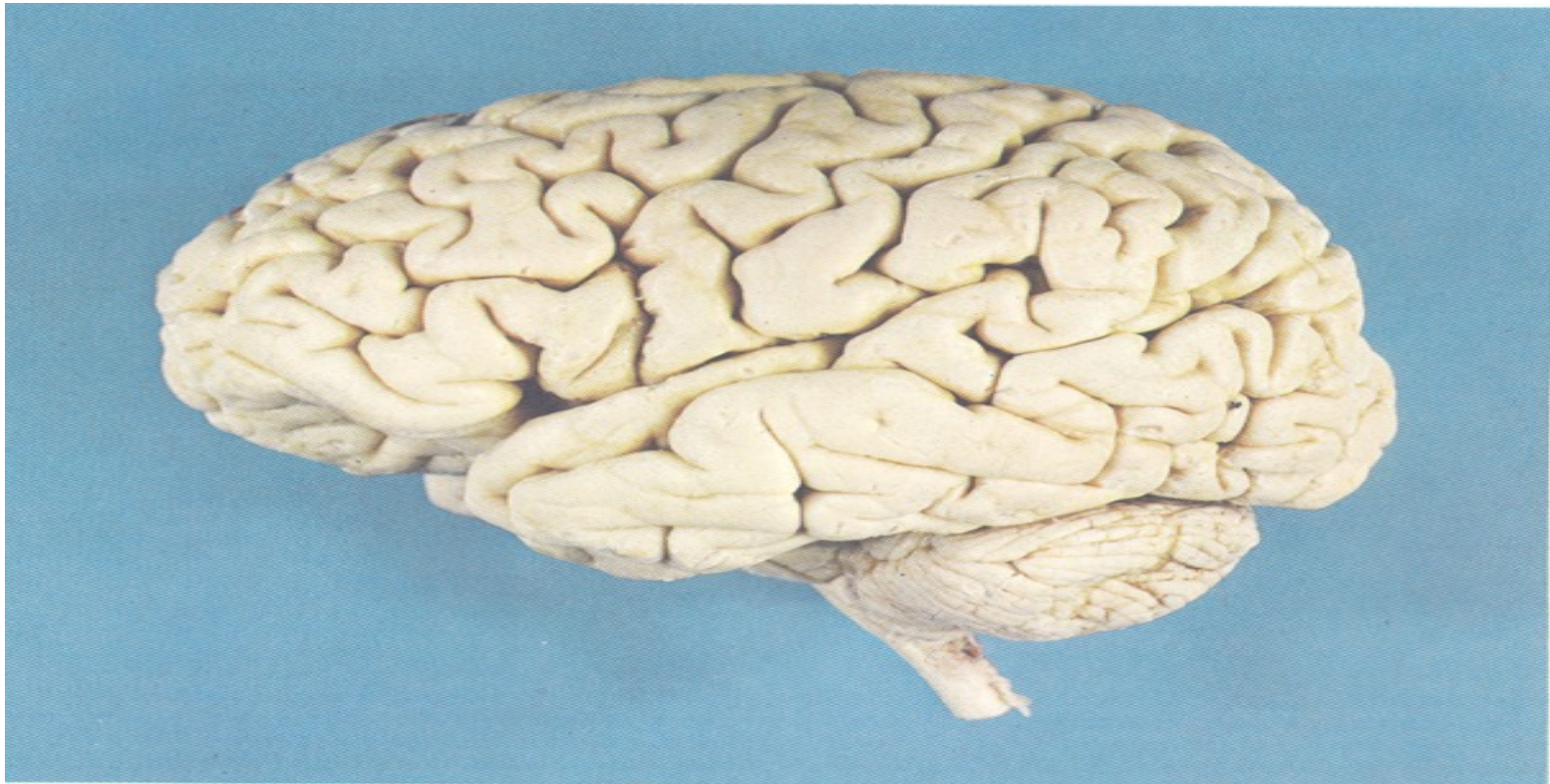
- The outer 1/8 inch thick covering of the brain is the cerebral cortex.
- Parts of the cortex mature at different rates.
- Different areas of the cortex (lobes) have different functions.
- First area to be impacted by drugs of abuse-the faster the absorption-the increased risk of damage.



Lobes of the Cerebral Cortex

Objectives:

To learn the names, locations and boundaries of six lobes of the cerebral cortex



The Cerebral Cortex

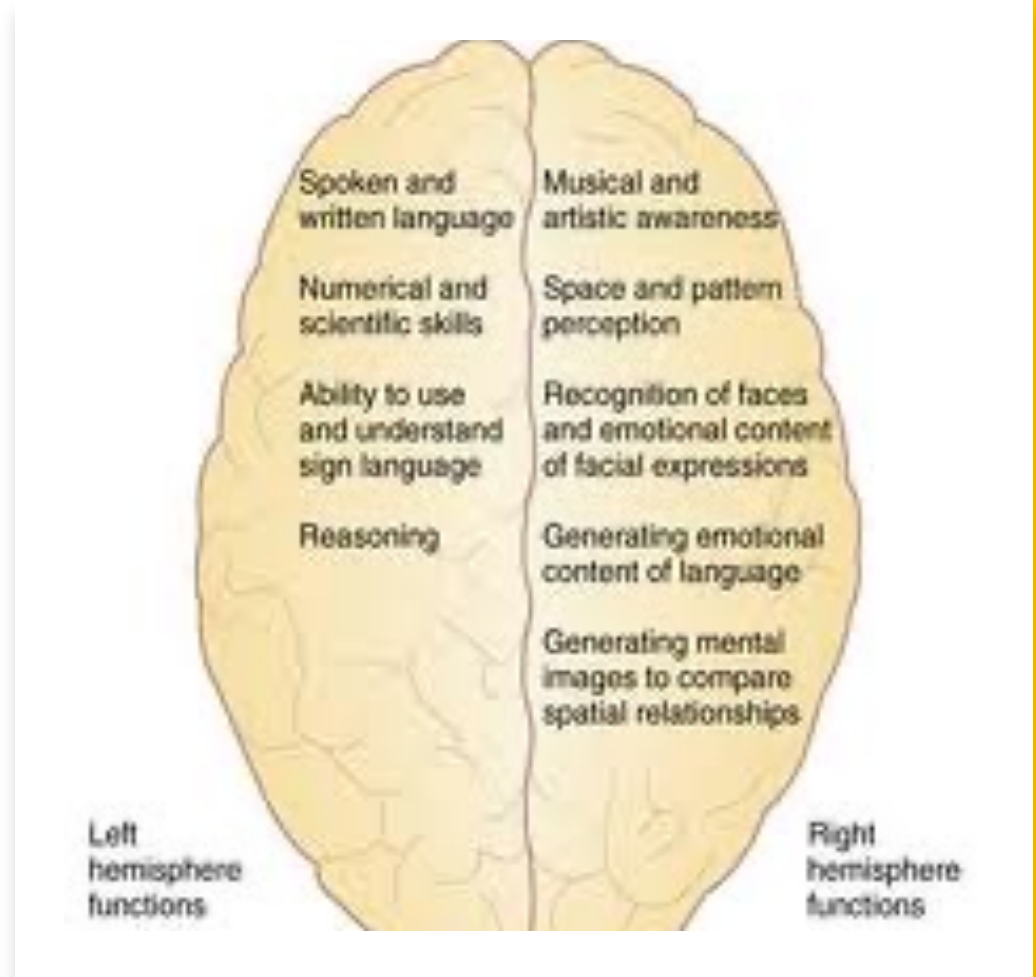
- Motor cortex (motor movement): matures first
- Visual cortex (vision) and auditory cortex (hearing): mature second
- Frontal cortex and temporal lobe (higher-order thinking): matures last

To accomplish complex functions, the cortical areas must communicate and coordinate with each other.

The area of the brain extremely important in new learning.

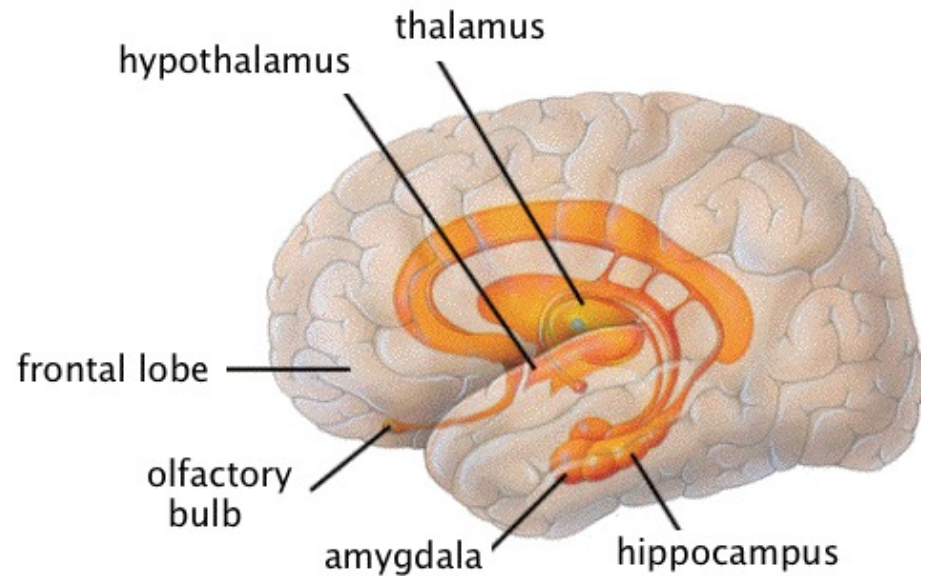
The Cerebral Cortex: Lateralization

- **Lateralization:** The specialization of the two hemispheres of the brain. Each hemisphere controls the opposite side of the body.
- For most of us (right-handed people)...
- **Left hemisphere:** language processing
- **Right hemisphere:** spatial-visual information and emotions
- Less hemispheric specialization in left-handed people and females on an average.



The Limbic System

- The limbic system is a complex set of structures that lies on both sides of the thalamus, just under the cerebrum.
- It includes the hypothalamus, the hippocampus, the amygdala, and several other nearby areas.
- It appears to be primarily responsible for our emotional life, and has a lot to do with the formation of memories.
- Emotional memory is super-fast.



The Amygdala-Emotional Survival-React Than Act

- The amygdala performs primary roles in the formation and storage of memories associated with emotional events, especially fear.
- Research indicates that, during fear conditioning, sensory stimuli reach the basolateral complexes of the amygdalae, particularly the lateral nuclei, where they form associations with memories of the stimuli.
- The association between stimuli and the aversive events they predict may be mediated by long-term potentiation, a sustained enhancement of signaling between affected neurons.
- The amygdalae are crucially engaged in the emotional and motivational modulation of cognition and behavior.

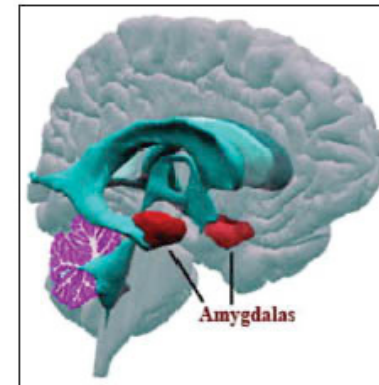
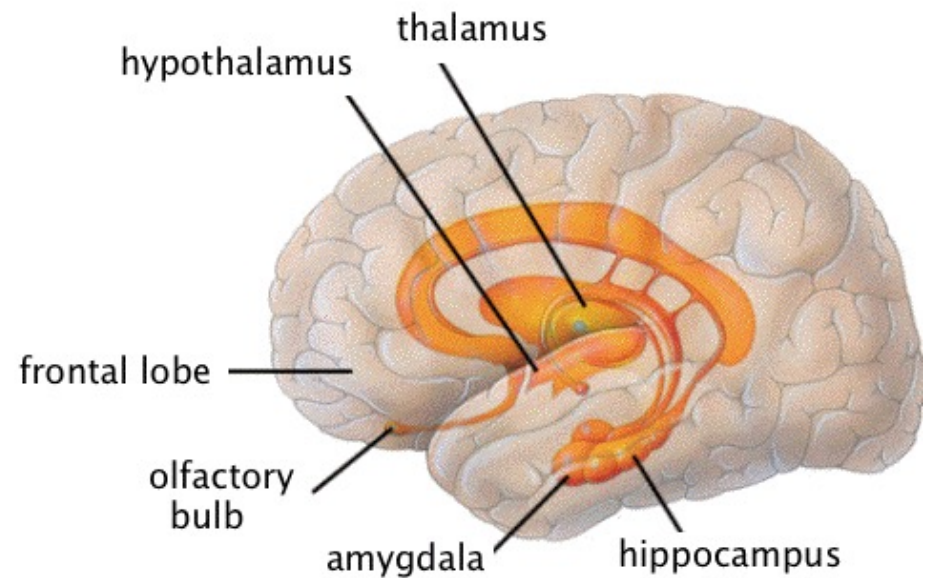


Figure 1: The amygdalas, important and intrinsic part of the limbic system, are located in the anterior portion of the temporal lobes. It is postulated to be a generator of human aggression in health and disease

