The New Look of

NICOTINE ADDICTION

TALK WITH YOUR KIDS ABOUT THE DANGERS OF VAPING

GET OUTRAGED!

Get the facts at **GetOutraged.org**

Introduction

Diane Knight RN

Director

Northeast Tobacco-Free Community Partnership

- Help people quit using tobacco/nicotine
- Prevent youth from starting to use tobacco/nicotine
- Protect everyone from secondhand smoke

*Funded by the Massachusetts Tobacco Cessation and Prevention program, a Community Partnership in your region can provide **free** resources to your community.*

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Agenda

1. Why we are here
2. Vaping 101
3. Tobacco & Vaping Industry Tactics
4. What you can do
5. Questions/Discussion

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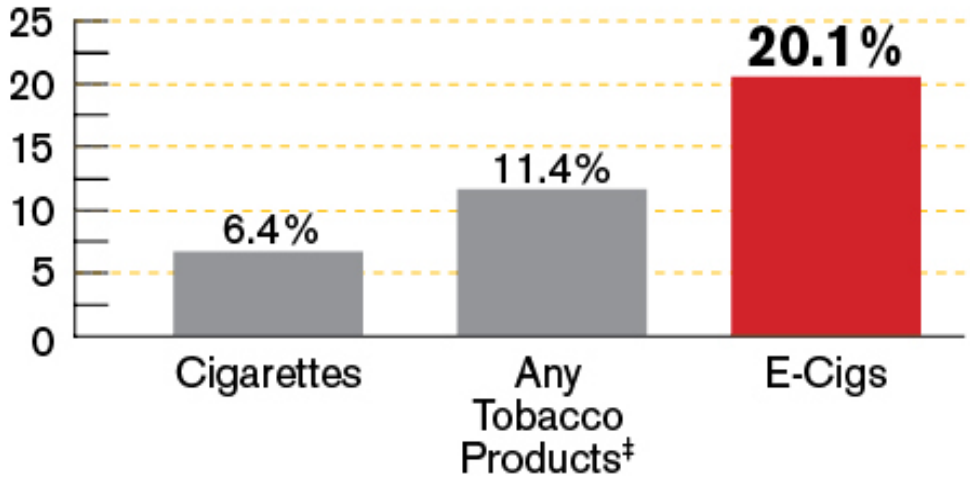
Youth use of vaping products

In 2017 41.1% of MA high school youth had ever used e-cigarettes.

High school youth current use of e-cigarettes was higher than use of any other tobacco products combined

Current† Use of Tobacco and Vaping Products by MA High School Youth, 2017



† Use in the past 30 days

‡ Any tobacco defined as cigarettes, cigars (including little cigars and cigarillos), and smokeless tobacco (chewing tobacco, snuff, dip)

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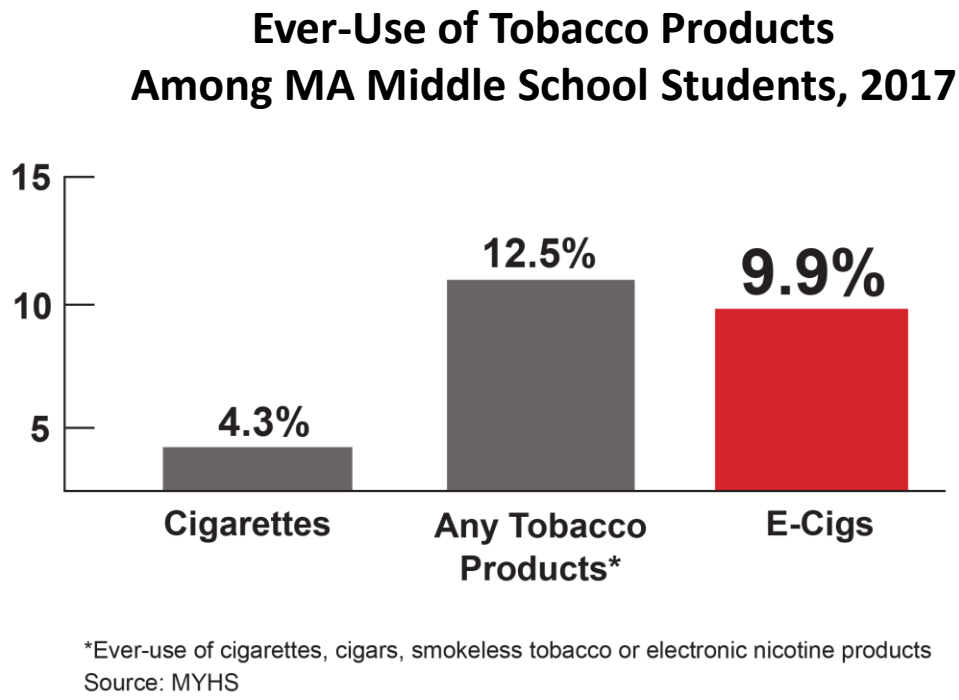
Youth use of vaping products - MS

In 2017 nearly 10% of MA middle school youth had ever used e-cigarettes.



‡ Any tobacco defined as cigarettes, cigars (including little cigars and cigarillos), and smokeless tobacco (chewing tobacco, snuff, dip)

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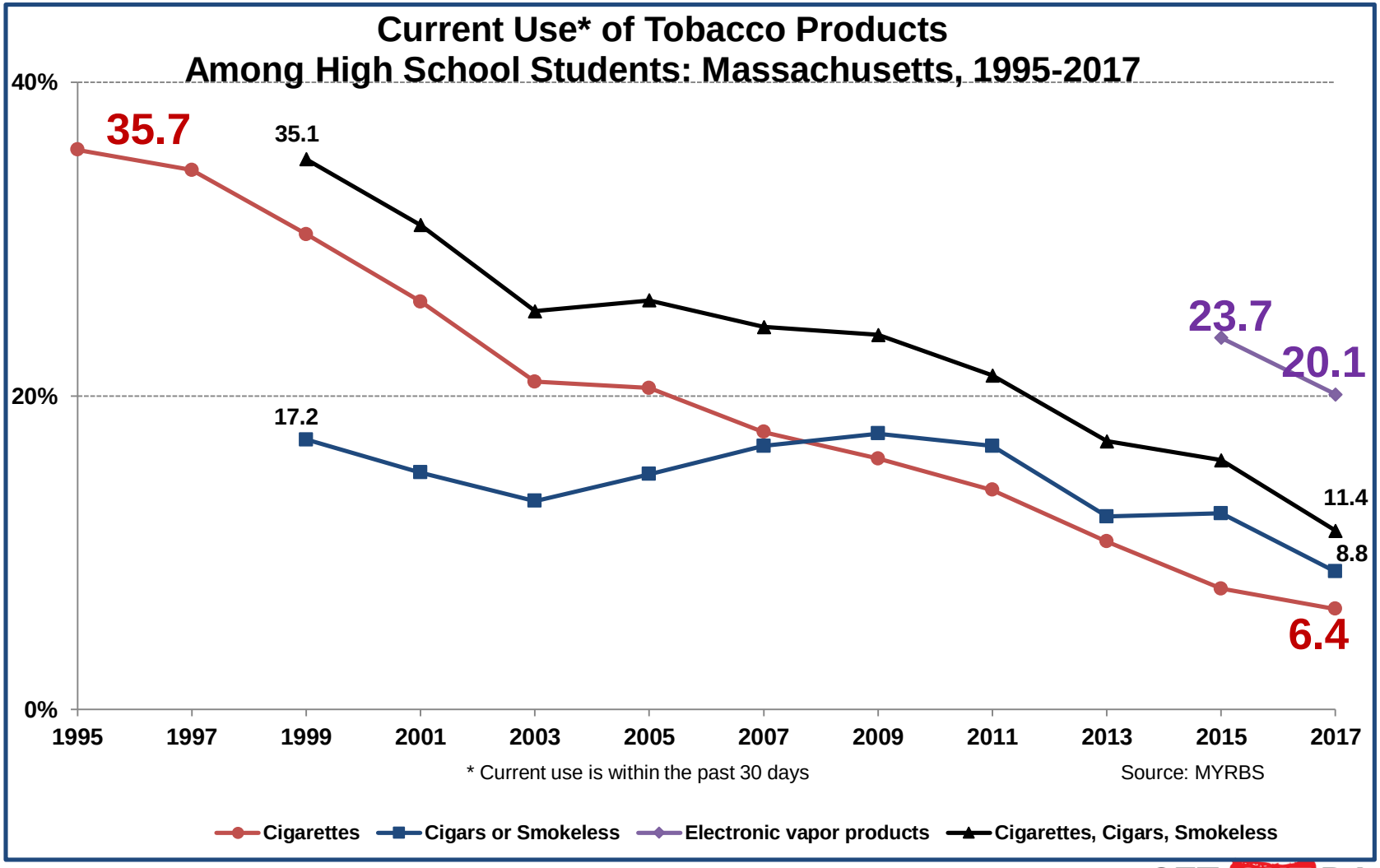
We've come a long way



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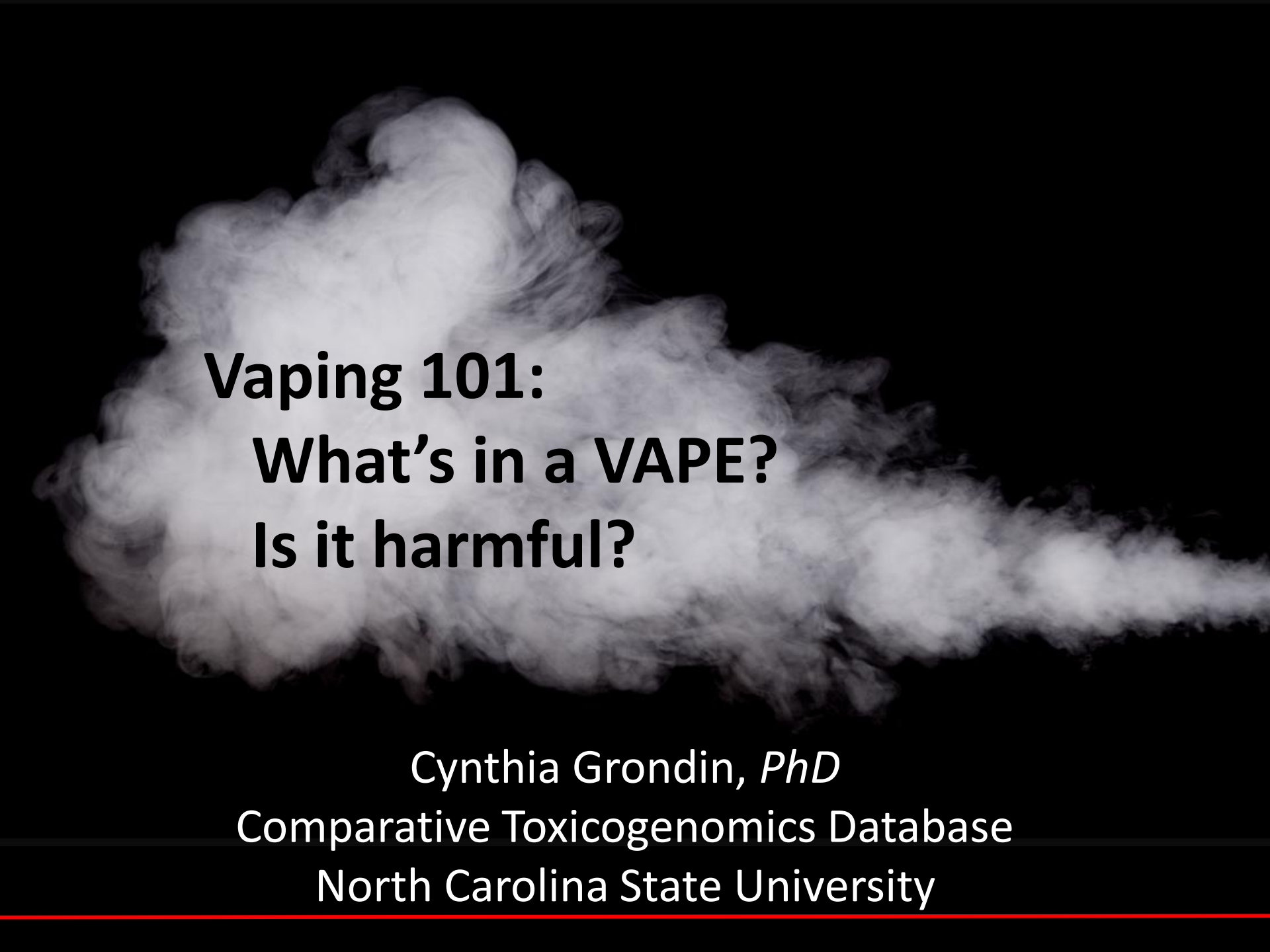