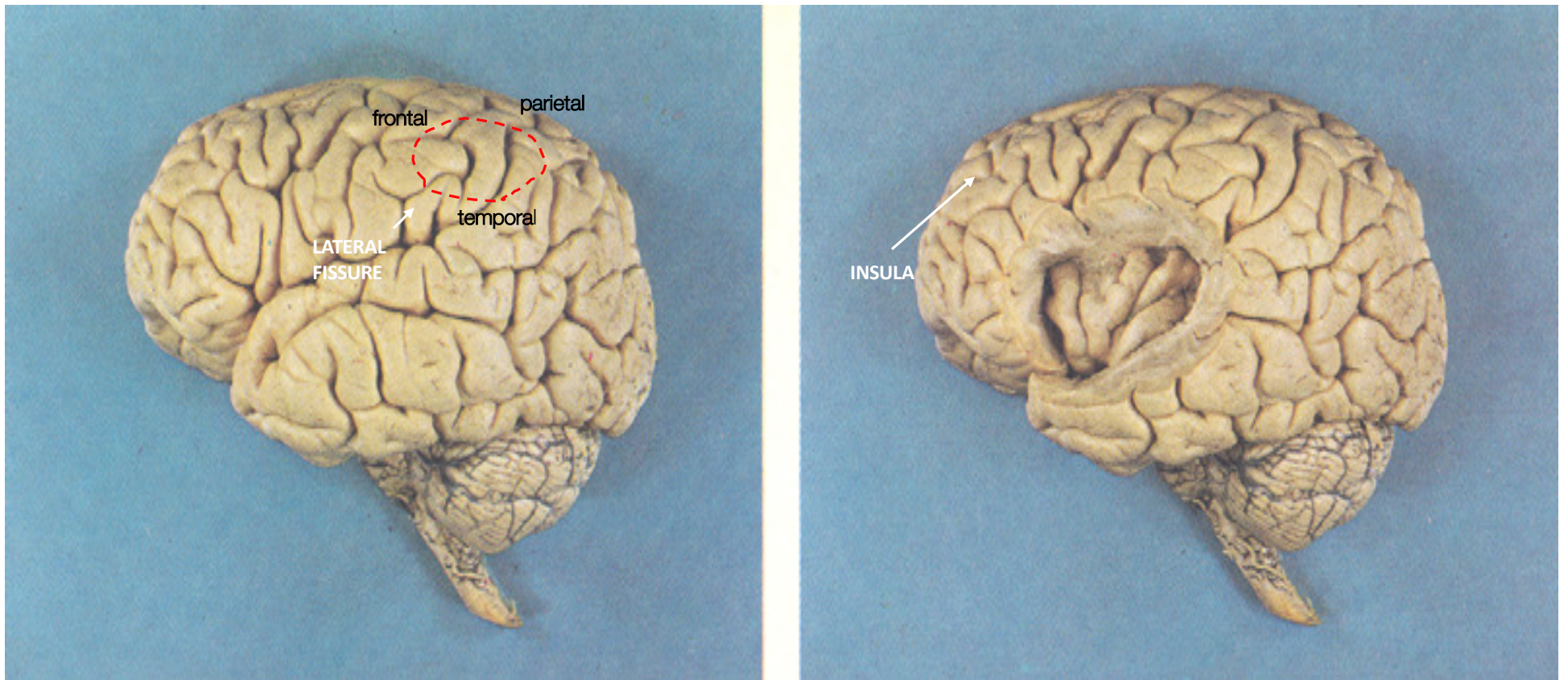
Hypothalamus

- The hypothalamus is a small part of the brain located just below the thalamus on both sides of the third ventricle. It sits just inside the two tracts of the optic nerve, and just above (and intimately connected with) the pituitary gland.
- The hypothalamus is one of the busiest parts of the brain, and is mainly concerned with **homeostasis**. Homeostasis is the process of returning something to some “set point.”
- The hypothalamus is responsible for regulating your hunger, thirst, response to pain, levels of pleasure, sexual satisfaction, anger and aggressive behavior, and more.
- It is neurally and chemically connected to the pituitary, the “master gland,” which in turn pumps hormones called releasing factors into the bloodstream.




The sixth lobe of the cerebral cortex is the **insula, or island lobe**. This lobe is covered by the growth of the frontal, parietal and temporal lobes during fetal development, so that in the adult brain it is only visible by pulling or cutting away the overlying lips (opercula) of these other lobes.

The insula is essentially the floor of the deep lateral fissure.



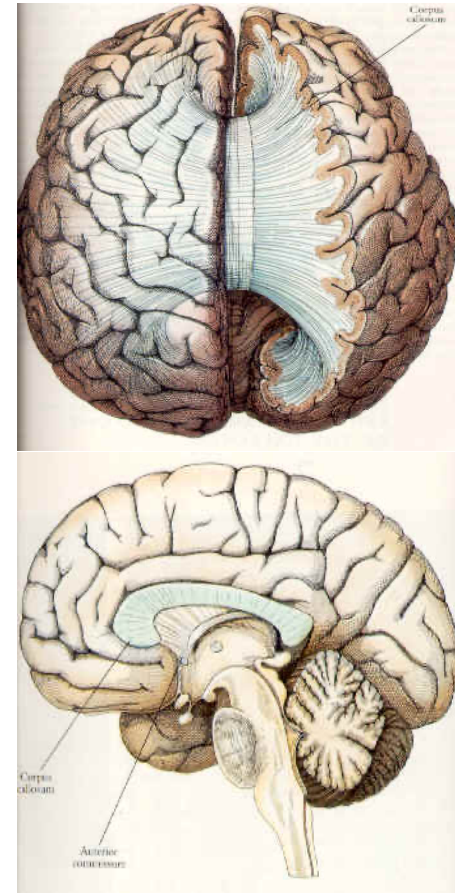


The Insula Cortex: The Regulator of Self Control

- **Researchers believe that the insula cortex is the “primary taste cortex.” What that means is that this center coordinates various addiction sensations;**
 - **Simply stated-this cortex integrates all bodily signals that guides behaviors in the prefrontal cortex for the purpose of balance of neurochemicals or homeostasis;**
 - **Homeostasis in the insula cortex is believed to be the center of self control;**
 - **Highly addictive substances altered the balance of homeostasis in the insula cortex that leads to “loss of control”;**
 - **Younger brains have an immature balance of neurochemicals so when an addictive substance is consumed: loss of control occurs quicker than in adult brains.**
- 

Corpus Callosum: The connection

- This thick cable of nerves connects the left and right hemispheres
- It appears to be related to creativity, higher types of thinking, intelligence, consciousness, and self awareness
- It changes throughout childhood and takes different shapes for different childhood illnesses
- Its increasing elaboration can help learning finally “click”, such as finally understanding geometry
- Reaches full maturity in 20s
- Alterations in development results in an immature brain- inattentive or hyperkinetic



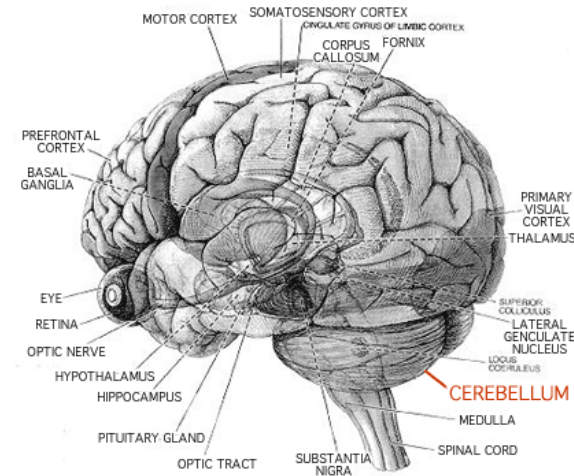
The “Oops” Center— anterior cingulate gyrus

- The cingulate is responsible for helping focus attention
- Links cingulate and emotional hippocampus for integrating reason & emotion to guide decisions
- May involve ability to empathize
- Undergoes high myelination (doubles) during adolescence
- “Oops center” anticipates risk, detects and keeps us from making errors

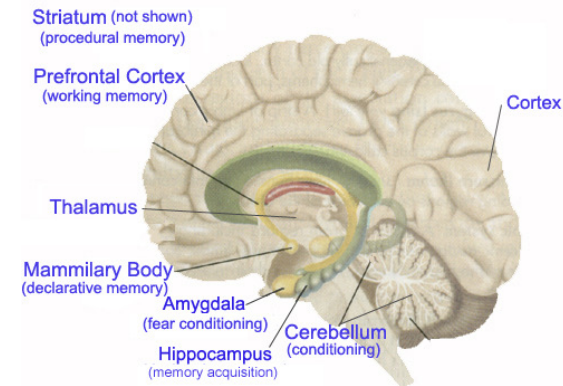


Cerebellum

- The cerebellum was previously considered to involve only the coordination of movement
- MRI shows while not essential for activity, it makes any activity better
- Smooths complex thinking processes such as math, music, philosophy, decision making, social skills, etc.
- This part changes most during teen years and is not finished until 20s
- As youth become increasingly less physically active, the impact on cerebellar development is unknown

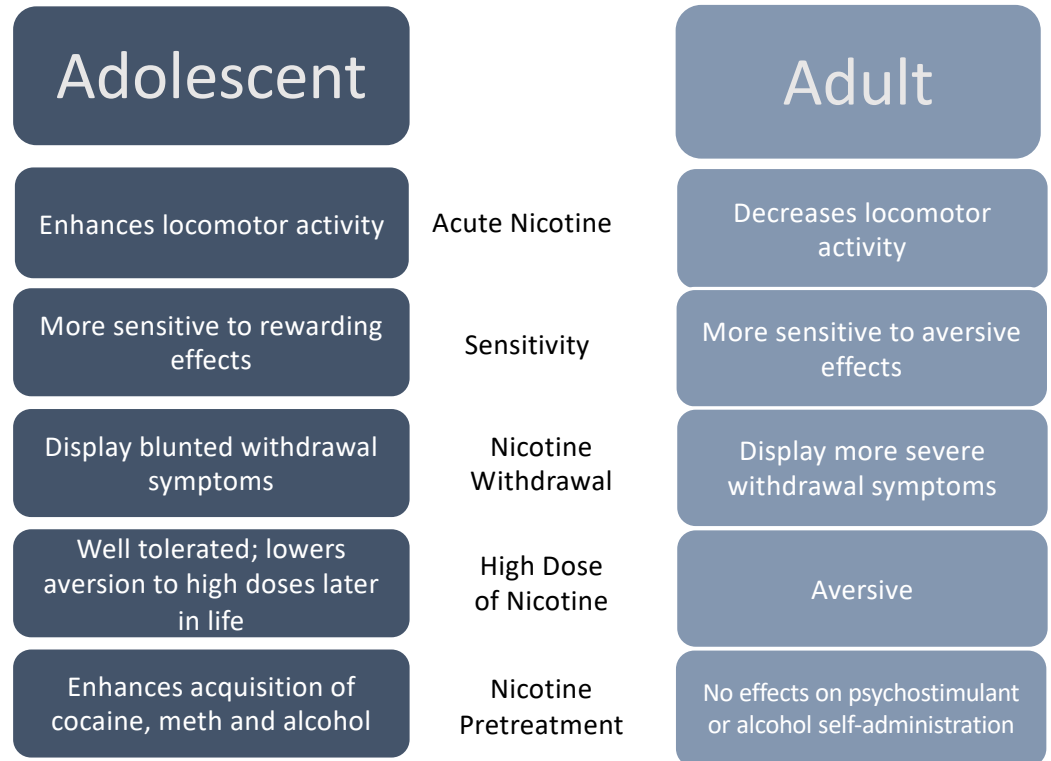


The Brain and Memory



Nicotine's Impact on Teens

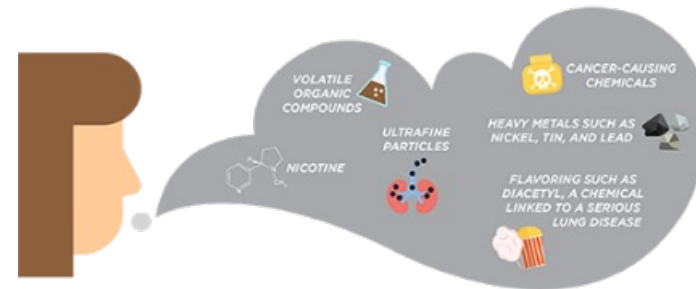
- Teen brain reacts differently to nicotine
- Chronic nicotine exposure can, among other things, reduce attention span and increase reckless behavior
- Effects are less intense and long-lasting in adults



Source: Child Mind Institute

Harmful Chemicals: Cigarettes vs. Vaping

Cigarette smoke contains over 7,000 chemicals, including known cancer-causing (carcinogenic) compounds and hundreds of other toxins



The aerosol created when vaping contains harmful ingredients:

- Nicotine
- Ultrafine particles
- Flavorings
- Volatile organic compounds (e.g., benzene, found in car exhaust)
- Heavy metals (e.g., nickel, tin, lead)

So Why the Concern?

Nicotine itself is harmful

The chemicals in the aerosol are harmful

Risk of progressing to cigarette smoking

Dual use – both vaping and smoking – is common

Risk of addiction

Link to other substance use and addiction

Link to mental health disorders

Recent spate of illnesses and deaths



Nicotine Itself is Harmful

Extremely addictive, especially for kids

Addiction sets in quickly

Structurally changes the developing brain

Increases risk of addiction to other drugs

Affects attention, learning, mood, impulse control

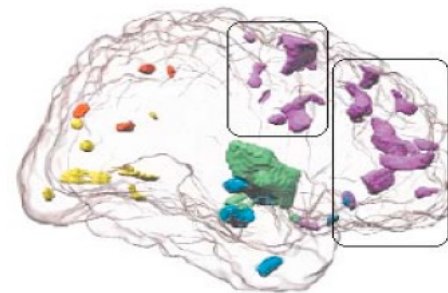
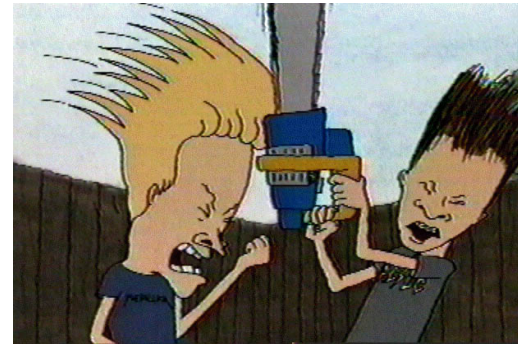
Increases blood pressure, respiration, heart rate

Harms nervous, cardiovascular, respiratory, and reproductive systems

Increases risk of developing diabetes

Pruning: Use it or Lose it!

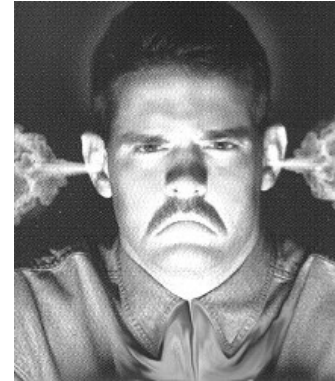
- Synapse formation in the frontal cortex are over-produced until just before puberty (11 girls, 12 boys), then are pruned
- Excess connections means they have trouble tracking multiple thoughts & focusing attention
- The gray matter is thinned at 1-2% per year (up to 50%!) as excess connections that are not used are eliminated
- Ability to learn languages declines after age 12 (changes in the corpus callosum fibers)
- At this age, teens begin deciding what they want to do and how they want to spend time– if it is laying around and watching TV, the other potentials get pruned
- Pruning increases the efficiency and power of brain function by myelinization of nerves making them respond faster
- Pruning may expose latent problems such as ADHD, Tourette' s, and schizophrenia



Dark areas show portions of gray matter pruned between adolescence & adulthood

Effects of Stress & Trauma on the Brain

- Long term exposure to stress & violence produces high fear hormone, cortisol
- High stress homes more often produce ADHD
- Verbal abuse (repeated yelling, scolded, criticized) has effects on the limbic system, likely through stress pathways
- Physical and/or sexual abuse increases limbic system dysfunction including olfactory hallucinations, visual disturbances, déjà vu, jamais vu
- Abuse is reflected in changes in left hemisphere, corpus callosum, cerebellar vermis (sensitive to stress glucocorticoids)
- Repeated recollection and obsessing can intensify the stress effects
- Physical/sexual abuse or neglect is associated with decrease in the size of the hippocampus in adulthood
- Stress tends to short-circuit frontal lobe processing (what little there is) and switch to emotional processing
- Such impairments may make the challenges of school even more stressful– a vicious cycle

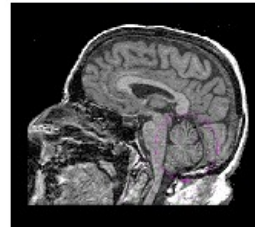


Going up in smoke: effects of smoking, alcohol, and drugs

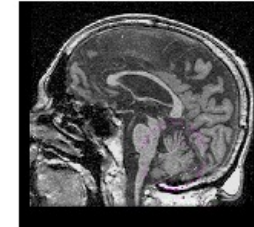
- The reward center in adolescent brains is not as responsive as adult brains
- Lower dopamine levels may take drugs to activate pleasure circuits
- High risk and substance abuse require little effort for greater reward
- Addictions starves cells of dopamine, triggering craving
- Use of addictive substances during adolescence make it more likely to become addicted as an adult— (88% of adult smokers started before 18)
- Adolescents required twice as much nicotine as adults, which continued when they become adults
- Alcohol quickly impairs the hippocampus, reduces its size, and may be long lasting
- Cognitive impairment can persist weeks after stopping drinking and make them more sensitive to impairments later in life

Alcohol damage to the cerebellum

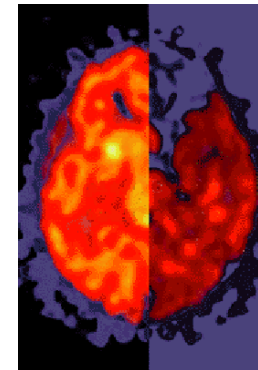
Control



Alcoholic



Sullivan et al., *Neuropsychology*, in press



PET scan of non-drug user (left) and Ecstasy user (right) regarding serotonin activity. Suggests permanent brain damage

THE JUUL!





What is VAPING?

The act of inhaling vapor produced by any kind of e-cigarette or personal vaporizer. Users load a liquid solution containing their drug of choice into the device. When they draw on the device, the battery heats the liquid, which is then atomized into an inhalable vapor.

Electronic Cigarettes



Electronic cigarettes, also known as e-cigarettes, are battery-operated products designed to deliver nicotine, flavor, and other chemicals. They turn chemicals, including highly addictive nicotine, into an aerosol that is inhaled by the user.

How much nicotine does an e-cigarette contain?

A typical e-cigarette chamber can hold up to 3 milliliters (mL) of liquid nicotine. Nicotine concentration in common products can range from 6 mg per mL all the way up to 24 mg per mL. This means one e-cigarette can contain anywhere from 18 to 72 mg of nicotine. In comparison, one cigarette can contain 8—20 mg of nicotine.



What other names do e-cigarettes go by?

- E-devices
- E-pens
- E-hookahs
- Hookah pens
- Vape-pipes
- Vape-pens
- Vaporizers

What is “vaping”?

Vaping is the act of using an electronic cigarette, which can resemble the act of smoking a cigarette.



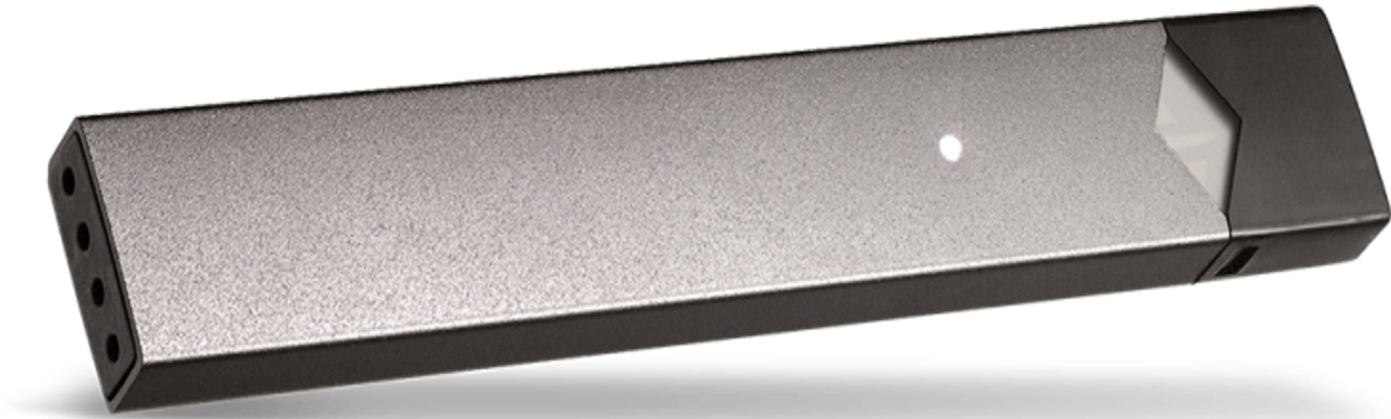
How can I keep my child safe from liquid nicotine?

It is important to store all nicotine products out of reach of children. Children may be attracted to liquid nicotine products because they come in brightly colored packages, are flavored, and are not required to have child resistant packaging. Parents also should not use e-cigarette products around young children as young kids may be tempted to mimic the actions of older adults.

[Back to Appendix](#)



Latest and Greatest: The JUUL







Just Water
Vapor?
..Nooo !!!

AEROSOL COMPOSITION

- Propylene glycol
- glycerin
- Flavorings (many)
- Nicotine
- NNN
- NNK
- NAB
- NAT
- Ethylbenzene
- Benzene
- P,m, xylene
- Toluene
- Acetaldehyde
- Formaldehyde
- Naphthalene
- Styrene
- Benzo(b)fluoranthene
- Chlorobenzene
- Crotonaldehyde
- Propionaldehyde
- Benzaldehyde
- Valeric acid
- Hexanal
- Fluorine
- Anthracene
- Pyrene
- Acenaphthylene
- Acenaphthene
- Fluoranthene
- Benz(a)anthracene
- Chrysene
- Retene
- Benzo(a)pyrene
- Indeno(1,2,3-cd)pyrene
- Benzo(ghi)perylene
- Acetone
- Acrolein
- Silver
- Nickel
- Tin
- Sodium
- Strontium
- Barium
- Aluminum
- Chromium
- Boron
- Copper
- Selenium
- Arsenic
- Cadmium
- Silicon
- Lithium
- Lead
- Magnesium
- Manganese
- Potassium
- Titanium
- Zinc
- Zirconium
- Calcium
- Iron
- Sulfur
- Vanadium
- Cobalt
- Rhubidium

Compounds in yellow are from FDA 2012

*“Harmless” Vapor:
Toxic chemicals are
formed as the e-liquid
heats up to
make the aerosol that
e-cigarette users
inhale*



The FDA Warns...

- ❖ E-cigarettes can increase nicotine addiction among young people and may lead kids to try other tobacco products, including conventional cigarettes, which are known to cause disease and lead to premature death.
- ❖ The products may contain ingredients that are known to be toxic to humans.



E-cigarette Products: Liquids, Cartridges, and Pods

- E-cigarette liquid can contain
 - Nicotine
 - Flavorings
 - Propylene glycol and vegetable glycerin used in varying proportions as carriers
 - Other chemicals also present
 - Cannabinoids: Δ -9-tetrahydrocannabinol (THC), cannabidiol (CBD), butane hash oil (BHO)
 - Other substances
- E-cigarette liquid types
 - Commercial refillable e-liquid
 - Commercial non-refillable e-liquid
 - Homemade or street sources

What do we know today about what is in the vapor?

- ❖ E-cigarette users exhale – passive vaping like secondhand smoke does happen.
- ❖ This chemical aerosol is not “just” water vapor.
- ❖ Studies so far show it contains:
 - Nicotine
 - Propylene Glycol which is converted to Propylene Oxide when heated
 - Formaldehyde a by-product given off during vaping and this is a chemical we use to embalm dead people. Not meant to be inhaled
 - Glycerin an additive in some flavored juices. Glycerin is used topically in skin care/beauty products to moisturize.
 - Dangers of inhaling it into the lungs are unknown at this point.
 - Fine and ultrafine (UF) particles
 - Low levels of toxins known to cause cancer
 - Nanoparticles of chromium, lead, nickel and tin
 - Volatile organic compounds (VOCs)

E-cigarette Products: Behaviors

- **Hacking:** modifying device in a way not intended by the manufacturer
 - Refilling single-use cartridges (e.g., with homemade or illicit substances)
 - Dripping: dropping liquid directly onto device heating coil to attain higher compound concentrations in the aerosol
- **Dabbing:** superheating substances containing high concentrations of THC or other cannabinoids (e.g., budder, BHO, 710, CBD)

Teens may not call them e-cigarettes:

*“cartridges”
“carts”
“water pipe”
“vape pipe/pen”
“Juul”*



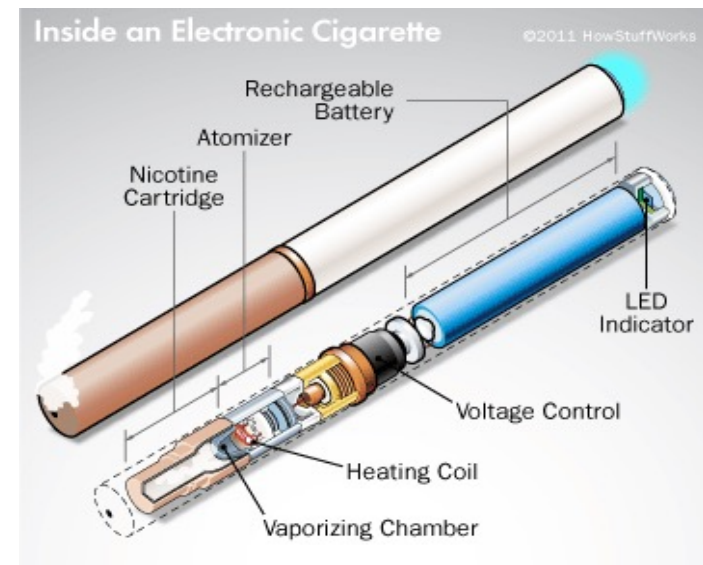
Note. Some e-cigs connect to other electronic devices to play music and answer calls

The Interworkings

Ingredients

1. Vegetable oil
2. Propylene glycol (anti-freeze)
3. Flavorants aldehydes- diacetyl
4. Cadmium and Nickel
5. Acrolein (high dose popcorn lung)

How it works...



E-Liquid/E-Juice

- *Main ingredient: propylene glycol (PG) and/or vegetable glycerin (VG) usually with water-soluble food flavorings. With or without nicotine, THC*
- *Allergies to PG are rare, but it can irritate the lungs and eyes and may be more harmful to people with chronic lung diseases like asthma and emphysema.*
- *The FDA generally views both PG and VG as safe in food, drugs and cosmetics BUT there have not been sufficient scientific studies done on what the impact of inhaling them on a short or long term basis may be*
- *It is not always clear what is in e-liquids*



What is e-liquid?

- **The liquid that ENDS vaporize.**
 - Also called e-juice or vape juice
- **Components vary across brands and products.**
 - Generally, a blend of water, vegetable glycerin, and propylene glycol, then different flavorings or additives are included to create a specific flavor
- **Many ingredients have a Generally Recognized as Safe (GRAS) certificate.**
 - When they are heated and vaporized, there is little research that suggests they are safe for vaping



Effects

- **“Vaping without nicotine prevents nicotine dependence... However, vaping without nicotine can also cause side effects...”**
 - **General toxicity**
 - A 2012 study found that chemicals manufacturers used to flavor e-liquids had toxic effects on the body.
 - A 2015 study showed that heating propylene glycol and glycerol in e-liquids creates compounds that release formaldehyde, a cancer-causing carcinogen.
 - A 2018 study compared teens who used e-cigarettes daily, those who used e-cigarettes in addition to smoking standard cigarettes, and those who had never used either. Overall, vaping was less damaging than cigarette smoking, however, teens in the e-cigarette only group had significantly higher quantities of toxic chemicals in their urine compared to those in the control group.

Effects

- **“Vaping without nicotine prevents nicotine dependence... However, vaping without nicotine can also cause side effects...”**
 - **Lung and throat irritation**
 - Short-term use can irritate the lungs and throat, often referred to as a “throat hit.”
 - Can be described as a tingling, burning sensation that one feels when they inhale the vapor.
 - **Inflammation**
 - A 2018 study found several common e-liquid flavoring ingredients caused a damaging inflammatory response in lung cell samples. These did not contain nicotine.
 - Chronic inflammation can lead to irreversible lung scarring.

What does this mean?

- Vaping can have many side effects, even if it does not contain nicotine. Flavorings and additives can have several harmful effects.

- These chemicals may have harmful effects on lung tissue. Heating the chemicals can trigger the release of carcinogens.

- Early research shows that vaping, even without nicotine, is not a completely safe alternative to cigarette smoking.

JUUL

The nicotine in one JUUL pod is equal to approximately 41 cigarettes.

0.7 ml e-juice in one JUUL pod has 41.3 mg of nicotine

41 cigarettes
(2 packs)



=



PHIX

The nicotine in one PHIX pod is equal to
approximately 75 cigarettes

One 1.5 ml PHIX pod has 75
mg of nicotine

75 cigarettes
(4 packs)



Suorin Drop & Suorin Air

One Suorin pod has 90 mg of nicotine.