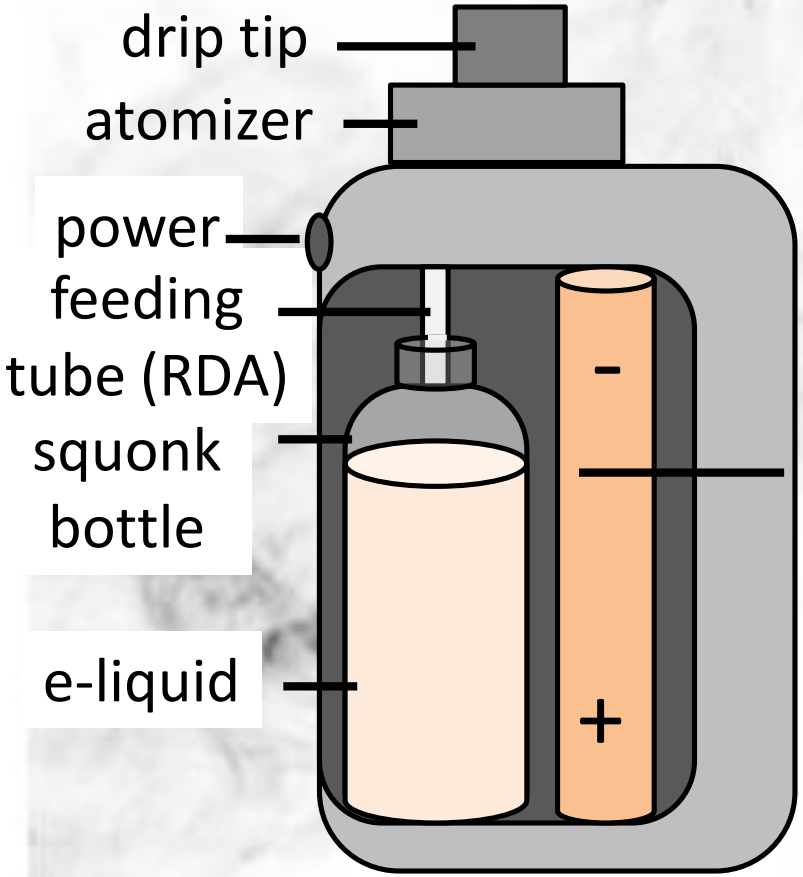
Vaping 101:
What's in a VAPE?
Is it harmful?

Cynthia Grondin, *PhD*
Comparative Toxicogenomics Database
North Carolina State University

Vape mods


aerosol/vapor
mouthpiece
atomizer
e-liquid
on/off switch
Lithium battery

Squonk mods – “squonking”



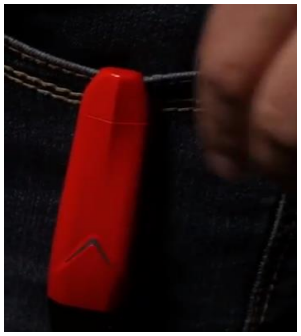
Vandyvape
Pulse X

Wotofo Recurve

common e-cigarette vaping devices

Suorin Drop

Suorin Vagon



Suorin Air Pod System

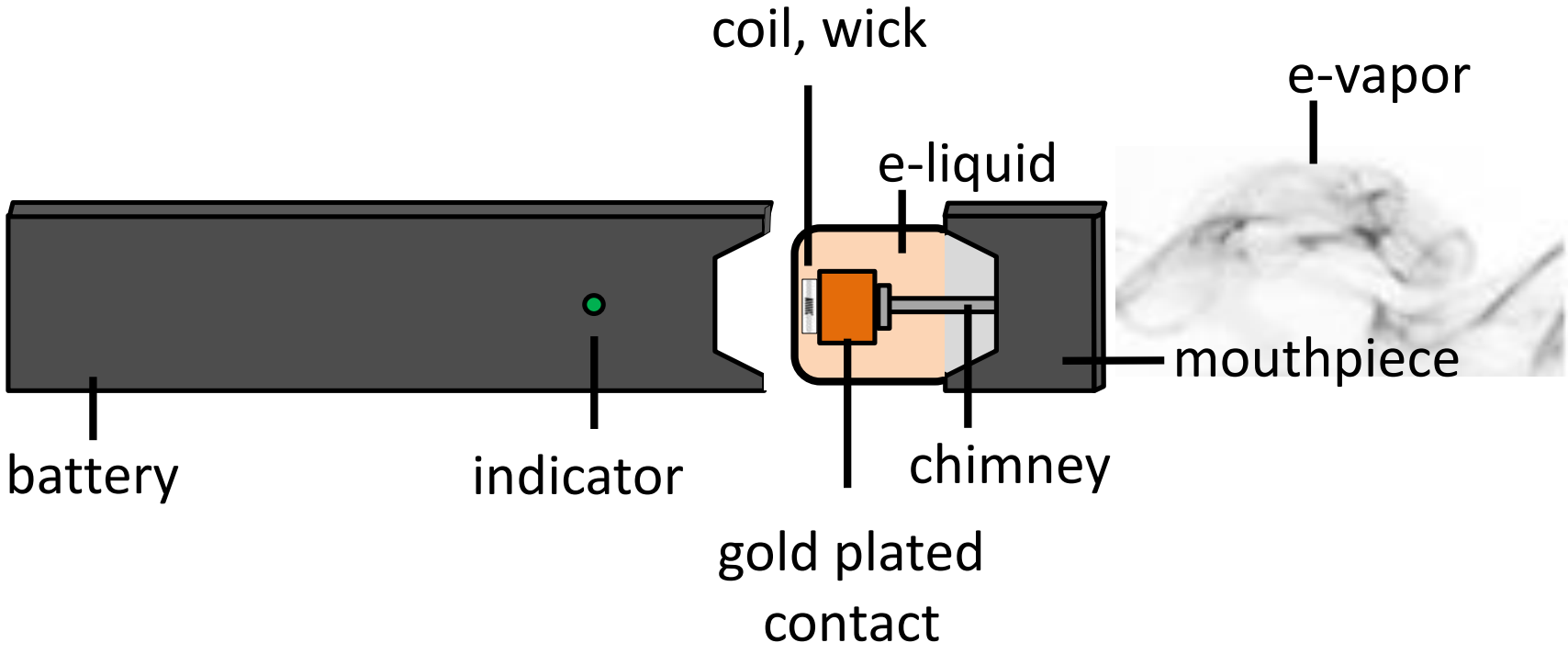
Juuls – “Juuling”

1 pod = nicotine in 1 pack cigarettes 59mg/ml

banned in European Union and Israel due to 3x permitted nicotine levels

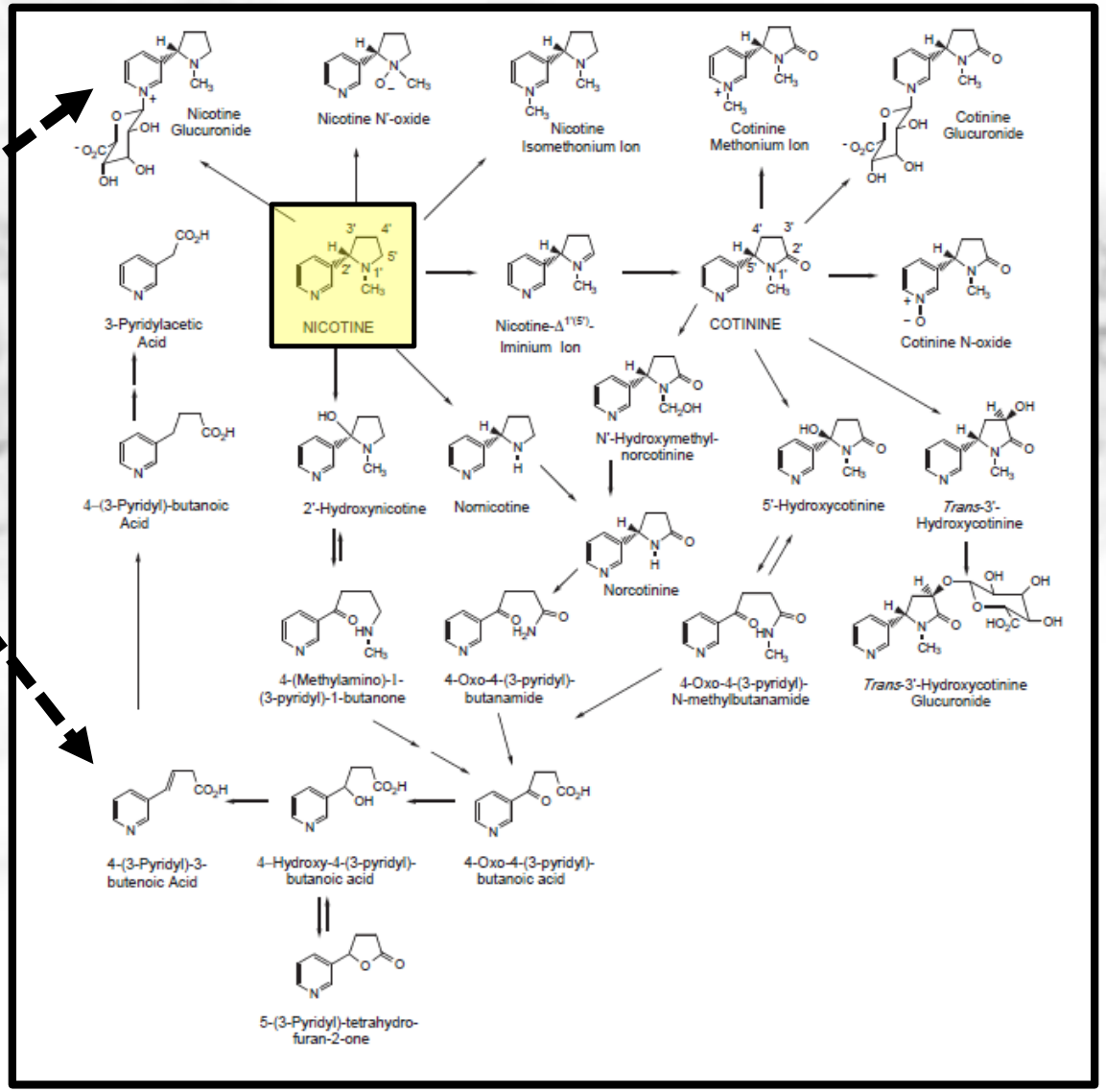
ALL Juuls contain NICOTINE

Anatomy of a Juul



Beyond the List of Ingredients

nicotine
propylene glycol
glycerin
benzoic acid
flavorings, oils



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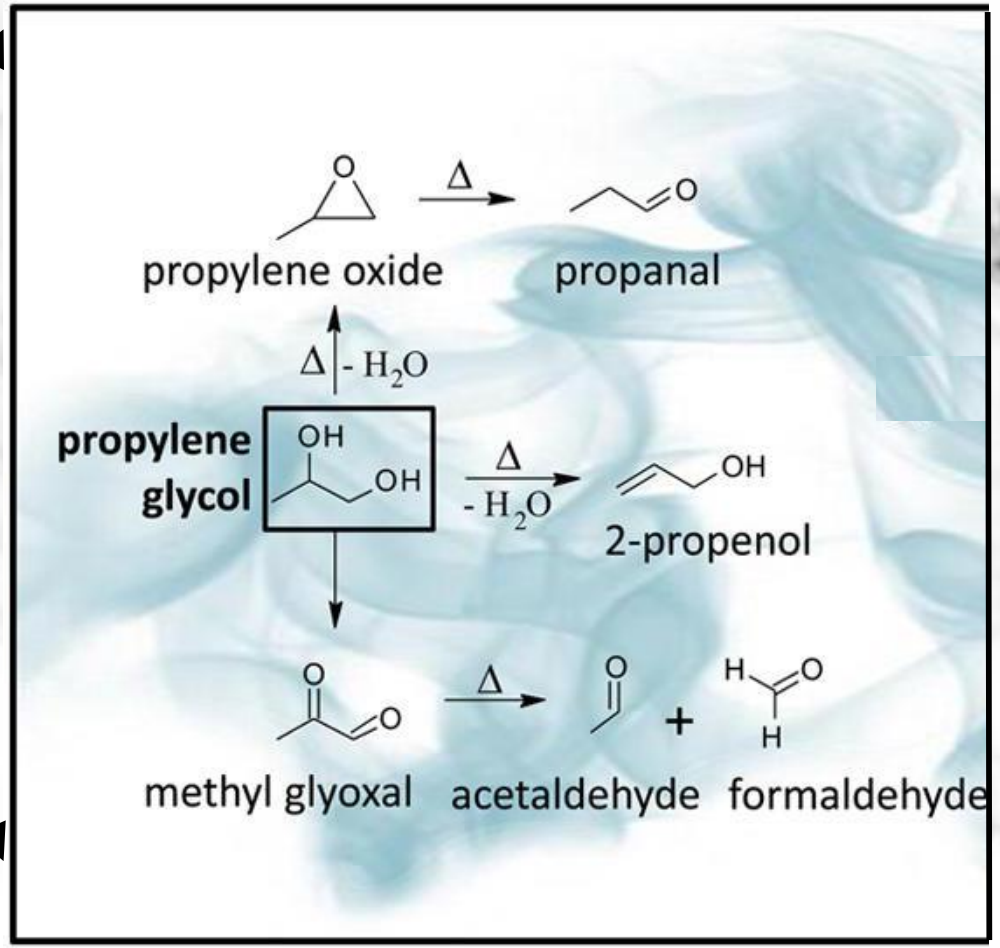