90 cigarettes
(4 ½ packs of cigarettes)



=



A photograph of two vapes against a black background. The vape on the left is emitting a thick, bright blue vapor that spreads out to the left. The vape on the right is emitting a thick, bright pink vapor that spreads out to the right. The two plumes of vapor meet in the center. The text "Consequences of Vaping E-cigarettes and THC" is overlaid in white, bold, sans-serif font in the center of the image.

Consequences of Vaping E-cigarettes and THC



The Science of Vaping

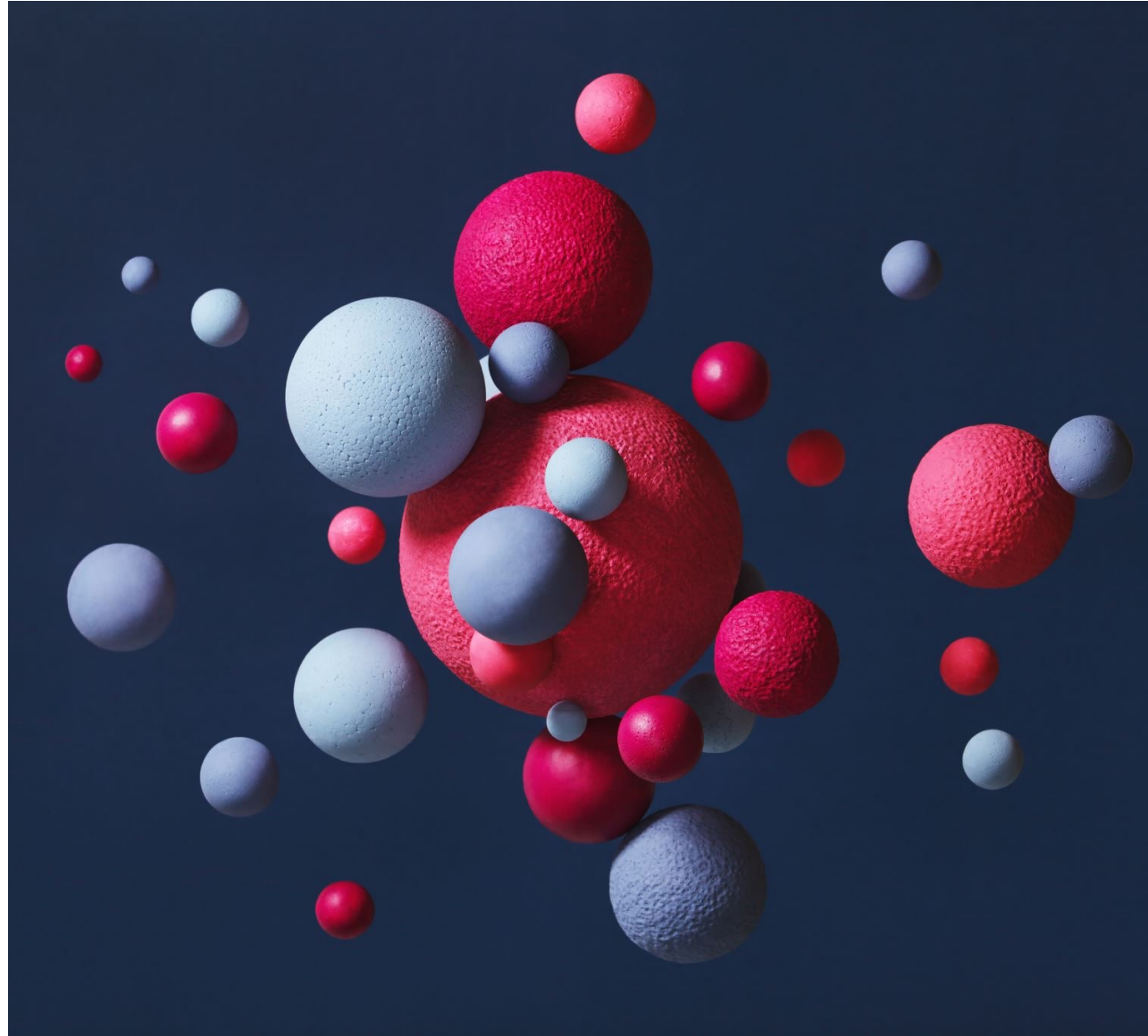


Matter

**MATTER IS
EVERYWHERE AND
EVERYTHING!**

**MATTER IS ANTHING
THAT TAKES UP SPACE!**

**MATTER IS MADE UP
OF TINY PARTICLES
CALLED ATOMS!**



Matter

▶ Matter can be found in three different types. These three types are considered the three STATES of MATTER.

- ▶ Solids
- ▶ Liquids
- ▶ Gasses



States of Matter

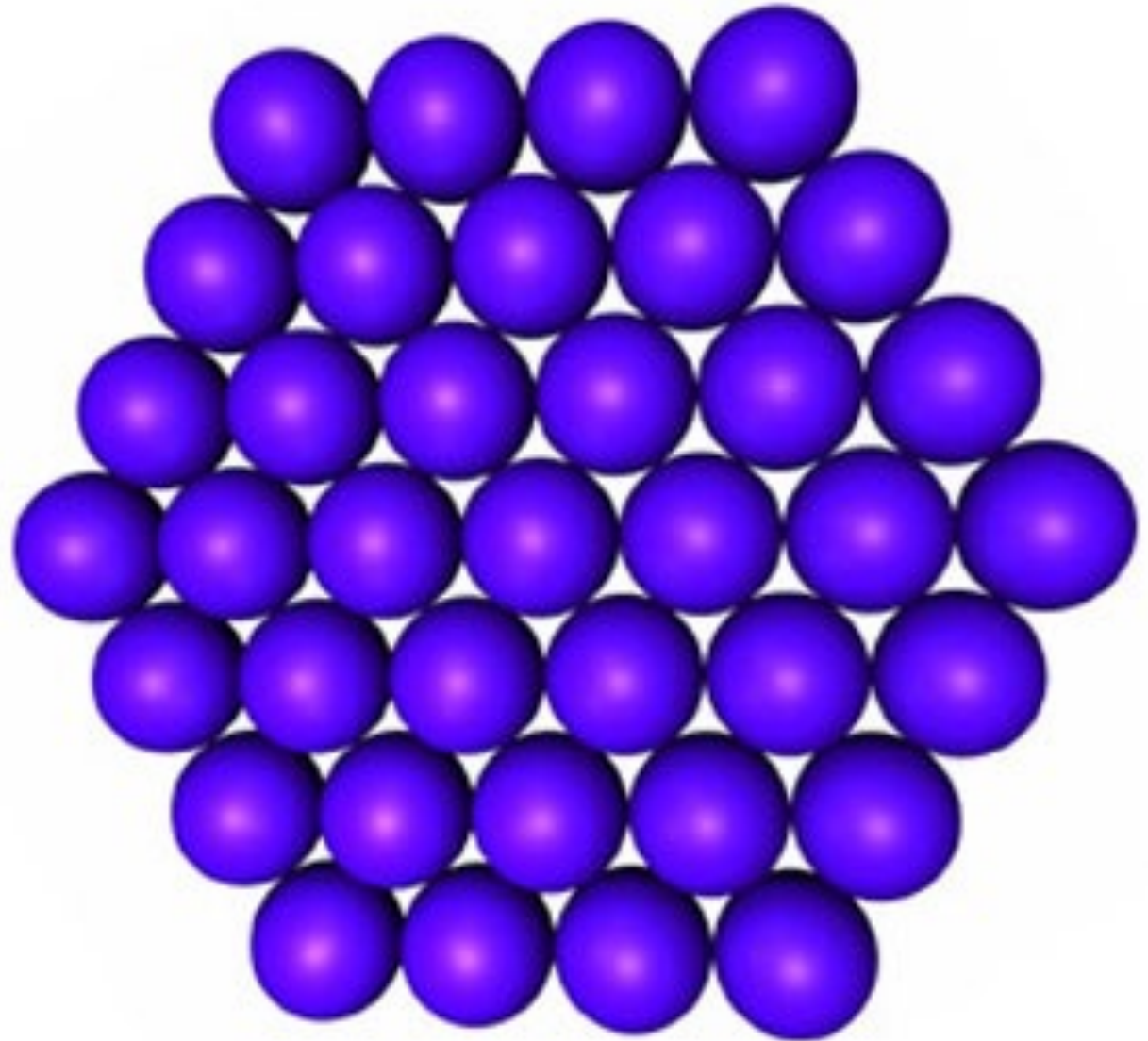
SOLIDS

➤ A SOLID is matter that has a defined shape and will not lose its shape.

➤ FIXED VOLUME AND FIXED SHAPE

➤ Examples of solids:

- Chair
- Table
- Golf Ball
- Hockey Puck
- Glass Jar



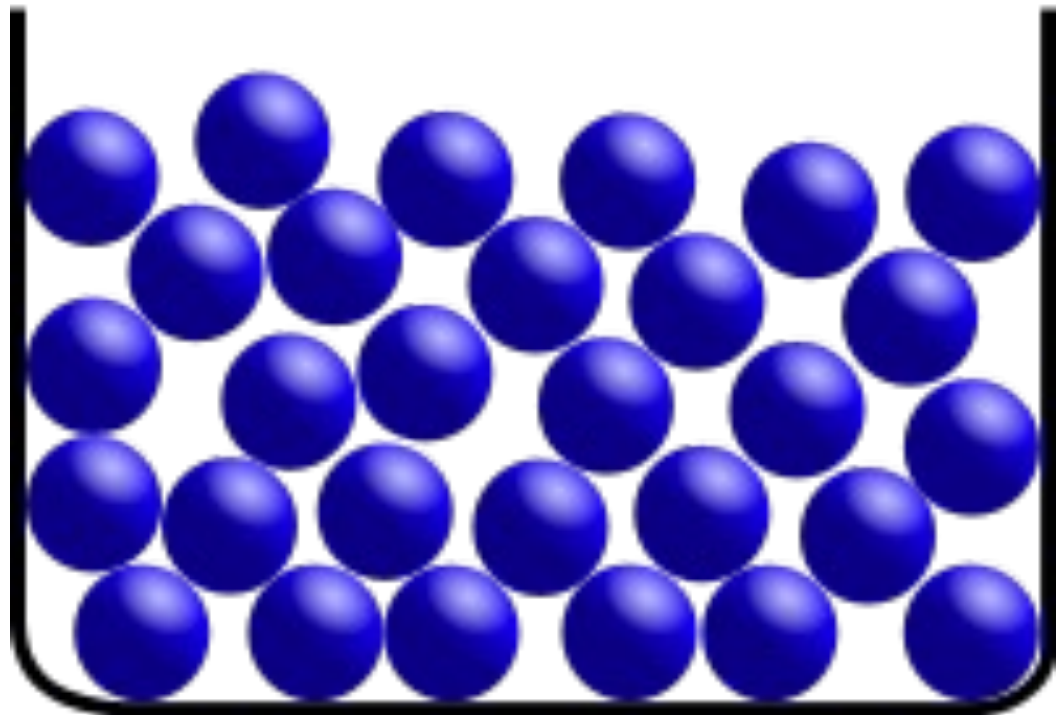
States of Matter

LIQUIDS

- A LIQUID is matter that will take the shape of any container it is placed in put has a fixed volume.

- Examples of LIQUIDS:

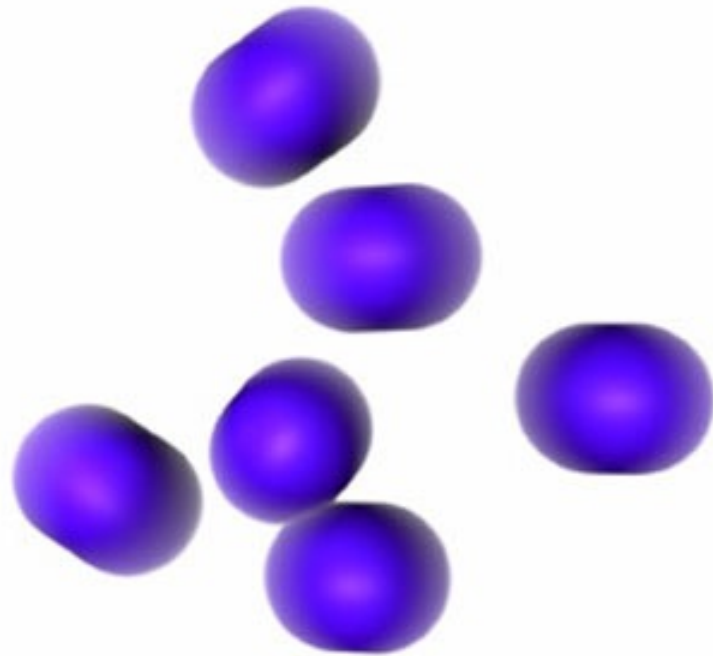
- Water
- Soda
- Milk
- Juice
- Tomato Sauce



States of Matter

GASSES

- A GAS is matter that does NOT have a fixed shape or volume, but will completely take up all the space in a container.
- MOST GASSES ARE INVISIBLE!!!!
- Examples of GASSES:
 - Oxygen
 - Helium
 - Carbon Dioxide
 - Nitrogen
 - Carbon Monoxide



Changes in Matter

➤ Matter can go through two different types of changes.

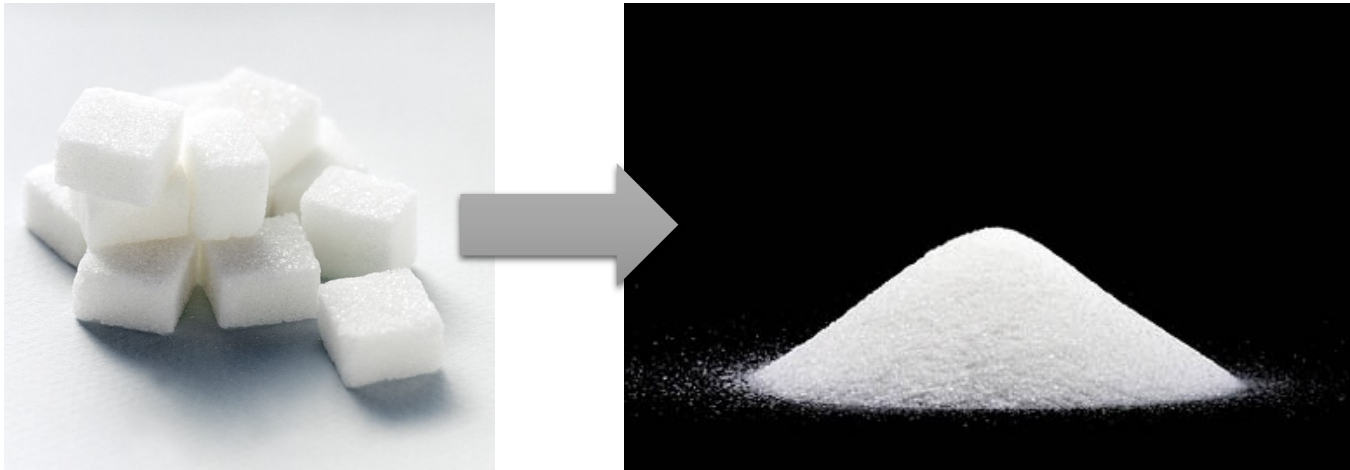
➤ Types of Changes:

- Physical
- Chemical



Physical Changes in Matter

A physical change in matter is when matter changes its property but not its chemical nature.



PHYSICAL CHANGES	
THE MATTER IS THE SAME.	The particles of the substance are rearranged
THE ORIGINAL MATTER CAN BE RECOVERED	

Physical Changes in Matter

EXAMPLES:

Aluminum foil is cut in half

Clay is molded into a new shape

Butter melts on warm toast

Water evaporates from the surface of the ocean

Juice freezes

Rubbing alcohol evaporates on your hand

Physical Changes in Matter

Chemical Changes in Matter

A **chemical change** in matter is when matter becomes something completely new. New matter is formed.



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Chemical Changes in Matter

- ▶ Chemical change:
- ▶ The substances present at the beginning of the change are not present at the end; new substances are formed. The change cannot be “undone.”

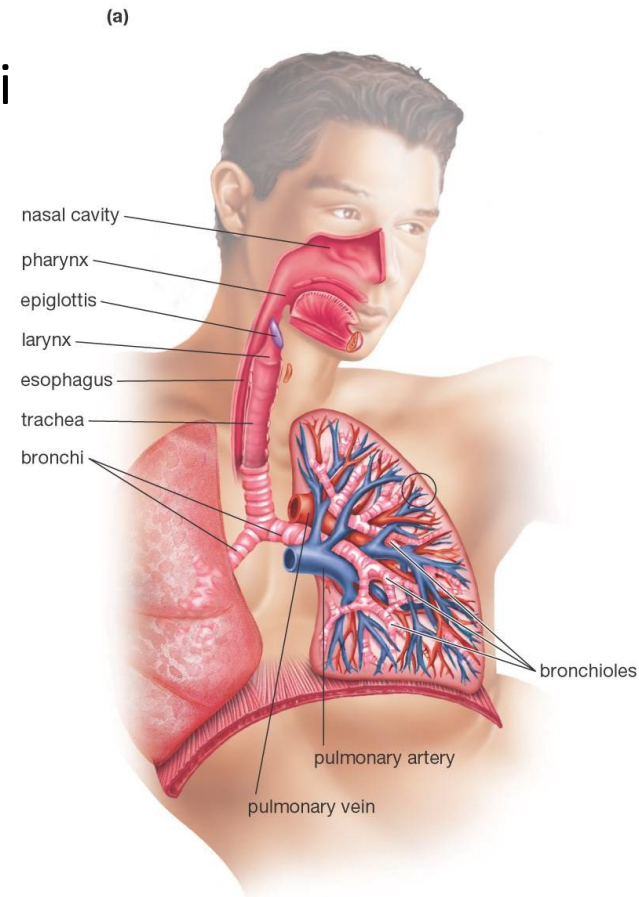


CHEMICAL CHANGES	
THE MATTER IS DIFFERENT.	THE PARTICLES OF THE SUBSTANCES ARE BROKEN APART
THE OLD MATTER IS NO LONGER PRESENT	ATOMS ARE REARRANGED INTO NEW PARTICLES
THE ORIGINAL MATTER CANNOT BE REMOVED FROM THE NEW MATTER	A NEW SUBSTANCE IS FORMED

Chemical Changes in Matter

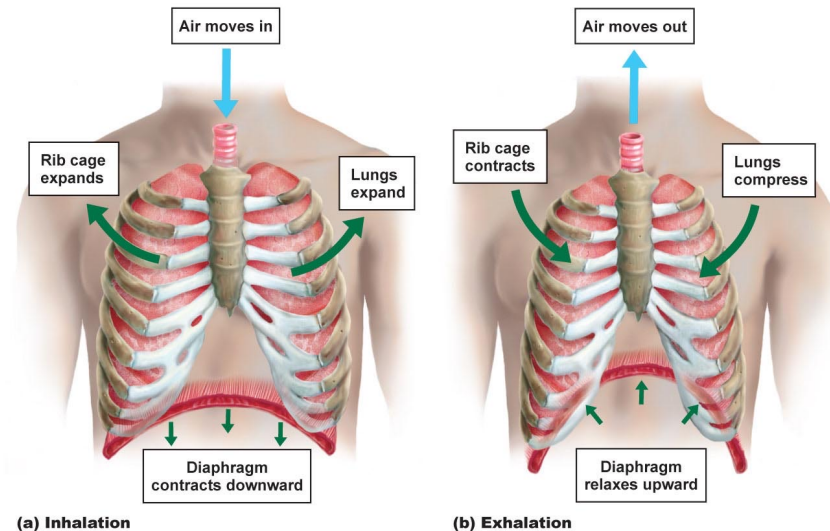
Human Respiratory System

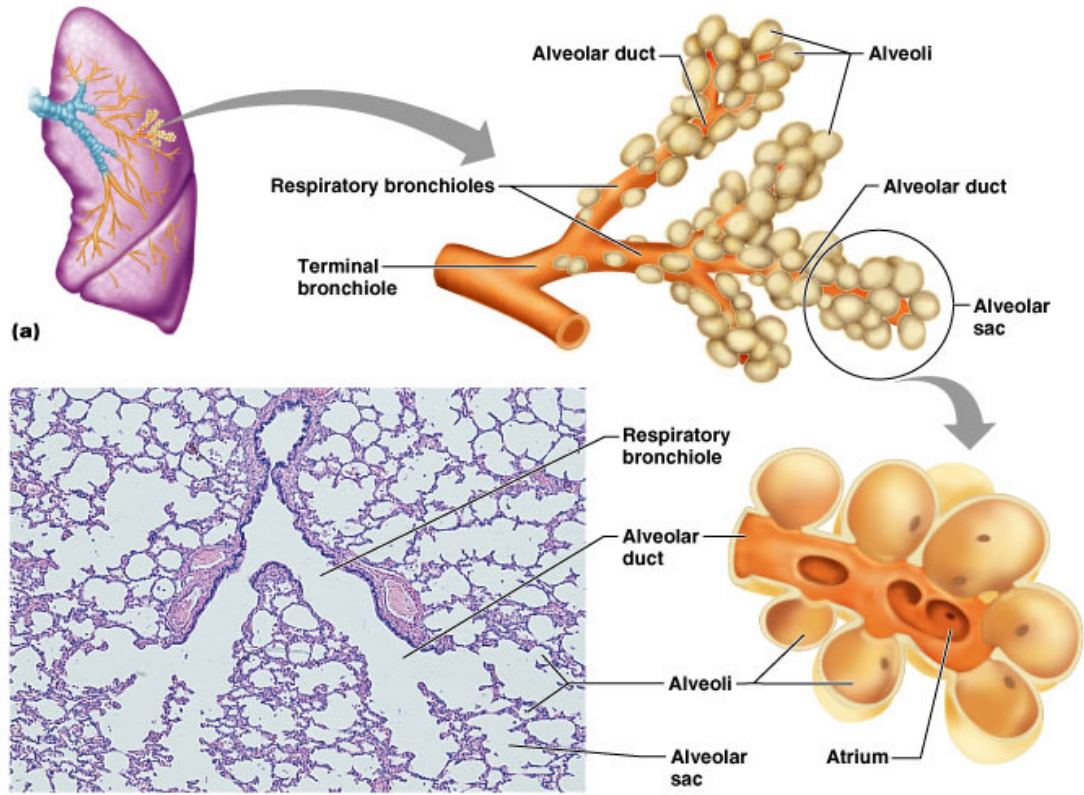
- Parts of the respiratory system i
 - Trachea
 - Bronchi
 - Bronchioles
 - Alveoli



Moving Air In and Out

- During inspiration (inhalation), the diaphragm and intercostal muscles contract.
- During exhalation, these muscles relax. The diaphragm domes upwards.

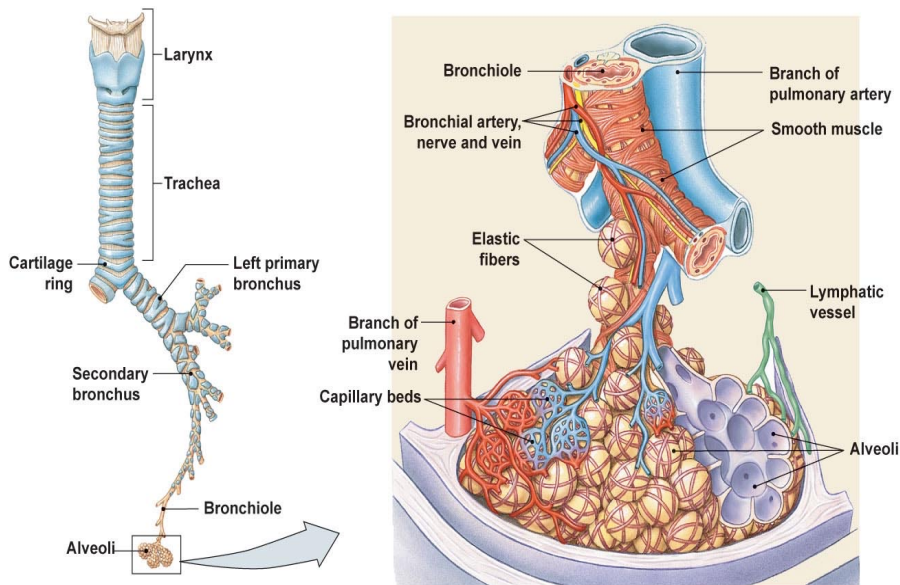




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Normal Lung

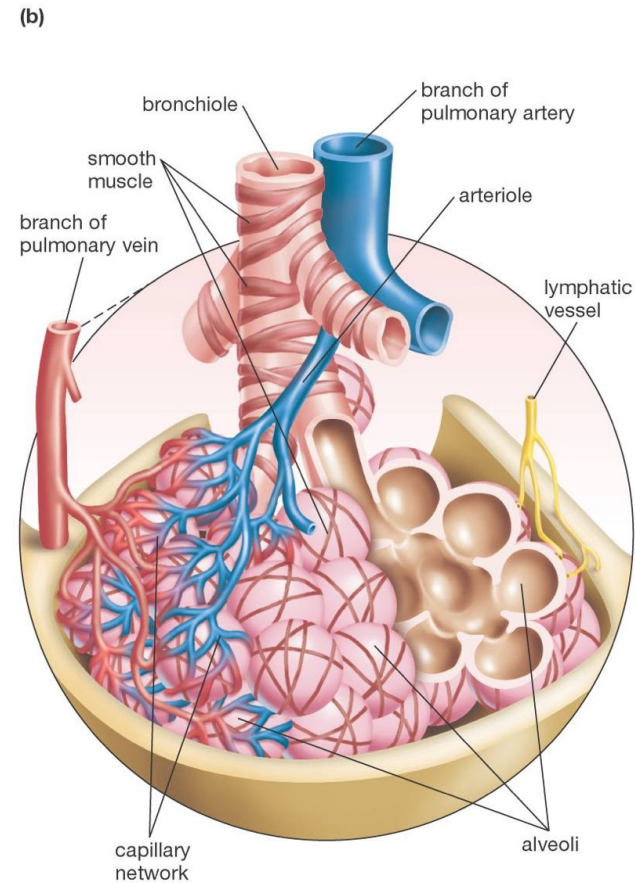
Normal Lung



	Name	Division	Diameter (mm)	How many?	Cross-sectional area (cm ²)	
Conducting system	Trachea	0	15-22	1	2.5	
	Primary bronchi	1	10-15	2	↓	
		Smaller bronchi	2	1-10		4
			3			
			4			
			5			
6-11	1×10^4					
Exchange surface	Bronchioles	12-23	0.5-1	2×10^4	100	
	Alveoli			8×10^7	5×10^3	
				$3-6 \times 10^8$	$>1 \times 10^6$	

Alveoli

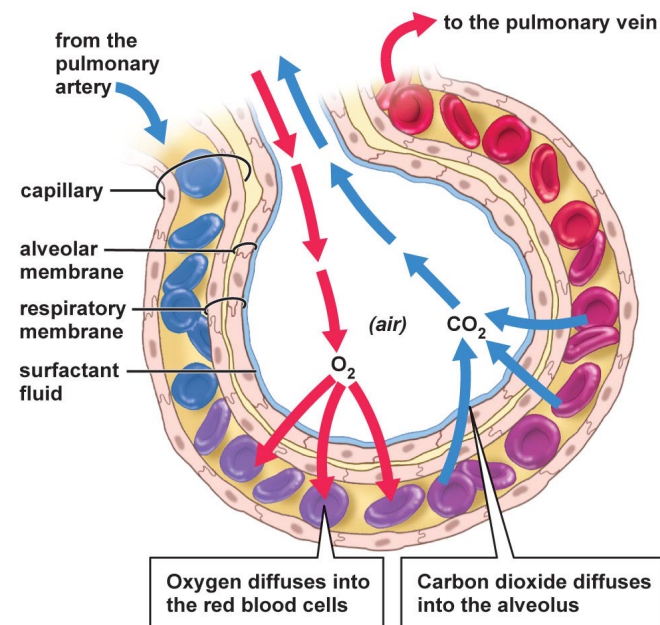
- The alveoli are moist, thin-walled pockets which are the site of gas exchange.
- A slightly oily surfactant prevents the alveolar walls from collapsing and sticking together.