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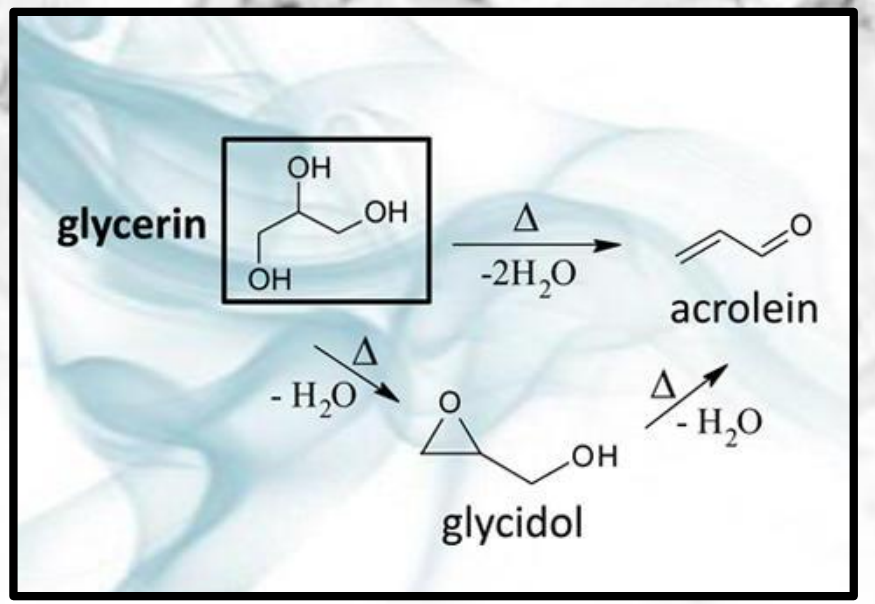

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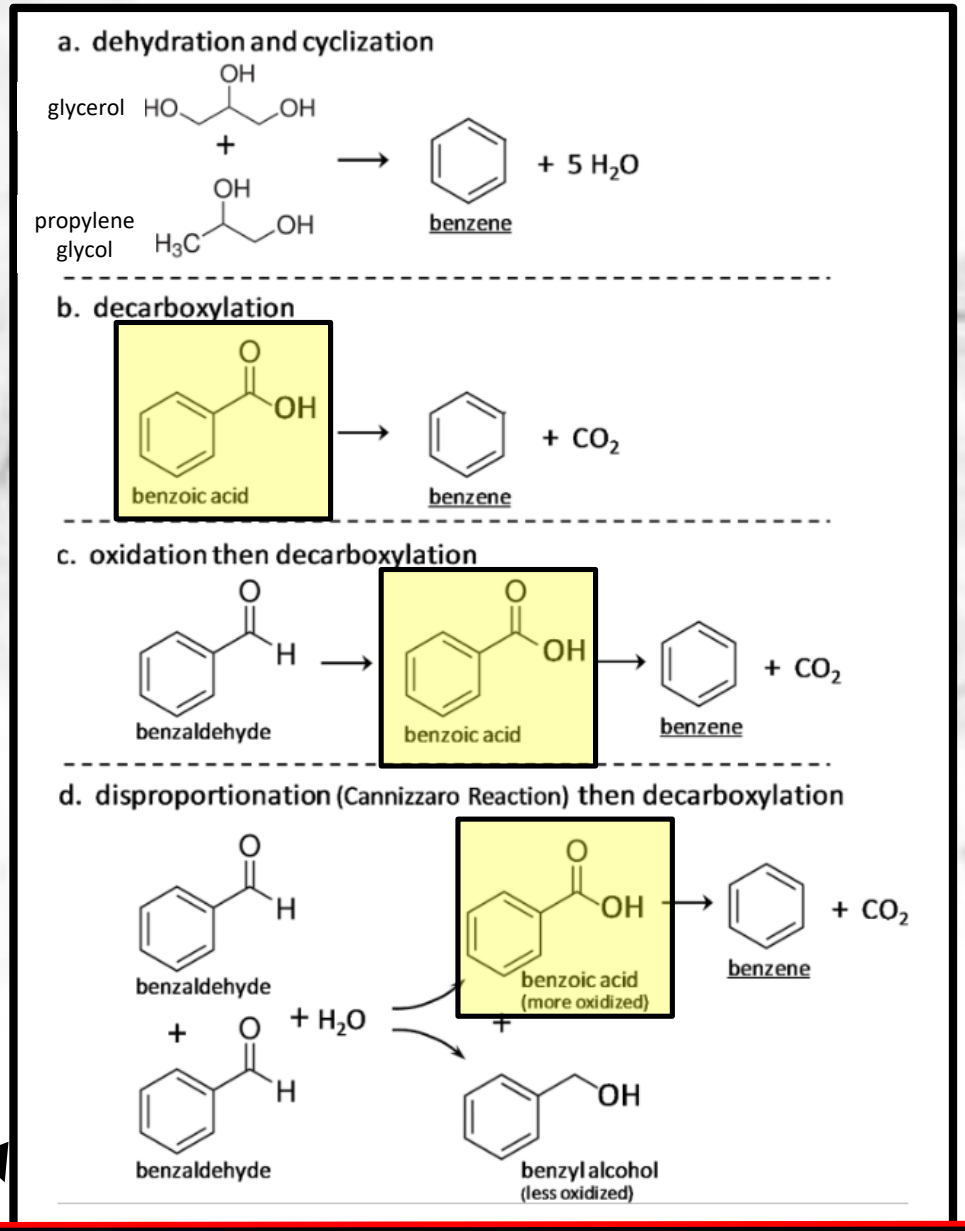

Beyond the List of Ingredients

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flavorings, o

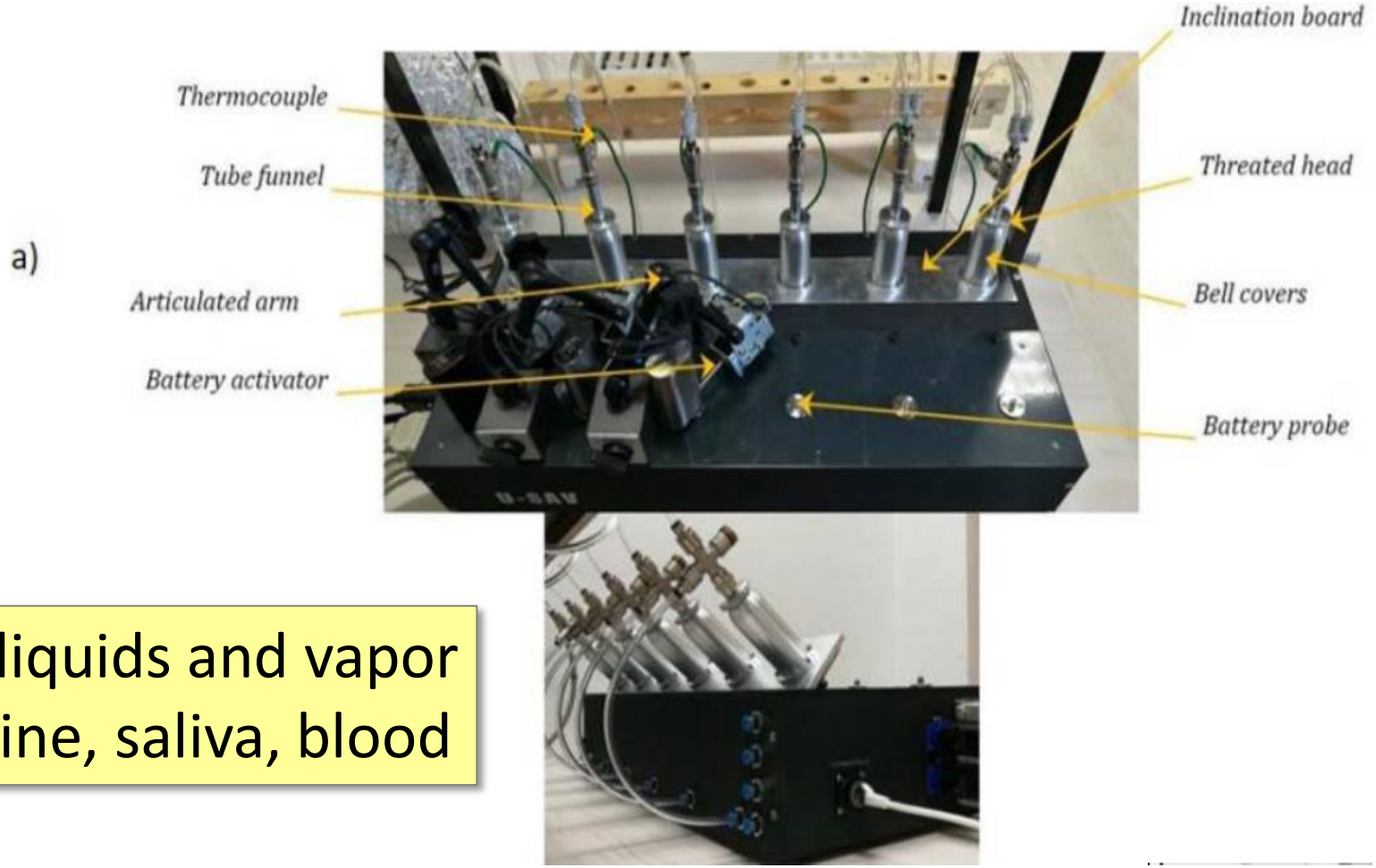
Alien Blood	Double Apple Hookah	Oatmeal Cookie
Bad Apple	Energy Drink	Orange Mint
Bluewater Punch	Grape Hookah	Peach Schnapps
Carmel Popcorn	Iced Berry	Pina Colada
Cherry Lava	Java Jolt	Pomegranate
CooCoo Coconut	Just Guava	Snap!
Cotton Candy	Kick!	Tutti Frutti
Cupcake	Menthol	Vanilla Bean

1-hexanol	cyclotene	limonene
2,3-pentanedione	decan-4-olide	linalool
2,5-dimethylpyrazine	decanaldehyde	linalyl acetate
alpha-terpineol	ethyl vanillin	Nicotine
anisyl acetate	Eucalyptol	n-pentanol
benzaldehyde	Eugenol	Pulegone
benzyl acetate	Furaldehyde	pyridine
Benzyl Alcohol	furaneol	raspberry ketone
Camphor	furfuryl alcohol	tetramethylpyrazine
Cinnamaldehyde	gamma-valerolactone	vanillin
citronellol	isoamyl acetate	

Lots of chemicals,
but how do they affect us?

What chemicals are in e-liquids and vapors?

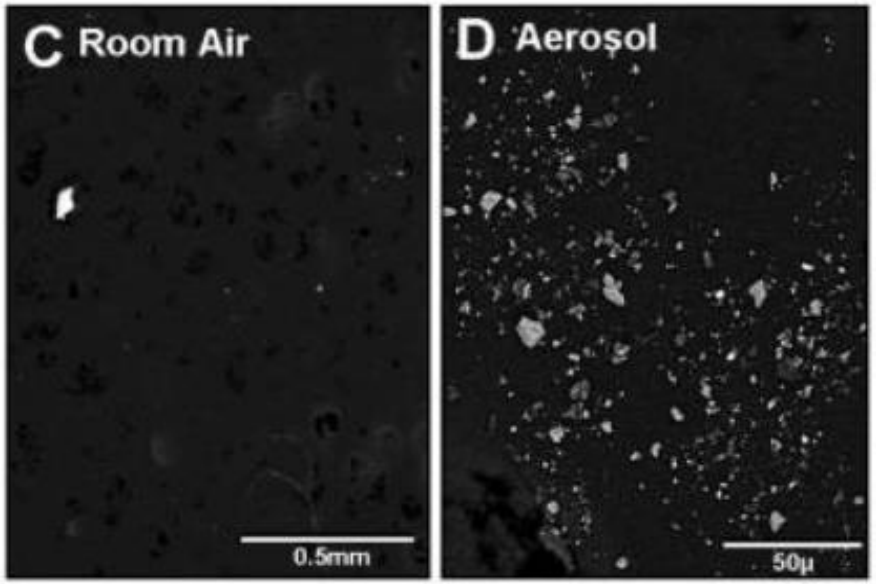
Universal System for Analysis of Vaping (U-SAV) machine



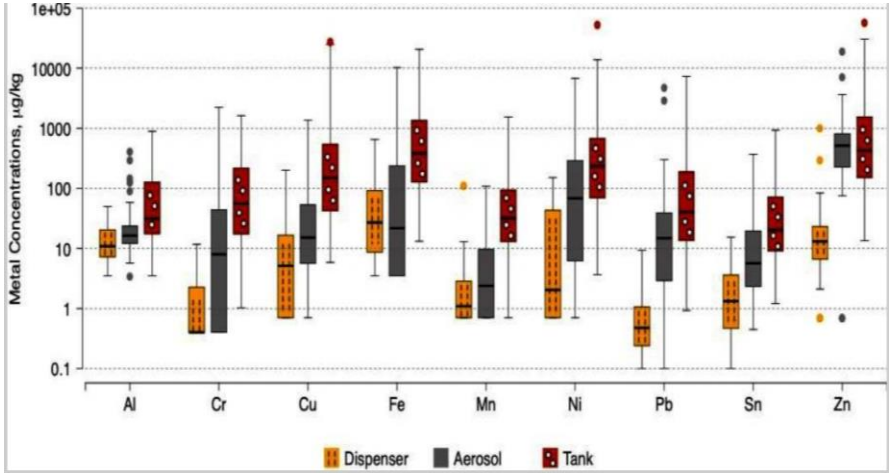
- e-liquids and vapor
- urine, saliva, blood

SOURCE: Int J Environ Res Public Health. 2017 Oct; 14(10): 1225.

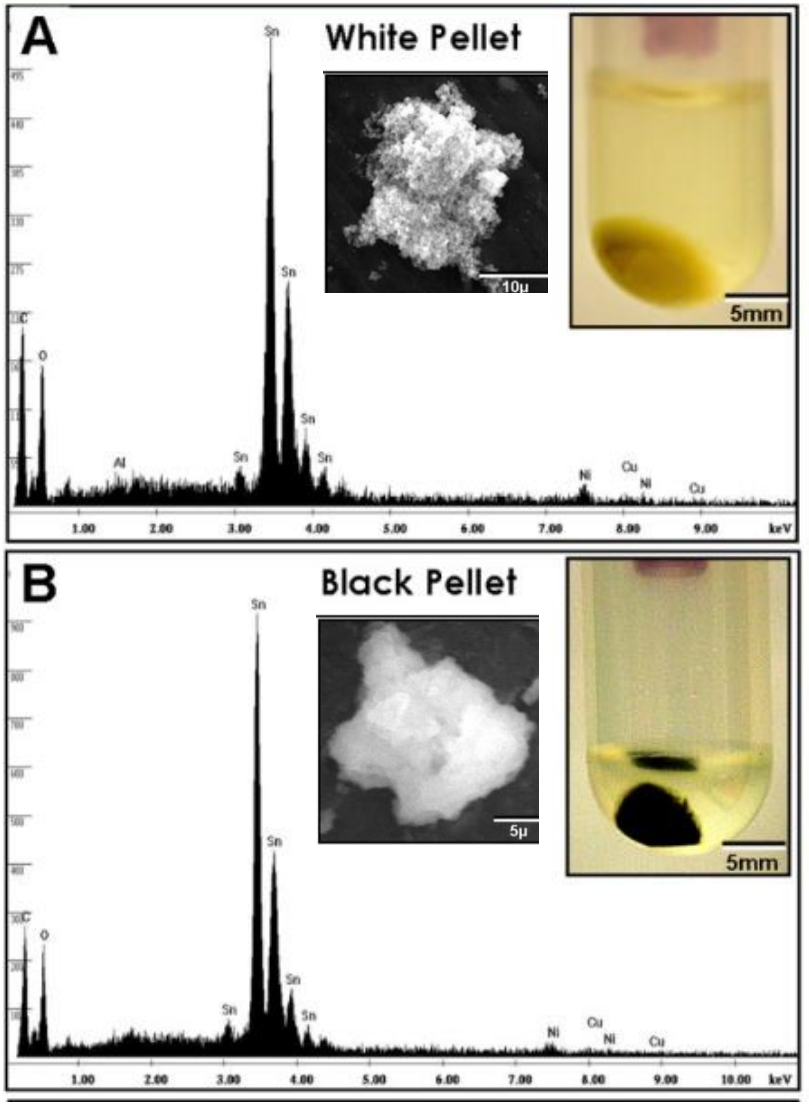
Vaping is NOT just inhaling flavored water vapor



Particles in room air vs. e-cigarette vapor



Metals in e-cigarette liquids and vapors



Particles filtered from e-cigarette vapor

Health Effects of Chemicals

PhD-level scientists read studies → Integrate data → ***ctdbase.org***

J Expo Sci Environ Epidemiol. 2017 Dec 29. doi: 10.1038/s41370-017-0005-x. [Epub ahead of print]

Assessment of indoor air quality at an electronic cigarette (Vaping) convention.

Chen R[1], Aherrera A[1], Isichei C[1], Olmedo P[1,2], Jarmul S[1], Cohen JE[3], Navas-Acien A[1,2], Rule AM[4].

Author information

J Chromatogr A. 2017 Sep 29;1517:156-164. doi: 10.1016/j.chroma.2017.08.057. Epub 2017 Aug 24.

Comprehensive determination of flavouring additives and nicotine in e-cigarette refill solutions. Part II: Gas-chromatography-mass spectrometry analysis.

Aszyk J[1], Woźniak MK[1], Kubica P[2], Kot-Wasik A[1], Namieśnik J[1], Wasik A[1].

Author information

Nicotine Tob Res. 2015 Oct;17(10):1270-8. doi: 10.1093/ntr/ntu279. Epub 2015 Jan 30.

Chemical Composition and Evaluation of Nicotine, Tobacco Alkaloids, pH, and Selected Flavors in E-Cigarette Cartridges and Refill Solutions.

Lisko JG[1], Tran H[2], Stanfill SB[2], Blount BC[2], Watson CH[2].

Author information

Abstract

INTRODUCTION: Electronic cigarette (e-cigarette) use is increasing dramatically in developed countries, but little is known about these rapidly evolving products. This study analyzed and evaluated the chemical composition including nicotine, tobacco alkaloids, pH, and flavors in 36 e-liquids brands from 4 manufacturers.

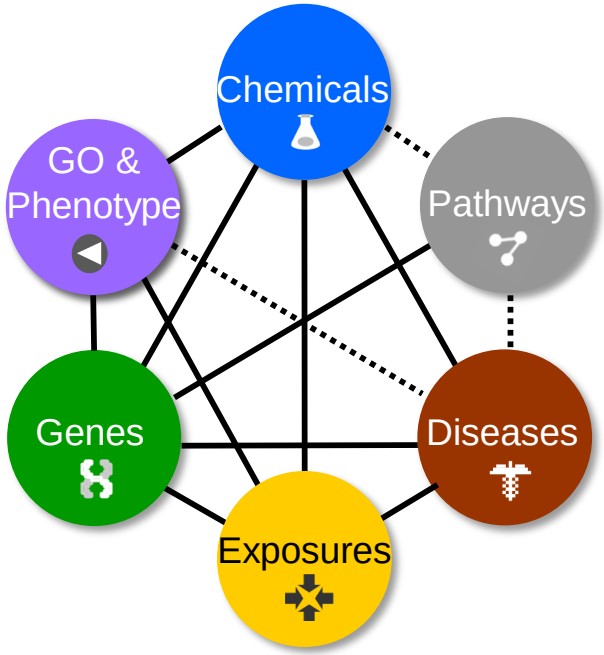
METHODS: We determined the concentrations of nicotine, alkaloids, and select flavors and measured pH in solutions used in e-cigarettes. E-cigarette products were chosen based upon favorable consumer approval ratings from online review websites. Quantitative analyses were performed using strict quality assurance/quality control validated methods previously established by our lab for the measurement of nicotine, alkaloids, pH, and flavors.

RESULTS: Three-quarters of the products contained lower measured nicotine levels than the stated label values (6%-42% by concentration). The pH for e-liquids ranged from 5.1-9.1. Minor tobacco alkaloids were found in all samples containing nicotine, and their relative concentrations varied widely among manufacturers. A number of common flavor compounds were analyzed in all e-liquids.

CONCLUSIONS: Free nicotine levels calculated from the measurement of pH correlated with total nicotine content. The direct correlation between the total nicotine concentration and pH suggests that the alkalinity of nicotine drives the pH of e-cigarette solutions. A higher percentage of nicotine exists in the more absorbable free form as total nicotine concentration increases. A number of products contained tobacco alkaloids at concentrations that exceed U.S. pharmacopeia limits for impurities in nicotine used in pharmaceutical and food products.

PMID: 25636907 PMCID: PMC4573955 DOI: 10.1093/ntr/ntu279

PubMed



Comparative Toxicogenomics Database (CTD)

ctd

- >41 million toxicogenomic relationships
- updated monthly

ctd *Illuminating how chemicals affect human health.*

Comparative Toxicogenomics Database

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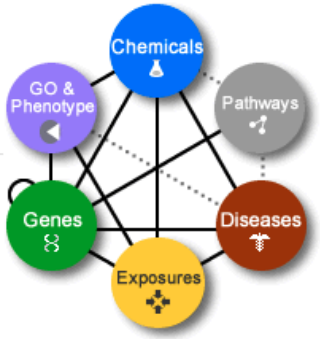

Discover.

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6. What cellular functions (GO terms) are affected by a chemical? (Example)

News

- *November, 2018*
  Phenotype–Disease Inferences (for example)!
  Phenotype–Disease In
- *November 12, 2018*
  New data available!
- *All changes...*

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  Mattingly CJ
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40,427,604 TOXICOGENOMIC RELATIONSHIPS!

Keyword Search

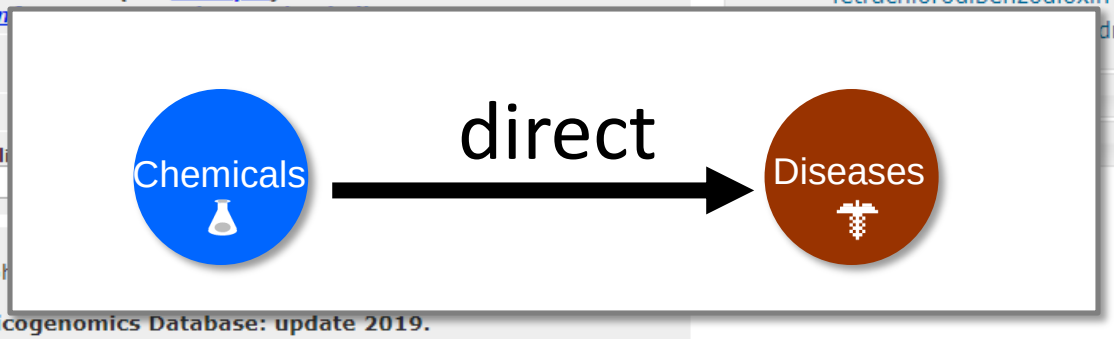
All

Name, ID, author...

Search ? *Advanced searches*

Updated Chemicals

(6-(4-(2-piperidin-1-ylethoxy)phenyl))-3-pyridin-4-ylpyrazolo(1,5-a)pyrimidine 4-(5-benzo(1,3)dioxol-5-yl-4-pyridin-2-yl-1H-imidazol-2-yl)benzamide Alitretinoin **Arsenic Trioxide** Atorvastatin bisphenol A Carvedilol **Decitabine** Docetaxel **Doxorubicin** Fulvestrant Hexachlorocyclohexane Irinotecan **Leflunomide** **Methamphetamine** Olanzapine Oxaliplatin **Panobinostat** **Resveratrol** **Rosiglitazone** Scopolamine Tetrachlorodibenzodioxin **Troglitazone** dronic Acid



Data updated November 8, 2018
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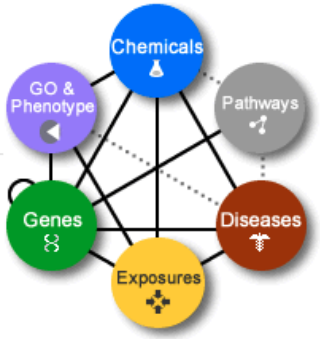

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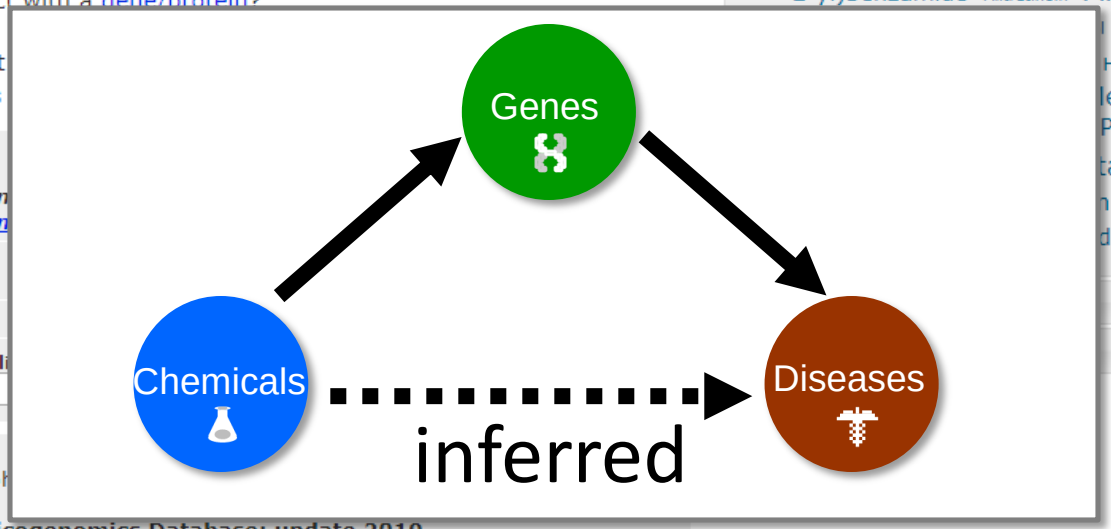
6. What cellular functions