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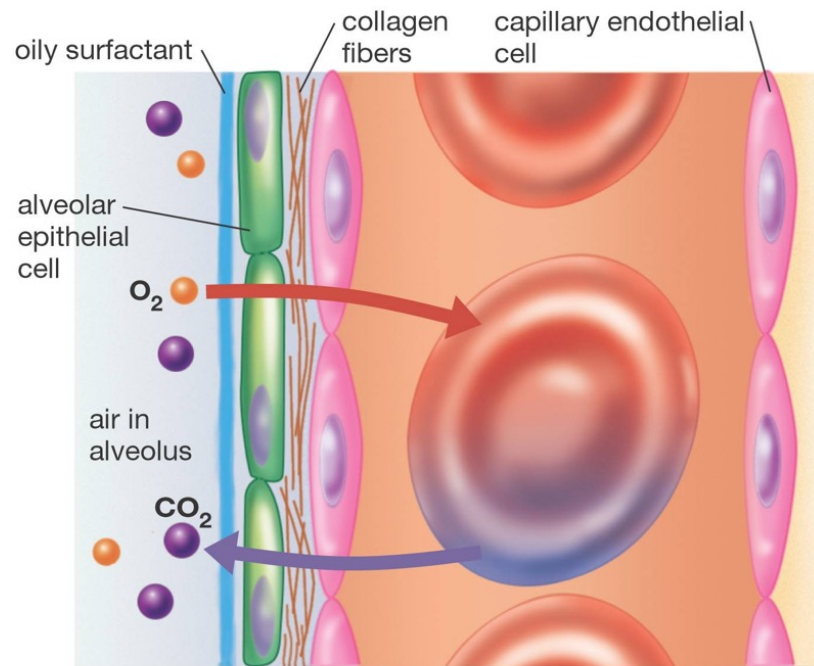
In the Alveolus

- The respiratory surface is made up of the alveoli and capillary walls.
- The walls of the capillaries and the alveoli may share the same membrane.



Gas Exchange

- Air entering the lungs contains more oxygen and less carbon dioxide than the blood that flows in the pulmonary capillaries.
- How do these differences in concentrations assist gas exchange?

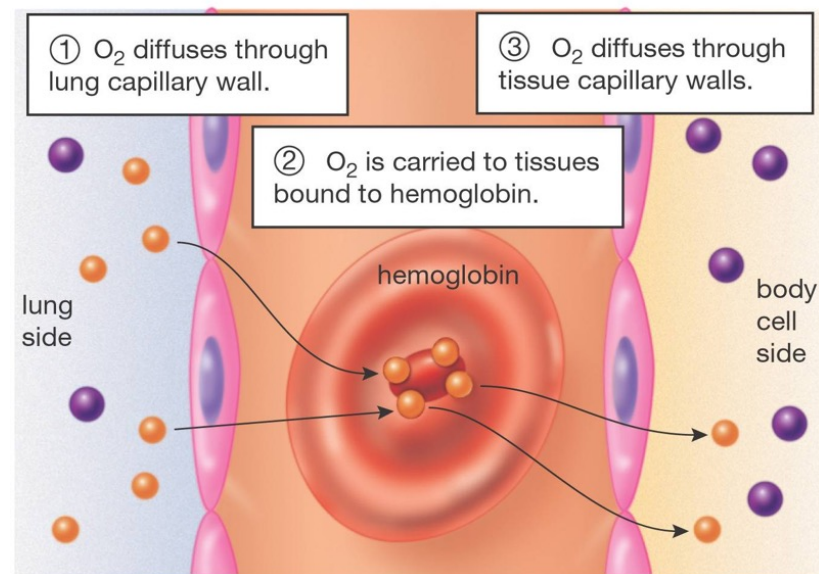


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Oxygen Transport

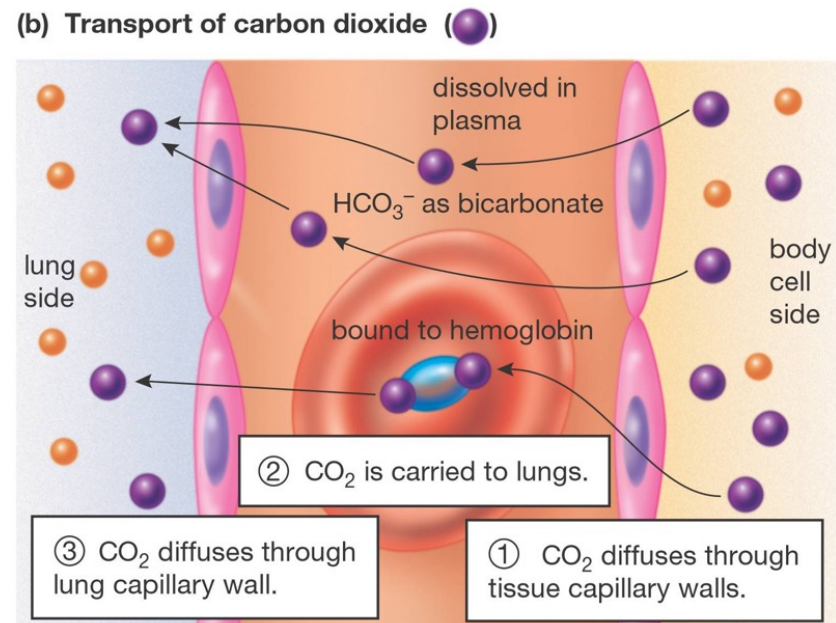
- Hemoglobin binds to oxygen that diffuses into the blood stream.
- What are some advantages to using hemoglobin to transport oxygen?

(a) Transport of oxygen (●)



Carbon Dioxide Transport

- Carbon dioxide can dissolve in plasma, and about 70% forms bicarbonate ions.
- Some carbon dioxide can bind to hemoglobin for transport.



Effects of Smoking

- Inhaled smoke contains:
- CO₂, which affects the CO₂ diffusion gradient.
- carcinogenic chemicals that can trigger tumors.
- toxic nicotine, which paralyzes cilia that normally clean the lungs.

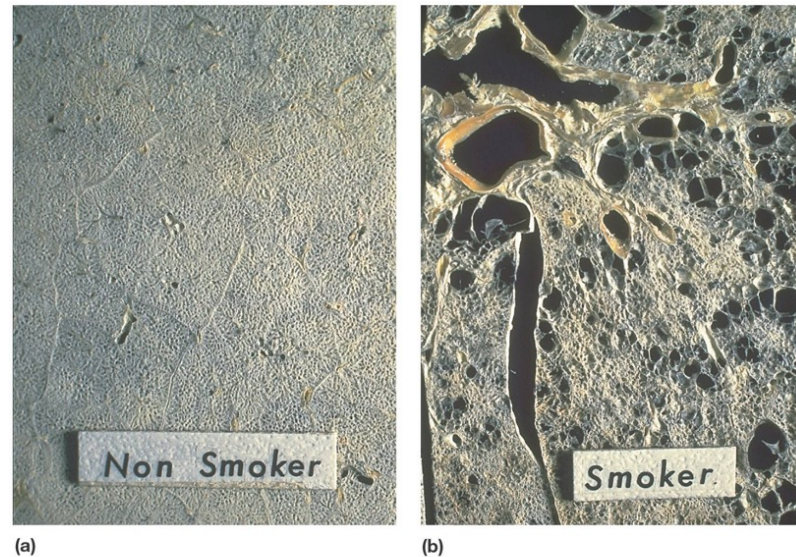
Gross, isn't it?



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Emphysema

- Besides cancer, smoking can also lead to emphysema. Alveoli become dry and brittle, and eventually rupture.
- Both active and passive smoking (“second-hand” smoke) can lead to lung problems.

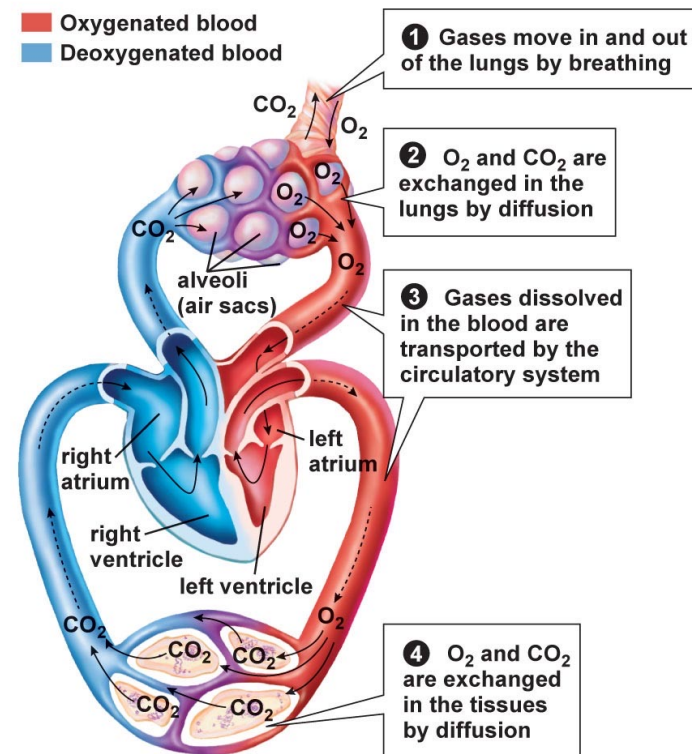


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All types of smoke, not just tobacco, can cause cancers and emphysema.

Circulation and Gas Exchange

- Recall the interconnection between circulation and the respiratory system.
- Gas exchange at the lungs and in the body cells moves oxygen into cells and carbon dioxide out.



CDC coined the term

EVALI

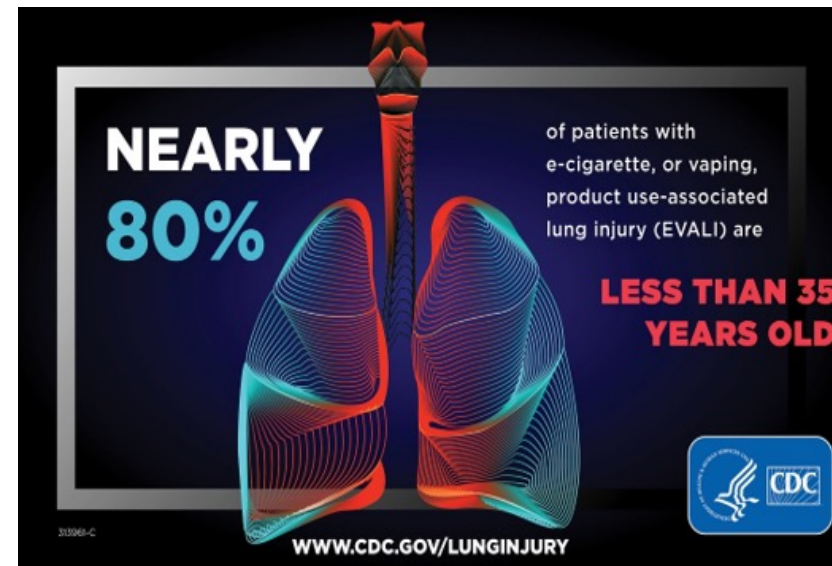
E-cigarette, or **V**aping, product use **A**ssociated **L**ung **I**njury

EVALI (E-cigarette and Vaping use-Associated Lung Injury)

Vitamin E acetate has been identified as the primary, but not only, cause.

Symptoms include shortness of breath, fever and chills, cough, vomiting, diarrhea, headache, dizziness, rapid heartrate, and chest pain.

- Due to it being so new, researchers are still searching for other causes and treatments, since there hasn't been one specifically identified treatment.
- 2,807 people have been hospitalized or died from EVALI across all 50 states, DC, Puerto Rico, and the US Virgin Islands.



CDC Data on Vaping/E-cigarette Injuries/Death

As of November 20, 2019

- **2,290** cases of e-cigarette, or vaping, product use associated lung injury (EVALI) have been reported to CDC
- **49** states (all except Alaska), the District of Columbia, and 2 U.S. territories (Puerto Rico and U.S. Virgin Islands) have reported these lung injuries
- **47** deaths have been confirmed in 25 states and the District of Columbia

Vaping-Related Illnesses

- Shortness of breath, weight loss, fatigue, gastrointestinal problems and lung failure
- As of February 2020
 - Nearly 70 deaths; 2,800 illnesses
 - Across 50 states, DC and U.S. territories

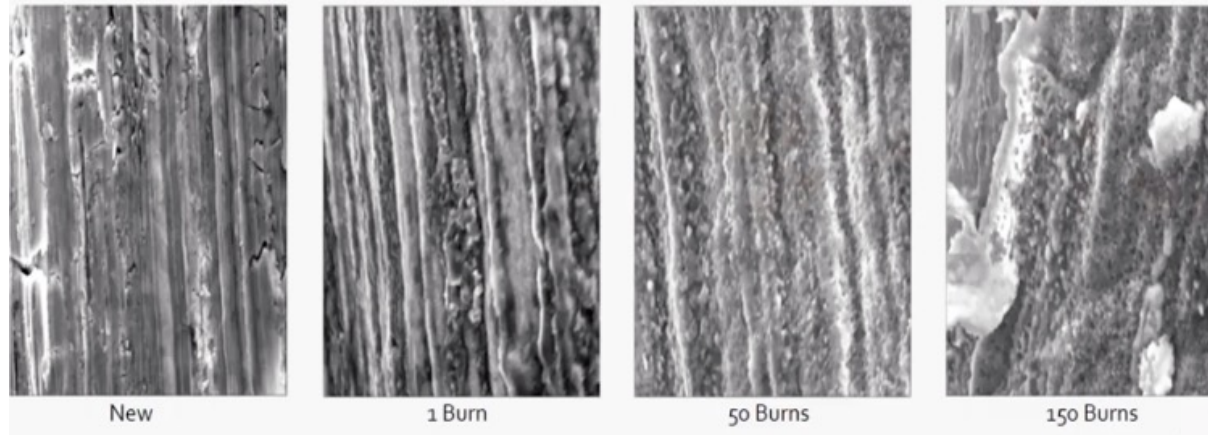
On the black market, **vitamin E acetate** is sometimes added as a cutting agent, decreasing the amount of THC in vape cartridges. It **is linked to most cases of EVALI**, but not all.