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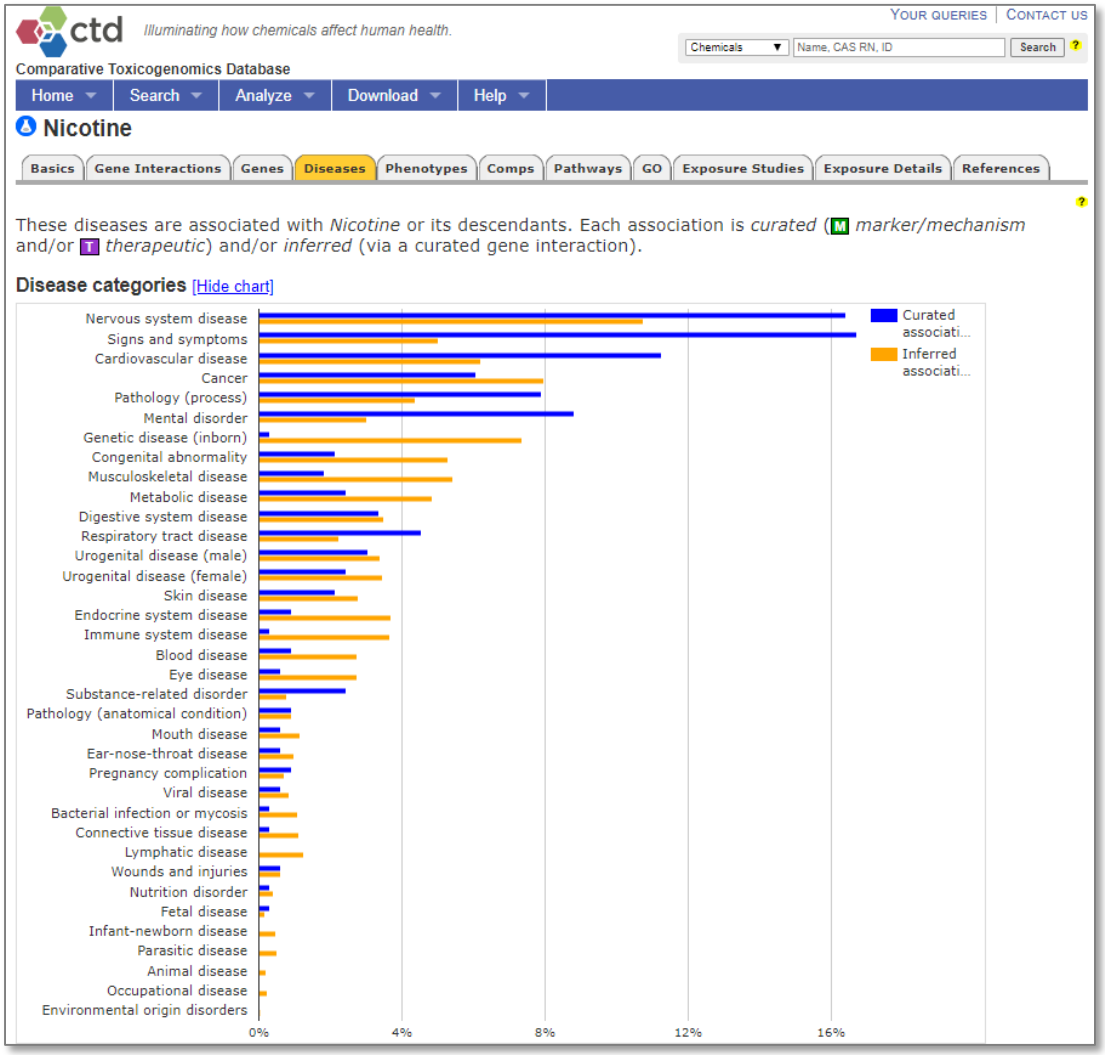
Nicotine Effects on Health

Nicotine-Disease Categories



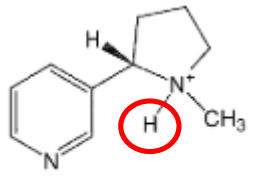
Nicotine-Diseases

- Cardiovascular Disease
- Respiratory Tract Diseases
- Reproductive Disorders
- Depression
- Lung Cancer
- Colon Cancer
- Type 2 Diabetes
- Pulmonary Fibrosis
- Pancreatic Cancer
- Heart Attack
- Nerve Degeneration
- Atherosclerosis
- Stroke
- Metastasis
- Acute Kidney Injury
- Hypertension
- Panic Disorder

221 direct/1773 inferred disease relationships

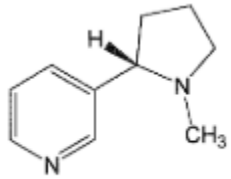
Nicotine (Protonated) vs Nicotine (Free base) vs Salts

Nic[H^+]



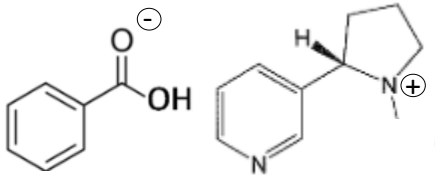
- acidic environment low pH
- protonated
- does not cross membranes rapidly
- less potent
- deposits in respiratory tract ~50% efficiency
- tobacco smoke
- ~ 12mg/cigarette
- absorb ~1mg/cigarette

Nic



- deprotonated/free base
- more volatile
- more potent
- harsher throat hit
- increased sensory effects
- rapidly deposits in mouth, respiratory tract
- e-cigarettes
- ~0-24 mg/ml

Nicotine Salts



- nicotine benzoate
- nicotine levulinate
- nicotine pyruvate
- smoother throat hit
- allows higher nicotine
- rapid absorption
- Juuls
- ~60 mg/ml

flavors can affect pH of e-liquids and consequently, nicotine form

Intro to CTD using Acrolein

ctd *Illuminating how chemicals affect human health.*

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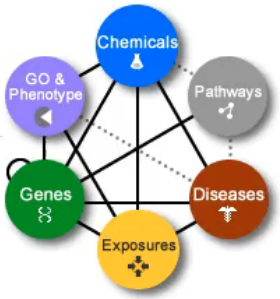

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Updated Chemicals

1-Methyl-3-isobutylxanthine 11-nor-delta(9)-tetrahydrocannabinol-9-carboxylic acid Aflatoxin B1 aflatoxin B2 Atrazine Benzo(a)pyrene benzo(e)pyrene bisphenol A Cannabinoids Citrinin Dexamethasone Doxorubicin Dronabinol Hydrogen Peroxide Methapyrilene Niclosamide ochratoxin A oxybenzone Paraquat Pentachlorophenol tebuconazole Tetrachlorodibenzodioxin Tobacco Smoke Pollution Triclosan Zearalenone

Updated Diseases

Updated Genes

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Data updated February 7, 2019
Revision 15707

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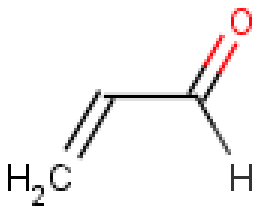
video link: youtube.com/watch?v=KL_MpE8g0Uc&t=5s

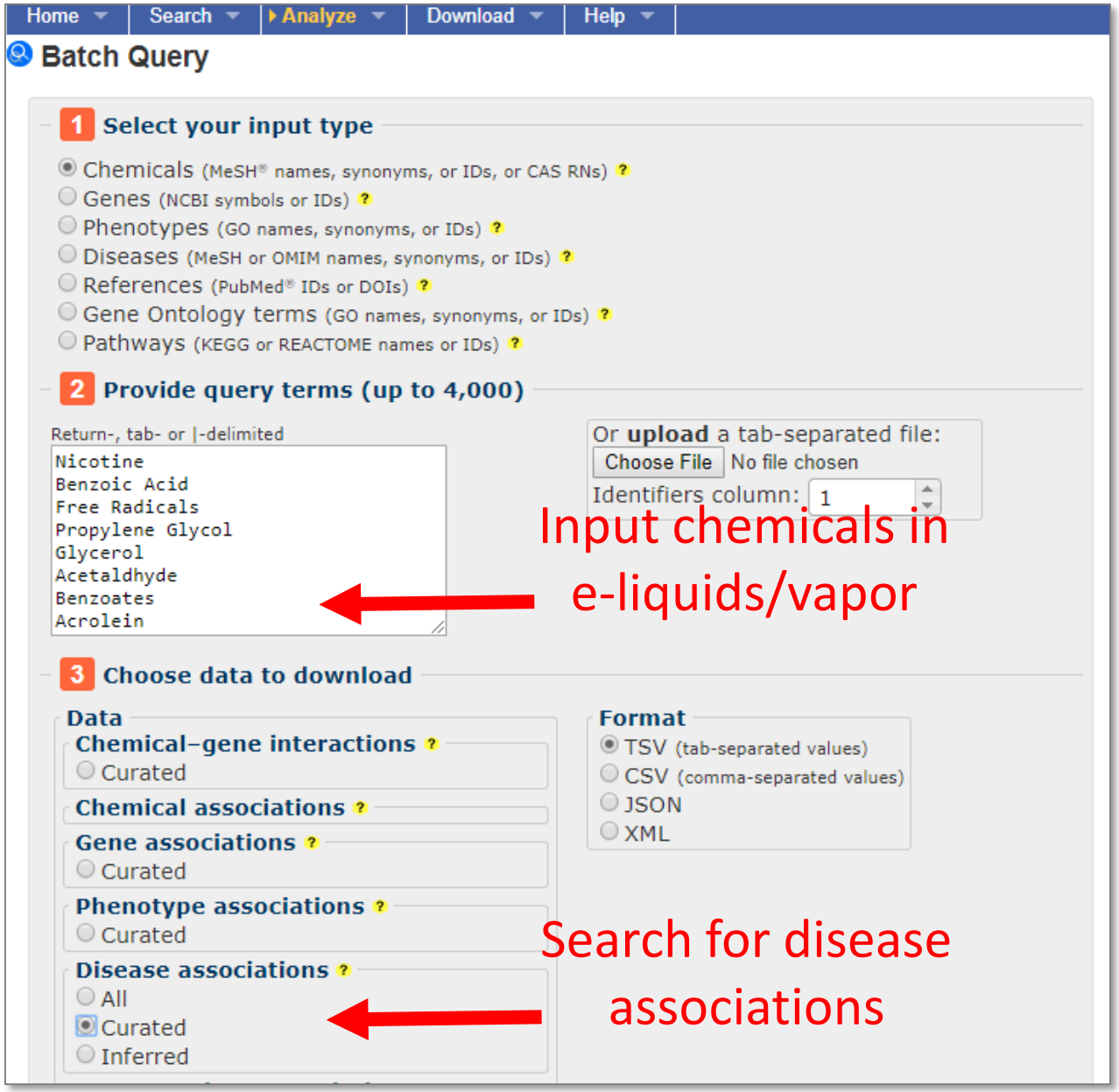
Effects of Acrolein in e-cigarette vapor



Acrolein

- interacts with 522 unique genes
- involved in 1,341 gene interactions
- involved in 434 molecular pathways
- associated with 170 phenotypes
- directly related to 87 diseases
- inferred relationship to 3,471 diseases

Chemical-Disease Associations in CTD



Chemicals in Juul pods and vapor

Nicotine	Propylene Glycol	Acetaldeh
Benzoic Acid	Glycerol	
Free Radicals		

2,064 direct disease associations
204,226 inferred disease associations

Top Disease Categories

Lots of disease associations, but what do they look like?

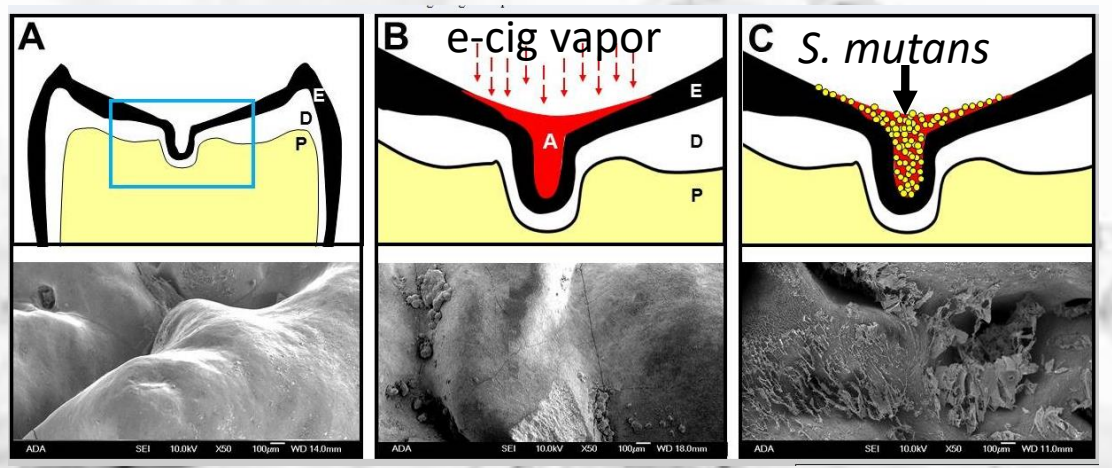
- Respiratory Tract
- Mental Disorders

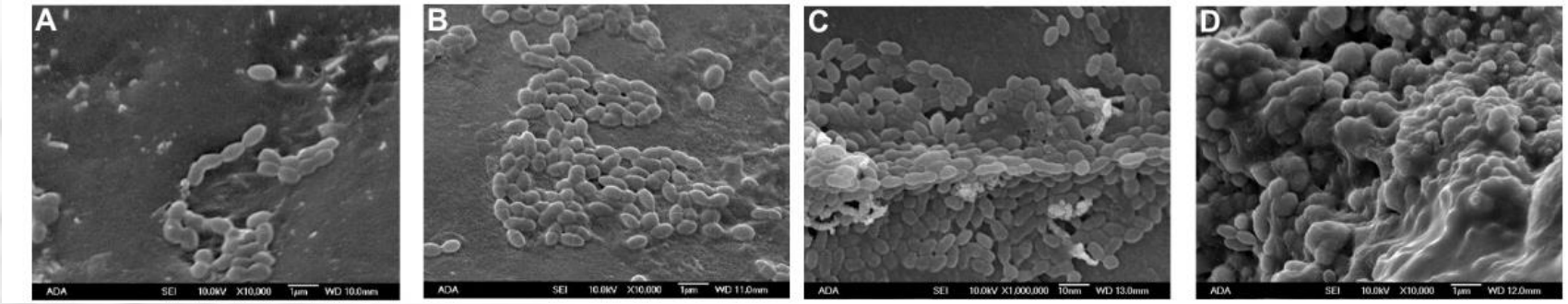
Vaping Tongue

Tongues of some people that vape begin to look like this

Lester J. Hartman, MD, MPH, Patrick McKenna

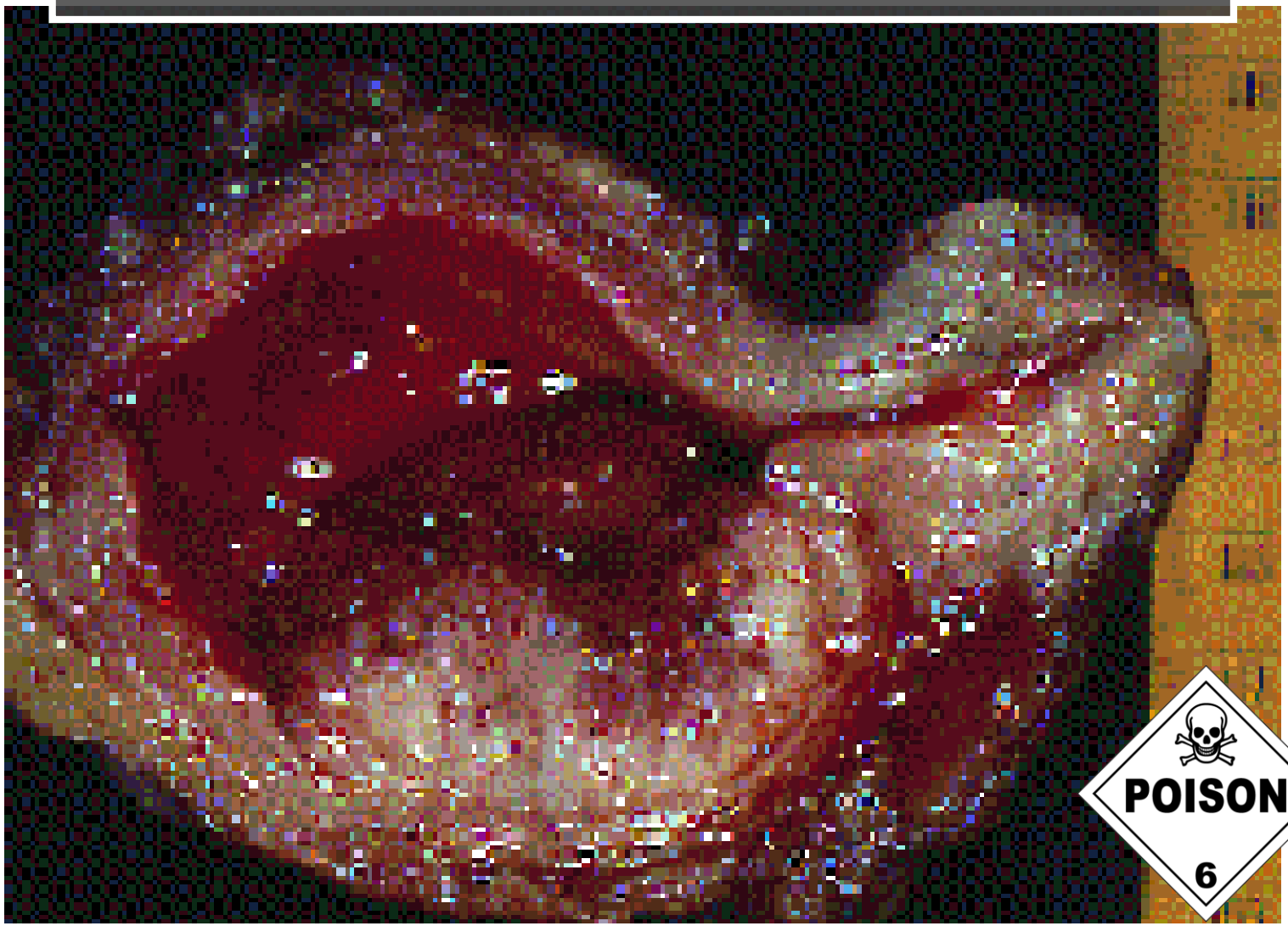
Vaping Effects on Teeth





SOURCE: Kim et al. PLoS One 2018 Sept 7

Nicotine / Bladder Cancer



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Lung Cancer

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Popcorn Lung

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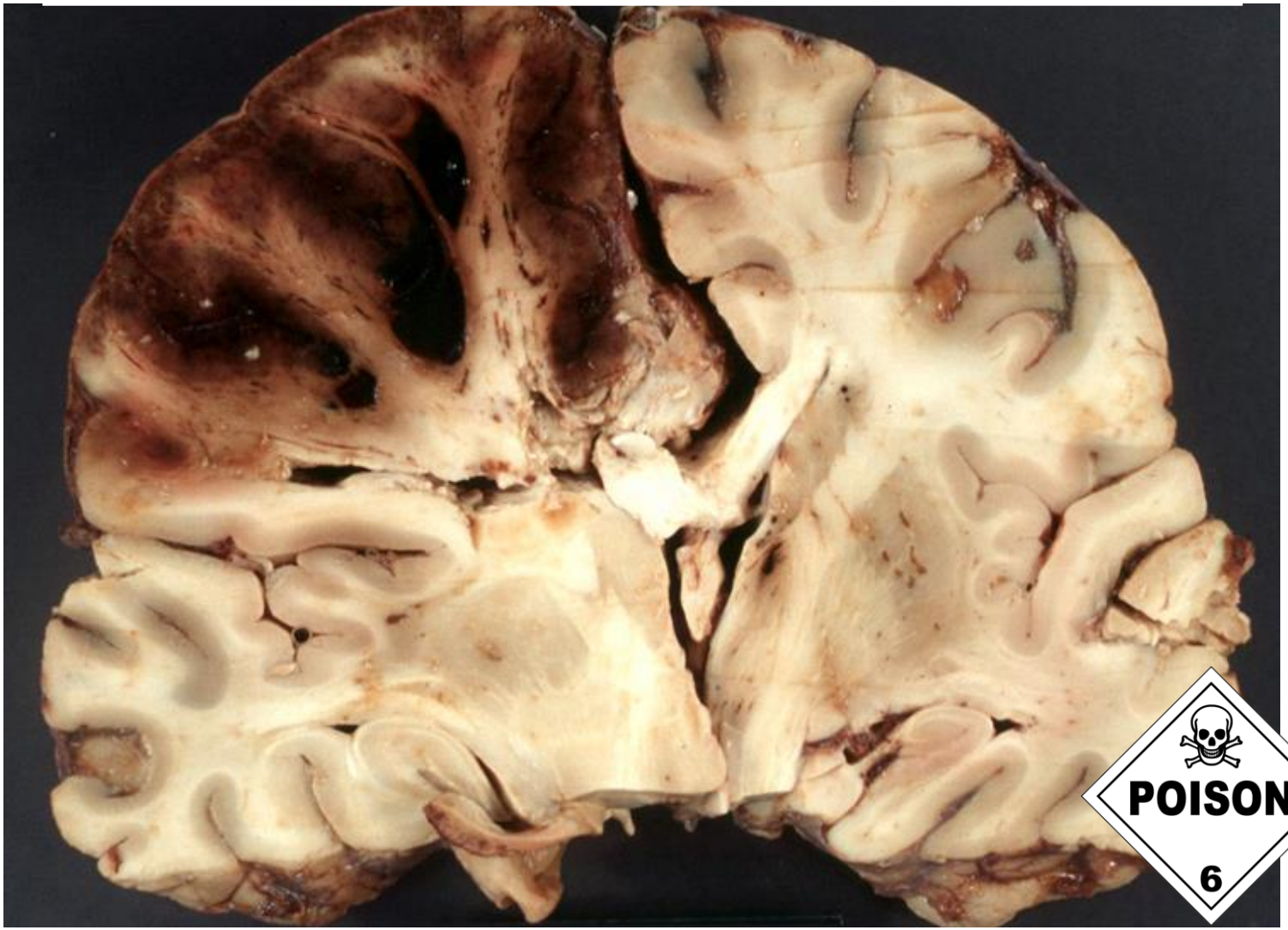
Brain Stroke



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www.wmpeds.com

Westwood-Mansfield Pediatric Associates

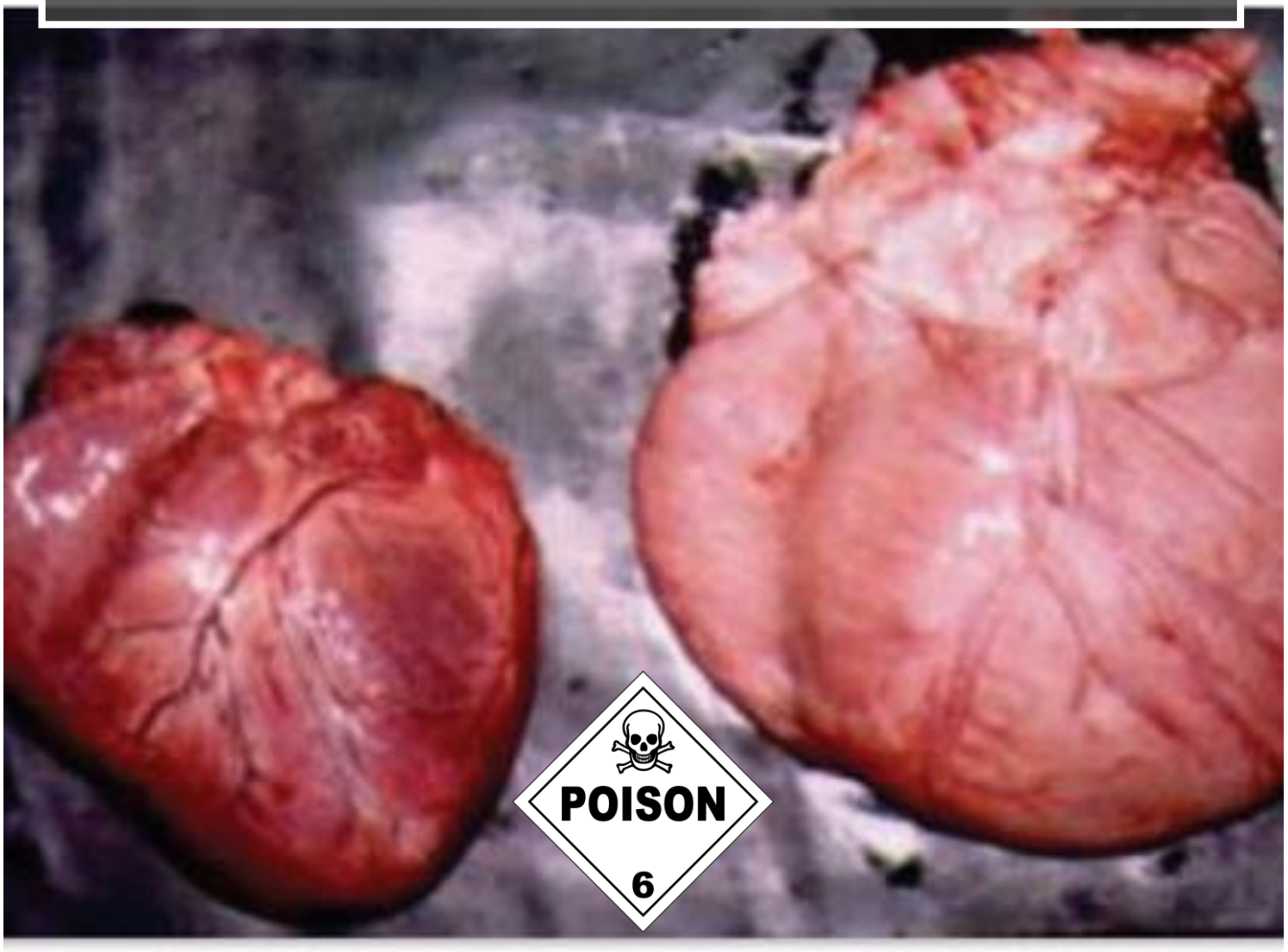
Westwood Office
541 High Street
Westwood, MA 02090
(781) 326-7700