Source: CDC



Hard Metal Lung Disease

- When the metal coils of e-cigarettes heat up to turn e-liquids into aerosols, toxic metals like nickel, aluminum, manganese, lead, cobalt and chromium can leach into the liquid



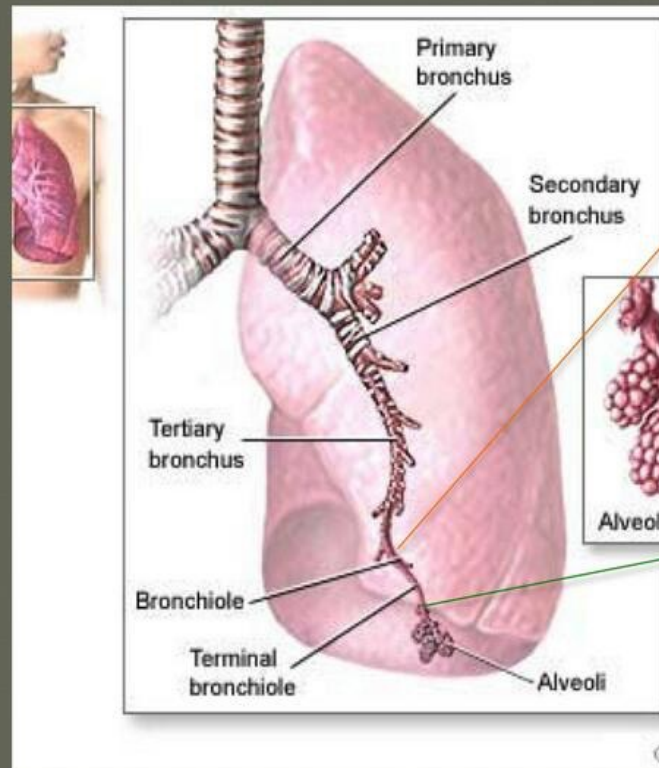
Coil under 2,000x magnification using an electron microscope
At 150 burns, it shows pitting and flaking

Popcorn Lung: Bronchiolitis Obliterans

- Over a decade ago, workers in a microwave popcorn factory were sickened by breathing in **diacetyl (alpha-diketone, 2,3-butanedione)**—the buttery-flavored chemical in foods like popcorn, coffee, caramel and dairy products. While this flavoring may be tasty, it was linked to deaths and hundreds of cases of bronchiolitis obliterans, a serious and irreversible lung disease. As a result, the major popcorn manufacturers **removed diacetyl from their products**, but some people are still being exposed to diacetyl - not through food flavorings as a worksite hazard, but through e-cigarette vapor. The flavorings industry has estimated that **over a thousand flavoring ingredients** have the potential to be respiratory hazards due to possible volatility and irritant properties (**alpha, beta-unsaturated aldehydes and ketones, aliphatic aldehydes, aliphatic carboxylic acids, aliphatic amines, and aliphatic aromatic thiols and sulfides**).

Bronchiolitis Obliterans

DLCO-Diffusing Capacity for Carbon Monoxide- medical measurement of how much oxygen travels from the alveoli to the blood stream



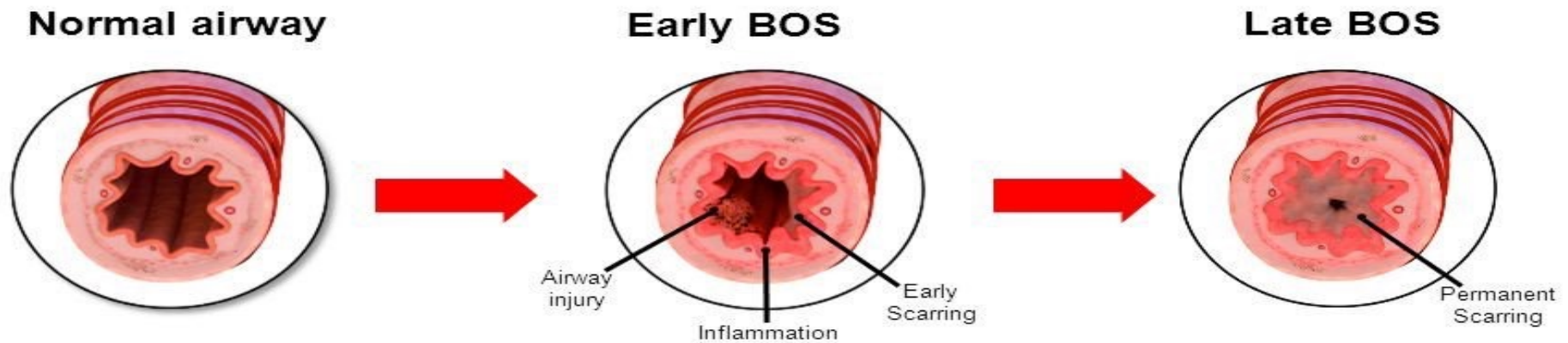
Constrictive Bronchiolitis Obliterans

- Affects proximal-mid bronchiole
- Peri-bronchiole fibrotic process that constricts rather than fills bronchiole causing **obstruction** & decreased DL_{CO}
- Seen in RA and post-SCT

Bronchiolitis Obliterans Organizing Pneumonia (Cryptogenic Organizing Pneumonia)

- Affects distal bronchiole
- Fills distal bronchiole with inflammatory infiltrate that causes **restriction** & decreased DL_{CO}
- Precipitated by pneumonia, drugs, CTD, malignancy etc.

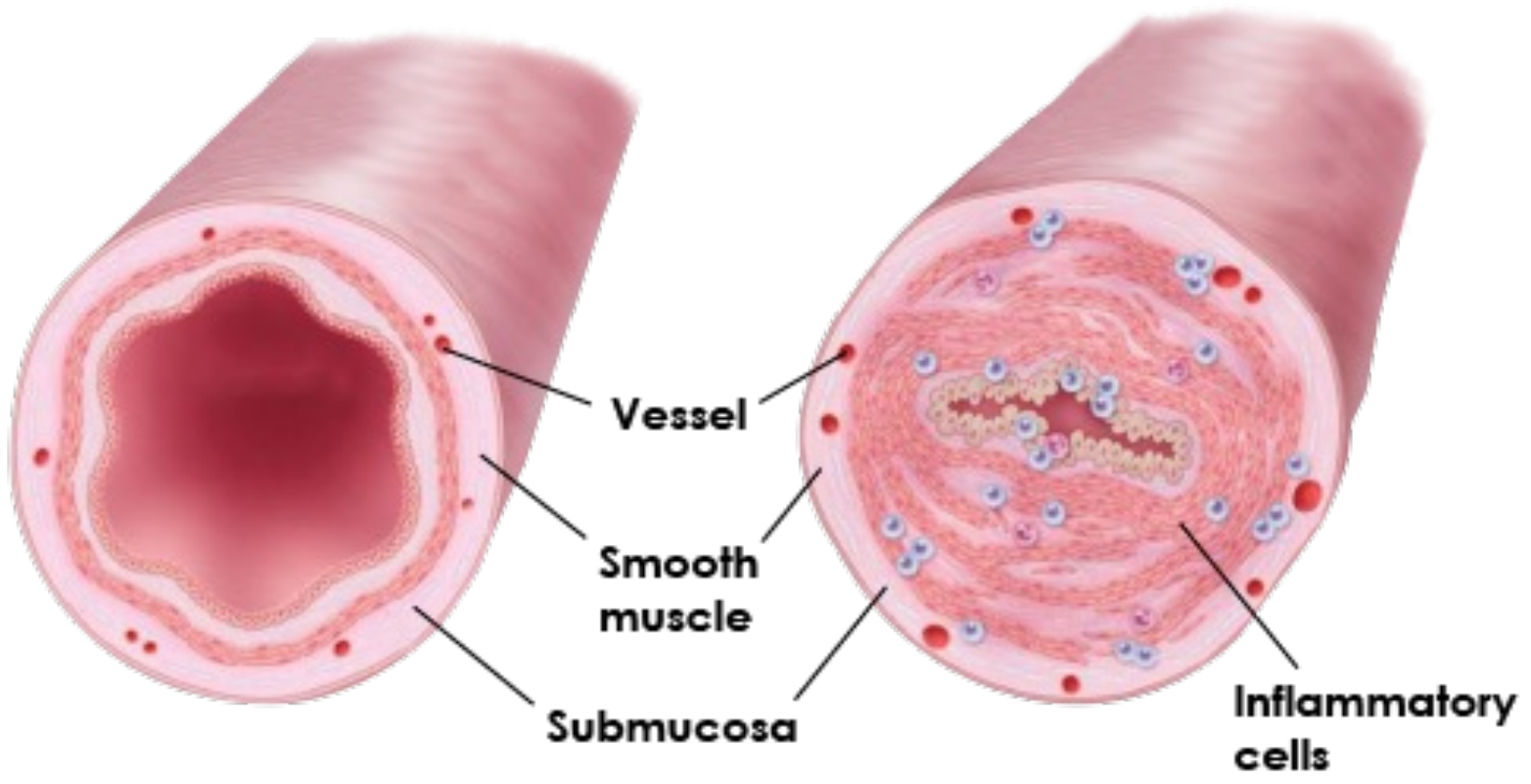
Bronchiolitis Obliterans Syndrome (BOS) is scarring in small airways.



Images by National Jewish Health

- Diacetyl, possibly diacetyl substitutes
- After injury, scars form.
- Scars cause airways to narrow.

Diacetyl and diacetyl substitutes do not have good warning properties.



Popcorn Lung: Bronchiolitis Obliterans



3/12/23


113

Also Where is the disconnect?

NICOTINE is NICOTINE




**Nicotine =
POISON**

- ❖ Large amounts of nicotine are lethal (60 mg adult, 6mg children)
 - ❖ Nicotine an insecticide and toxicant
 - ❖ The number of poisoning cases linked to e-cigarettes liquids was 1,351 in 2013, a 300% increase from 2012
- 




Health Effects

- ❖ A study examining the biological effects of e-cigarettes found “strikingly similar” gene mutations in lung cells exposed to e-cig vapor as those found in smokers.
 - This means that although e-cigarette vapor is tobacco and tar-free and that the device does not require combustion, it could potentially increase a user’s risk of cancer.
 - ❖ Nicotine can act as a neurotoxin and alter brain chemistry, so the brain doesn't function normally without it.
 - ❖ Nicotine is very dangerous for kids and teenagers, because their brain is still developing
- 



HEALTH CONSEQUENCES OF NICOTINE EXPOSURE

- **The potential adverse health consequences of nicotine may be summarized as follows:**
 - **Nicotine intoxication;**
 - **Accelerated coronary and peripheral vascular disease;**
 - **Stroke;**
 - **Hypertension (complications);**
 - **Delayed wound healing;**
 - **Reproductive or perinatal disorders (low birth weight, prematurity, spontaneous abortion);**
 - **Peptic ulcer disease; and**
 - **Esophageal reflux.**
- 

A close-up photograph of a clear glass vape pen lying horizontally on a dark, reflective surface. The pen is partially filled with a golden-brown liquid. In the foreground, a small, out-of-focus cannabis flower is visible. The text "Marijuana (THC) Vapes" is overlaid in white, centered on the image.

Marijuana (THC) Vapes

Let's Compare!

Vapes with Nicotine

E-liquid turns into aerosol

Dozens of harmful chemicals – many unknown

Has caused lung damage

Contains addictive chemical, nicotine

Sold in stores

Sold on the “black market”

Legal for people over the age of 18/21

Vapes with THC

- E-liquid turns into aerosol
- Dozens of harmful chemicals – many unknown
- Contains Vitamin E Acetate
- Has caused severe lung damage (EVALI)
- Contains psychoactive cannabinoid, THC
- Sold on the “black market”
- Illegal for people under the age of 18

Is Vaping & Marijuana Connected?


- Short answer, yes.
- A study was done using thousands of college students over 4 years
- E-cigarette use was found to predict cannabis use one year later
- Previous cannabis use was also found to predict later e-cigarette use
- This suggests the relationship between the two is bidirectional
- Further research was done to see if it was just nicotine in general or specifically e-cigarettes and it was found that cigarette use had no significance





Marijuana Vapes

- **Marijuana vapes can be hard to distinguish from some nicotine vapes.**
- **Many can work for:**
 - **Dry leaf marijuana**
 - **Dabs or concentrated forms of marijuana**
 - **Marijuana oils**



Various cannabis vapes can use a leaf form while others can use an oil form.

**Vapes Are Also
Being Used
for Some CBD
Products**



CBD
CANNABIDIOL

Vapes & Marijuana More Common

Vaping marijuana continues to dramatically increase in popularity among teens, according to numbers from the latest Monitoring the Future study.

In 2019, 14% of high school seniors admitted to vaping marijuana in the past month. This is almost double the percentage from 2018.

In addition, 21% of 12th-graders reported vaping marijuana within the past year - an increase from the 13.1% in 2018.

Safety Concerns with E-cigarettes and Vapes **Explosions!**



Recent Facts on Vaping Epidemic from Centers for Disease Control and Prevention (CDC)

New term used for health outbreak associated with vaping:

EVALI

- E – E-cigarette or
- V – Vaping product use
- A – Associated
- L – Lung
- I – Injury

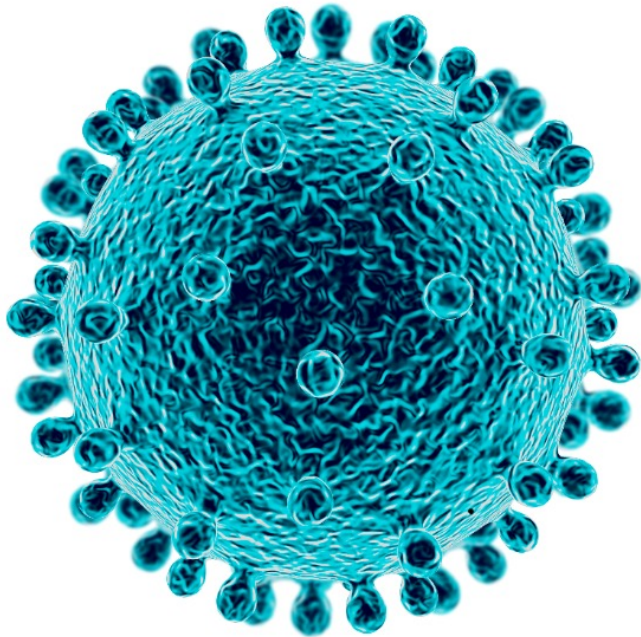


U.S. Department of
Health and Human Services
Centers for Disease
Control and Prevention

The slide features a white rectangular area with a subtle drop shadow, centered on a white background. This white area is framed by thick yellow bars: two vertical bars on the left side and a large L-shaped bar on the top and right sides. The text 'Vaping and COVID-19' is centered within the white area in a large, bold, black sans-serif font.