Mansfield Office
454 Chauncy Street
Mansfield, MA 02048
(508) 339-9944

Easton Office
115 Main Street
Easton, MA 02356
(508) 535-5535

Boston Children's Hospital
Until every child is well™

Congestive Heart Failure



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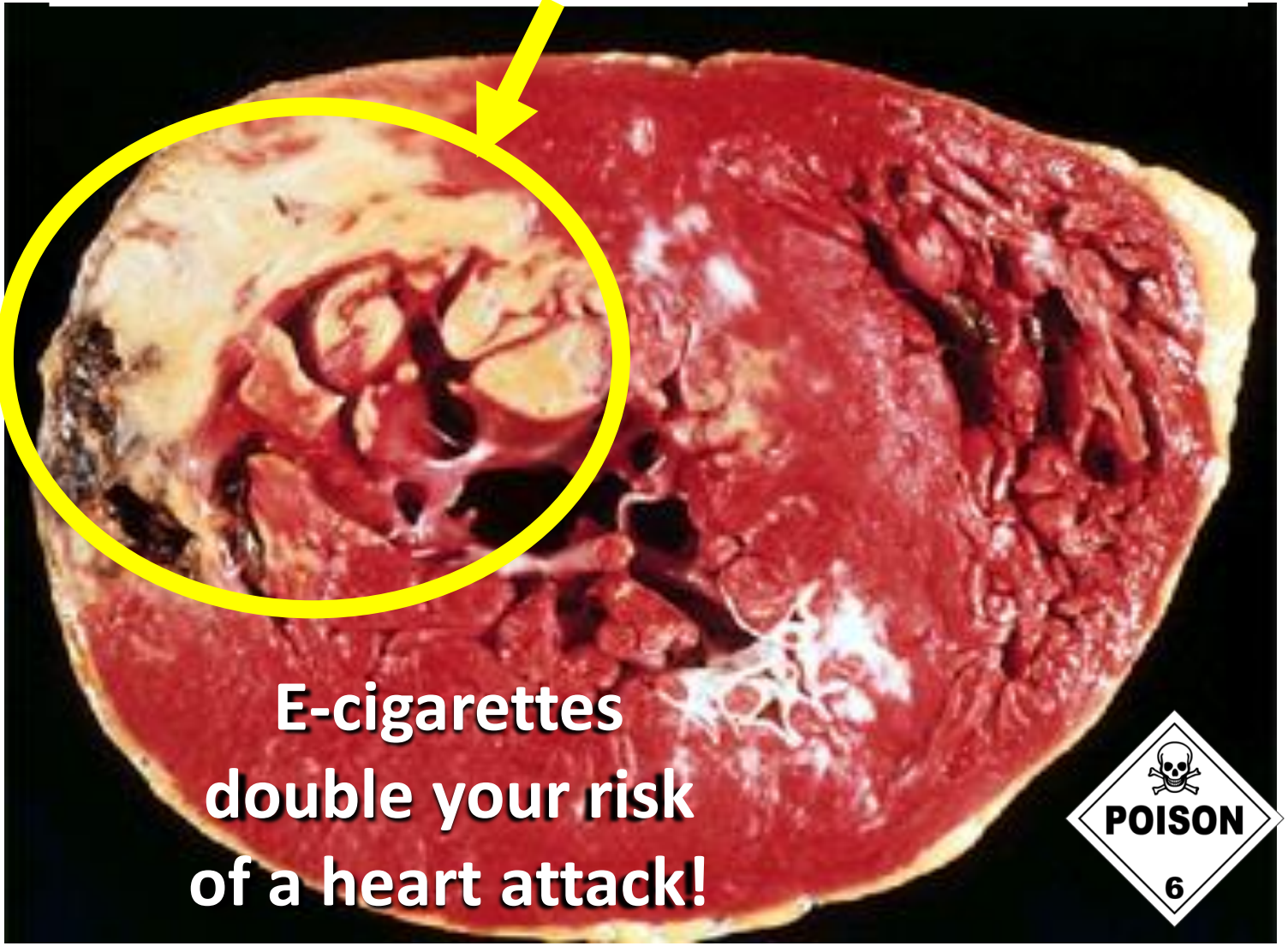
Heart Attack



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More Immediate Effects?

Nicotine is HIGHLY addictive

Increases likelihood of smoking cigarettes

More Immediate Effects?

Effects on Cardiovascular Fitness:

Acrolein, nicotine and other vaping chemicals may contribute to a hardening of the arteries and limit cardiovascular fitness

More Immediate Effects?

Effects on Mental Health:

Adolescent e-cigarettes users show increased Depression, Panic Disorder and inability to experience pleasure vs. non-users

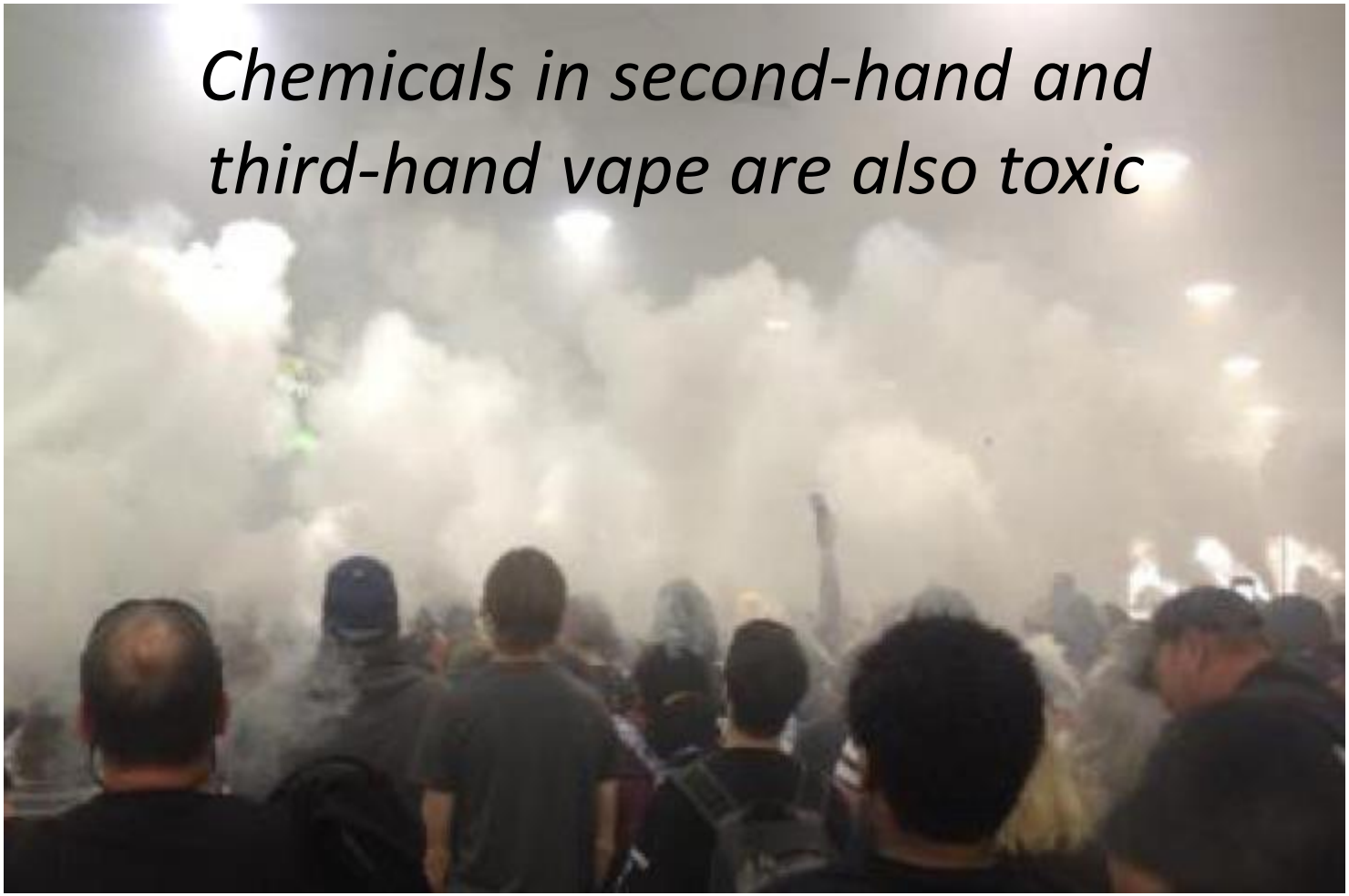
Vaping associated with illicit drug use, mental health problems and impulsivity in university students

More Immediate Effects?

Effects on Sexual Health:

Nicotine can *significantly* decrease physiological sexual arousal in healthy nonsmoking men and women (18-22 years)

J Sex Med. 2008 Jan;5(1):110-21
J Sex Med. 2008 May; 5(5):1184-1197



SOURCE: Chen et al., J Expo Sci Environ Epidemiol. 2017 Dec 29

Vaping Affects Users Differently

- type of device
- e-liquid
- vaping patterns
- coil resistance, age, composition
- user age, weight, metabolism, health, genetics
- environmental factors

Combustible cigarettes vs. E-cigarettes

- Both are addictive
- Both expose users to toxic chemicals (smoke and e-vapor)
- Vaping increases risk of smoking tobacco cigarettes
- Exposure to toxic substances from combustible tobacco cigarettes may be greater than from e-cigarettes
- Exposure to metals (*e.g.*, lead, nickel, chromium) may be greater in e-cigarette vapor than tobacco cigarettes
- Both increase risks of adverse health outcomes

Take Home Points

- **E-liquids AND vapor contain toxic chemicals**
- **Vaping chemicals can cause DNA damage**
- **Vaping impacts genes, pathways, immune system**
- **Vaping negatively impacts physical and mental health**
- Vaping increases risk of thousands of diseases

Contact Information

Cynthia Grondin, *PhD*
Senior Biocurator

North Carolina State University
Email: cjgrondin@ncsu.edu

website: *ctdbase.org*

Adolescents are especially harmed by nicotine

- Nicotine affects a young person's developing brain. Brain development continues through the mid-20s.
- Effects of youth nicotine exposure include:
  - lower impulse control
  - depression or mood disorders
  - disruption of brain circuits that control learning
  - can prime young brains for future drug addiction

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E-cigarettes can cause unintended injuries

- Defective e-cigarette batteries have caused fires and explosions
- Nicotine poisoning
  - Acute nicotine exposure can be toxic
  - Children and adults have been poisoned by swallowing, breathing, or absorbing e-cigarette liquid through their skin or eyes.

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Can e-cigarettes be used to vape other substances?

- Yes!
- Open systems require the user to add the e-juice, which can be a substance other than nicotine (including marijuana and other illicit drugs).
- Closed systems (those that use pre-filled pods) can also be altered to vape substances other than nicotine.

How do we know if our students/youth are vaping?

- **Unexplained Sweet Scent –** might be a flavored e-juice for a vaping device

- **Unfamiliar Products –** If you come across unusual pens or USB drives or an unfamiliar battery or battery charging device, they could be associated with vaping

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Industry tactics

The tobacco and vaping industries target young people by making their products:

- Sweet
- Cheap
- Easy to Get

GET OUTRAGED!

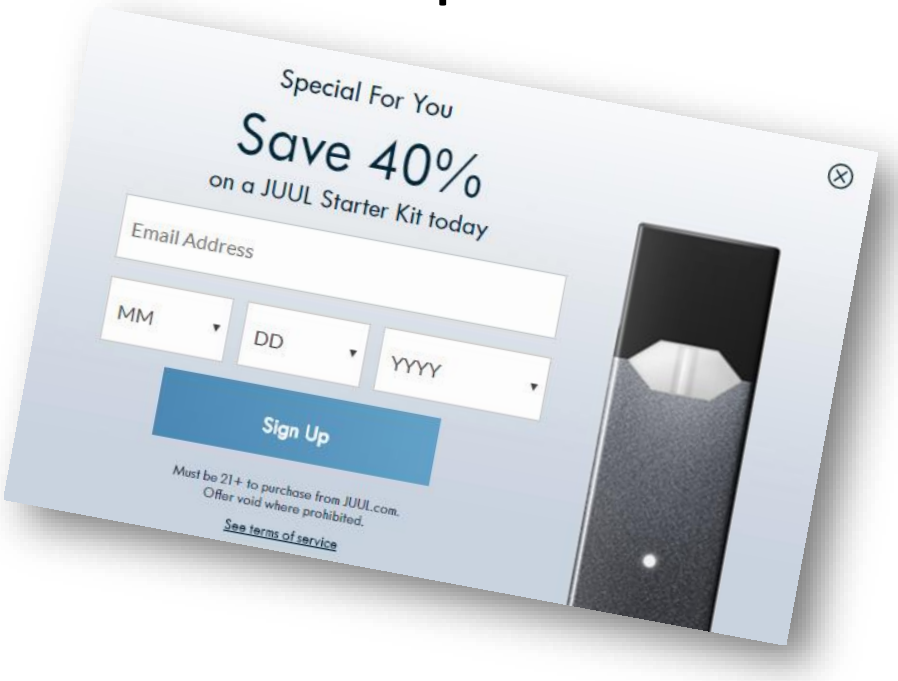
Sweet

GET OUTRAGED!

Cheap

- Products are often inexpensive—special offers and coupon codes make them cheap

- Low prices create impulse buys



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Easy to get

- Vaping products are everywhere—corner stores, gas stations, vape shops, online
- Availability sends the message that these products are normal and fine
- The more youth see them, the more likely they are to buy and use

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Where are kids getting e-cigarettes?

- Directly from a retailer
- Friends & social sources
- Online stores
  - Accept Visa gift cards

Vaping devices are “fairly easy” or “very easy” to get (Monitoring the Future 2018):

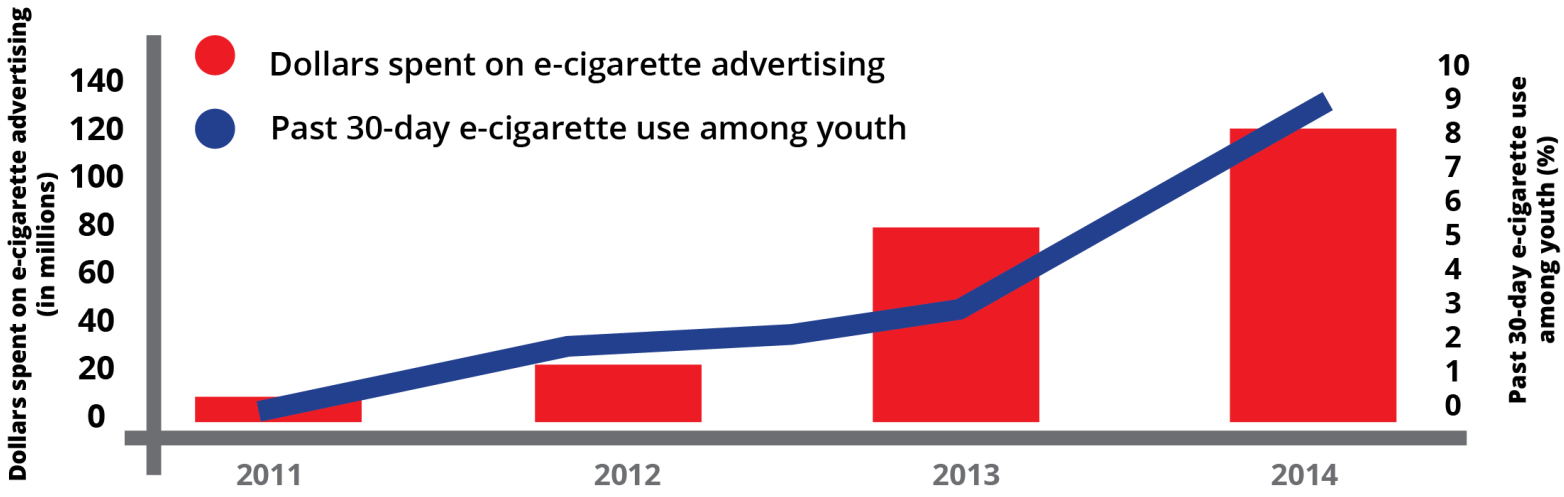
- 8th graders: 45.7%
- 10th graders: 66.6%
- 12th graders: 80.5%

http://www.monitoringthefuture.org/data/18data/18drtbl17.pdf

GET OUTRAGED!

Tobacco & Vaping Industries Tactics

E-cigarette use among youth is rising as e-cigarette advertising grows



Source: National Youth Tobacco Survey, 2011-2014; Kim et al (2014), Truth Initiative (2015)

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https://www.tobaccofreekids.org/assets/factsheets/0394.pdf

JUUL billboard in Times Square, New York City, 2015. https://www.spencer-pederson.com/work1/2017/2/23/juul-go-to-market

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WHAT YOU CAN DO

How can you make a difference?

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Educate Yourself

The New Look of Nicotine Addiction (Massachusetts Tobacco Cessation & Prevention Program)

- www.GetOutraged.org

Surgeon General: E-Cigarettes & Young People

- www.e-cigarettes.surgeongeneral.gov/

Centers for Disease Control: Electronic Cigarettes

- https://www.cdc.gov/tobacco/basic_information/e-cigarettes/index.htm

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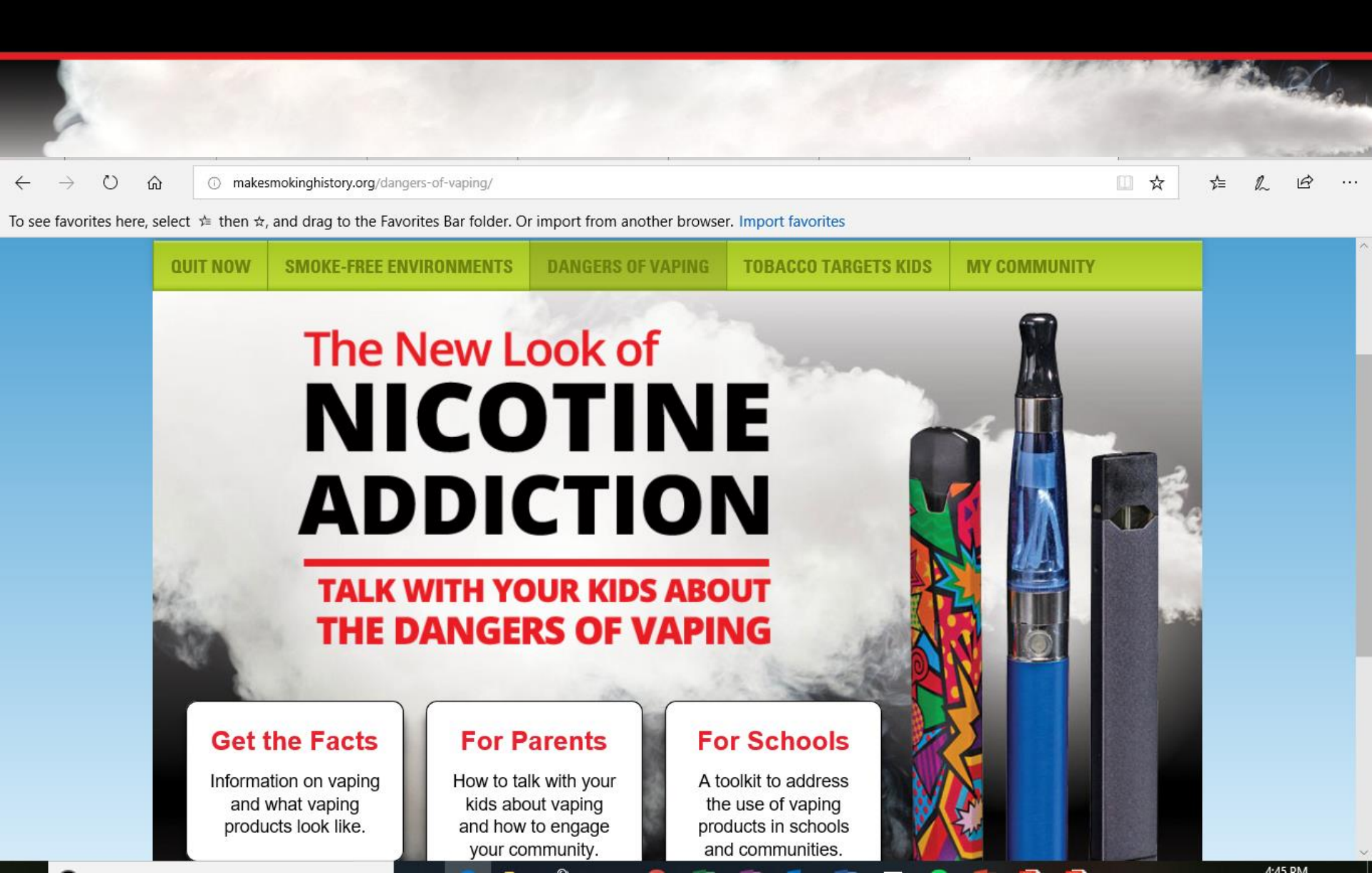

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Talk with kids as a trusted adult

- Provide them with facts about vaping
  - E-cigarettes contain nicotine
- Dispel the myths
  - It is not harmless water vapor
- Tell them the tobacco and vaping industries are targeting them to make money and hook them on their products
- Ask them what they see and what they think

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Best-Practice Curriculums

- E-Cigarette Prevention: CATCH My Breath – CATCH (Coordinated Approach to Child Health)
- The Tobacco Prevention Toolkit – Stanford University School of Medicine
- ASPIRE – MD Anderson Center.
- smokeSCREEN: A Smoking Prevention Videogame – play2PREVENT
- Get Smart about Tobacco: Health and Science Education Program – Scholastic
- The Real Cost of Vaping: Understanding the Dangers of Teen E-cigarette Use – Collaboration between the U.S. Food and Drug Administration and Scholastic.
- Resources on substance use disorder prevention (not specific to tobacco/nicotine).
  - For middle schools only: Project Here

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CATCH My Breath

- Health Resources in Action (HRiA), in partnership with CVS Health, is available to support your school in educating youth on vaping and implementing a **FREE** vaping curriculum

- Staff from HRiA is available to present the first lesson to youth and support schools as they implement the other three lessons.

- To schedule a presentation or for more information, please contact Danielle Adams at dadams@hria.org.

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The 84

- **The 84 is a statewide movement of youth fighting tobacco in MA.**
  - Formed through local organizations or high schools.
  - Youth educate peers and community members about the influence of the tobacco and vaping industries.
  - Participate in Kick Butts Day, an annual event at the MA State House.

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MA Smokers Helpline

1-800-QUIT-NOW

- Tobacco & e-cigarette users can call for FREE phone counseling
- Will be coached, make a quit plan, and receive materials
- If callers meet certain medical eligibility requirements, four weeks of NRT is provided FREE of charge
- Friends and family, providers, educators, professionals, etc. can call

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Quit E-Cigarette Resources for Youth

- Truth Initiative
  - **Text "QUIT" to (202) 804-9884**
  - Users can also enroll in This is Quitting or BecomeAnEX®, free digital quit programs from Truth Initiative that integrate the text program.
    - http://www.thisisquitting.com/
    - https://www.becomeanex.org/
- Smokefreeteen
    - https://teen.smokefree.gov/

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What you can do - know state laws

- State law effective December 31, 2018
  - Raises the minimum legal sales age for tobacco (including e-cigarettes) to 21
  - Includes e-cigarettes in the definition of tobacco
  - Expands the Smoke-Free Workplace Law to include e-cigarettes
  - Bans the sale of tobacco (including e-cigarettes) in pharmacies, hospitals, or other entities that offer health care services or employ licensed health care providers

- The “Education Reform Act”

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Massachusetts Clearinghouse

- Order or download free materials for events
  - Frequently asked questions
  - Tips for talking with kids
  - Fact sheet
  - Poster
  - No smoking/vaping sticker

https://massclearinghouse.ehs.state.ma.us/

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Contact Information

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Director

Northeast Tobacco-Free Community Partnership

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Phone: 978-722-2864

Website: www.GetOutraged.org

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