Vaping and COVID-19

What Do We Know About Coronaviruses?



Coronaviruses have a crown-like appearance under the microscope

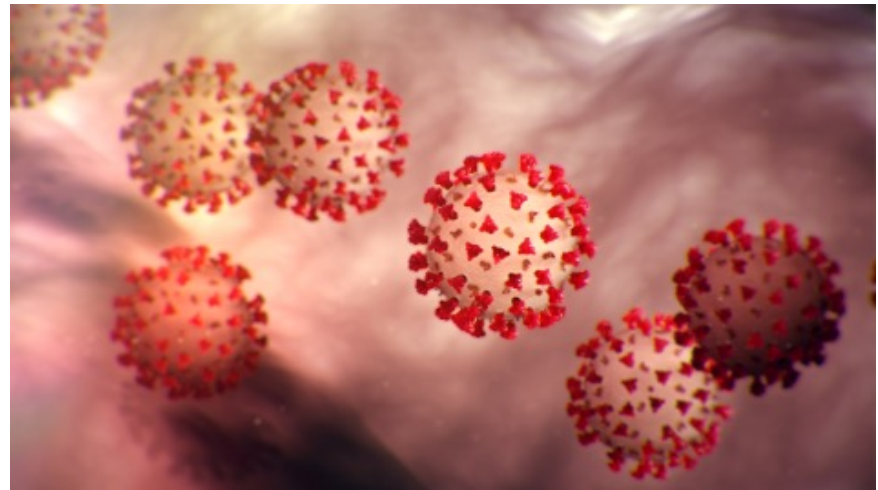
- Coronaviruses are a large family of viruses - some cause illness in people, and others only infect animals.
- Some coronaviruses infect animals then spread to people, and then spread person to person such as:
 - Middle East Respiratory Syndrome (MERS)
 - Severe Acute Respiratory Syndrome (SARS)
 - **Coronavirus Disease 2019 (COVID-19)**
- Common coronaviruses include some that cause mild upper-respiratory illnesses, like the common cold.

What is COVID-19?

Coronavirus disease 2019 or COVID-19 is a respiratory illness that can spread from person to person.

The virus that causes COVID-19 is a **new** coronavirus first identified during an investigation into an outbreak in Wuhan, Hubei Province, China.

Initial case-patients reported visiting a large seafood and live animal market in Wuhan.





Vaping and COVID-19

- *Healthy non-smokers were exposed to e-cigarette aerosol, and bronchoalveolar lavage was obtained to study alveolar macrophages. The expression of more than 60 genes was altered in e-cigarette users' alveolar macrophages two hours after just 20 puffs, including genes involved in inflammation.*

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Is there a reason to believe people who vape are more at risk of developing serious complications from COVID-19? If so, why?

•

- Certainly we know that vaping itself can lead to inflammation and [profound lung disease](#), as well as to a malfunction of the immune system in the lungs. I would therefore expect that those who vape or smoke may be more susceptible to pulmonary complications following a COVID-19 infection.
-

How does COVID-19 harm the lungs?

- COVID-19 can damage the lining of the air sacs in the lungs (alveoli) where oxygen is delivered to the blood. As those sacs fill with fluid, dead cells, and other debris, it prevents oxygen from getting through. The filling up of the air sacs is what causes the typical white appearance of the lungs on a chest X-ray or CT scan of a patient with COVID-19 pneumonia or pneumonitis. The air sacs normally are full of air and appear black on radiographic studies. When the lungs have to work harder or when there is decreased oxygen supply to other body organs, more stress is placed on those organs, and they are more susceptible to failure.

Could vaping be a reason for the number of young people diagnosed with COVID-19?

- Right now we don't know how vaping habits among young people are connected to COVID-19, but it has been curious that hospitals across the country are seeing younger patients who are quite sick, some of them requiring intubation and ventilation. One theory is that it is more likely that younger people were slower to take up social distancing and to self-isolate when they had early symptoms. Once we get past this initial surge and have a chance to look closely at the data, it will be interesting to sort out whether those patients who needed intubation had a history of smoking or vaping or of other underlying lung disease.

Some reports show that the new coronavirus is more deadly for men than women. Do smoking rates play any role in this?

- Early data from China and Italy seem to suggest that men are somewhat more likely to be infected than women, but also suggest that death rates in men might be 65% to 75% higher than in women. The reasons for this aren't entirely clear at this point. It may be that men are more likely to smoke than women in these countries and, thus, likely to have more significant underlying lung disease. This could predispose them to respiratory failure and death. There are also some interesting theories and some previous experiments that suggest estrogen may be somewhat protective against viral infections.

What advice
would you give
people who
vape?

- I remind patients that the harms of vaping have been well documented. It is clear that vaping may increase nicotine addiction, is strongly associated with acute lung injury, and potentially causes cancer down the road. This would be a great time to quit and a terrible time to start.
- *Brendon Stiles MD-Health Matters, NY Presbyterian*



Prevention

The main way to prevent nicotine addiction is to keep people from using nicotine products

Strategies that are implemented early work best

Effective approaches are comprehensive and involve:

- Education and awareness
- Appeal to students' desires for independence and future success
- Reduced access and availability
- Early detection of risk, parent involvement
- Compassionate, health-based interventions that promote cessation and improved mental health

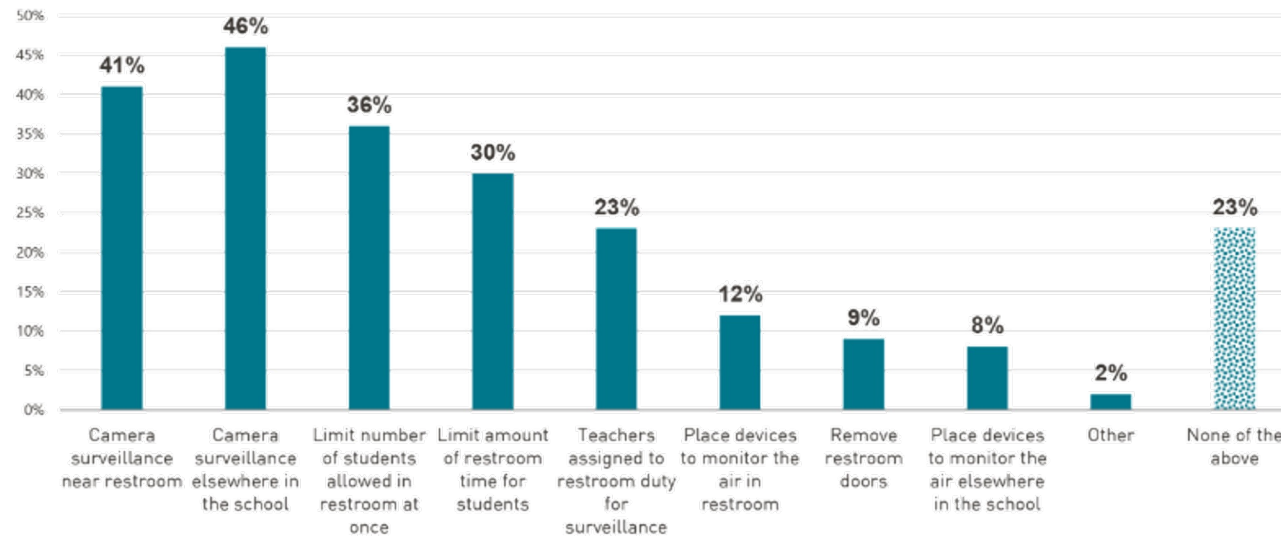
Signs of Student Vaping

- Frequent trips to the bathroom at the same time every day
- Mood changes before and after leaving the room
- Students hanging out in bathroom stalls together
- Returning to class smelling of minty or sweet scents
- Putting what appears to be thick markers or pens in their mouths; using colorful USB-like devices
- Using lanyards or hoodies to hide vaping devices
- Unexplained shifts in mood, behavior, academics



How Some Schools Have Approached Vaping

What have schools done about e-cigarettes?



Source: November 2018 survey of 1,525 middle and high school teachers and administrators across the U.S.

Addressing Vaping in Schools

- Offer a research-based anti-vaping curriculum
- Challenge students' perceptions of norms (it's not true that 'everyone' vapes)
- Address the pull of addiction, reasons for use
- Appeal to students' desire for independence by demonstrating industry marketing tactics that target youth
- Sponsor student-led anti-vaping campaigns
- Offer alternative, safer means of having fun, reducing stress and taking risks



Helpful Messages for Teens

1

Don't fall for it

- Don't let big businesses take advantage of you, ruin your health, make you dependent
- It's not cool to be addicted to and dependent on a drug

2

Don't be fooled by celebrity and social media promotions

- There's money behind them, not your best interests

3

Don't contribute to environmental damage

4

Make smart and healthy choices

- Vaping really is dangerous
- You only have one brain and body and they're in pretty great condition right now – why mess up your health?

Youth- friendly materials

- smokeSCREEN -- a smoking prevention videogame – play2PREVENT
- Get Smart about Tobacco: Health and Science Education Program – Scholastic
- The Real Cost of Vaping – FDA and Scholastic
 - Information and a single lesson plan for grades 9-12
- Know the Risks: A Youth Guide to E-cigarettes–CDC's Office on Smoking & Health



Additional Resources

Outbreak of Lung Injury Associated with the Use of E-Cigarette, or Vaping, Products

[Español \(Spanish\)](#)



CDC, the U.S. Food and Drug Administration (FDA), state and local health departments, and other clinical and public health partners are investigating a multistate outbreak of e-cigarette, or vaping, product use associated lung injury (EVALI).

For the Public

For Healthcare Providers

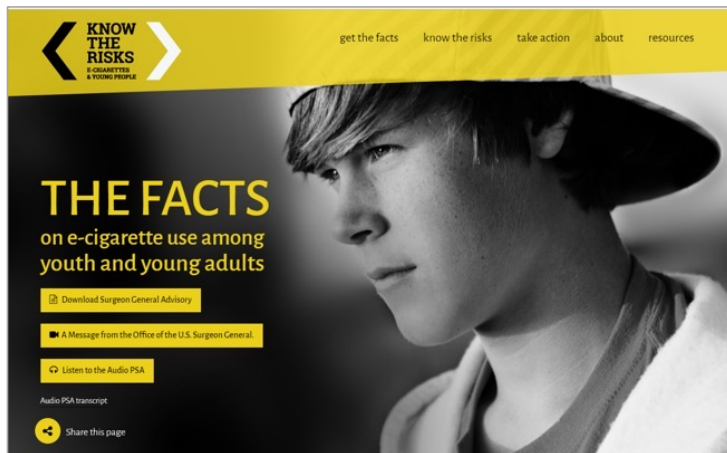
For Health Departments

Resources

Digital Press Kit

Resources

- The CDC website has numerous resources that are available and targeted to the general public and to health professionals
- A six minute video is available on e-cigs 101 for clinicians and public health professionals
- <https://www.youtube.com/watch?v=5aLilrPQnAc>
- The US Surgeon General's website has lots of resources and a recent advisory



KNOW THE RISKS
E-CIGARETTES & VAPING PRODUCTS

get the facts know the risks take action about resources

THE FACTS

on e-cigarette use among youth and young adults

Download Surgeon General Advisory

A Message from the Office of the U.S. Surgeon General

Listen to the Audio PSA

Audio PSA transcript

Share this page

Helpful Resources

- Partnership to End Addiction guide – *Vaping: What School Professionals Need to Know to Help Protect Children, Teens and Young Adults*:
<https://drugfree.org/community-resources/>
- Centers for Disease Control and Prevention (CDC):
https://www.cdc.gov/tobacco/basic_information/e-cigarettes/index.htm
- Stanford's *Tobacco Prevention Toolkit*:
<https://med.stanford.edu/tobaccopreventiontoolkit/E-Cigs.html>
- Truth Initiative's *quitting resources*:
<https://truthinitiative.org/thisisquitting>

Resources for Parents & Professionals

- CDC Quick Vape Facts - https://www.cdc.gov/tobacco/basic_information/e-cigarettes/Quick-Facts-on-the-Risks-of-E-cigarettes-for-Kids-Teens-and-Young-Adults.html
- CDC Teen Vape Sheets - https://www.cdc.gov/tobacco/basic_information/e-cigarettes/Quick-Facts-on-the-Risks-of-E-cigarettes-for-Kids-Teens-and-Young-Adults.html
- CDC Ecig/Product - [Dictionary-images-https://www.cdc.gov/tobacco/basic_information/e-cigarettes/pdfs/ecigarette-or-vaping-products-visual-dictionary-508.pdf](https://www.cdc.gov/tobacco/basic_information/e-cigarettes/pdfs/ecigarette-or-vaping-products-visual-dictionary-508.pdf)
- Surgeon General - [Vapes-https://e-cigarettes.surgeongeneral.gov/knowtherisks.html](https://e-cigarettes.surgeongeneral.gov/knowtherisks.html)
- CDC Smoking & Youth - https://www.cdc.gov/tobacco/data_statistics/sgr/50th-anniversary/pdfs/fs_smoking_youth_508.pdf
- CDC What Are E Cigs? - https://www.cdc.gov/tobacco/basic_information/e-cigarettes/about-e-cigarettes.html
- Vape Facts by Johns Hopkins Medicine - <https://www.hopkinsmedicine.org/health/wellness-and-prevention/5-truths-you-need-to-know-about-vaping>

TALL COP SAYS STOP Website: www.tallcopsaysstop.com

Questions

