

# Professor Rounds

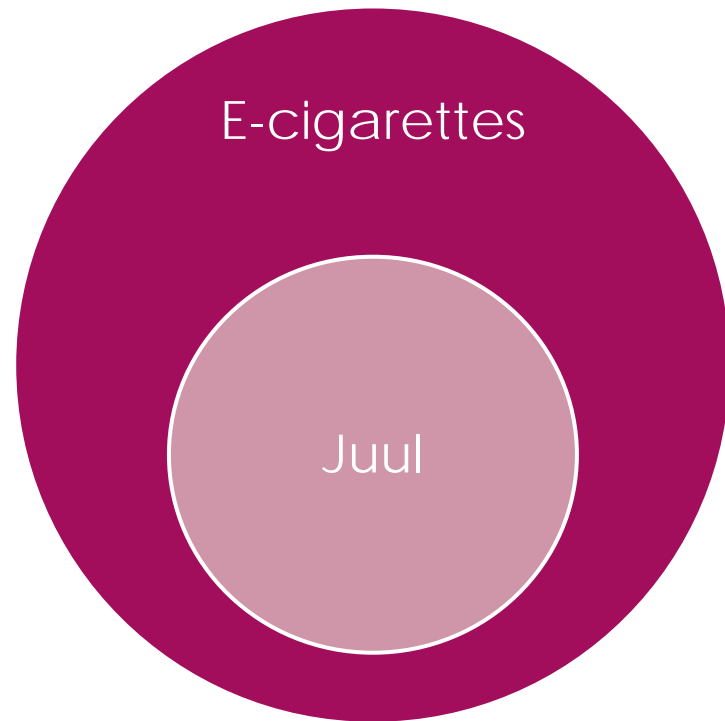
WHITEY SEVEY, MD

PGY-1

# What is this?



# What is a Juul?

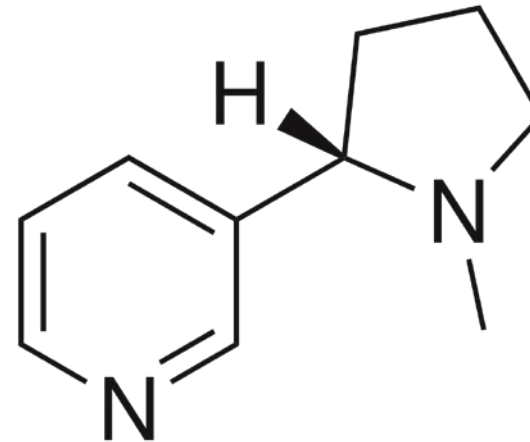


- ▶ Juul labs produces:
  - ▶ Juul device (w/charger)
  - ▶ Disposable Juul pods



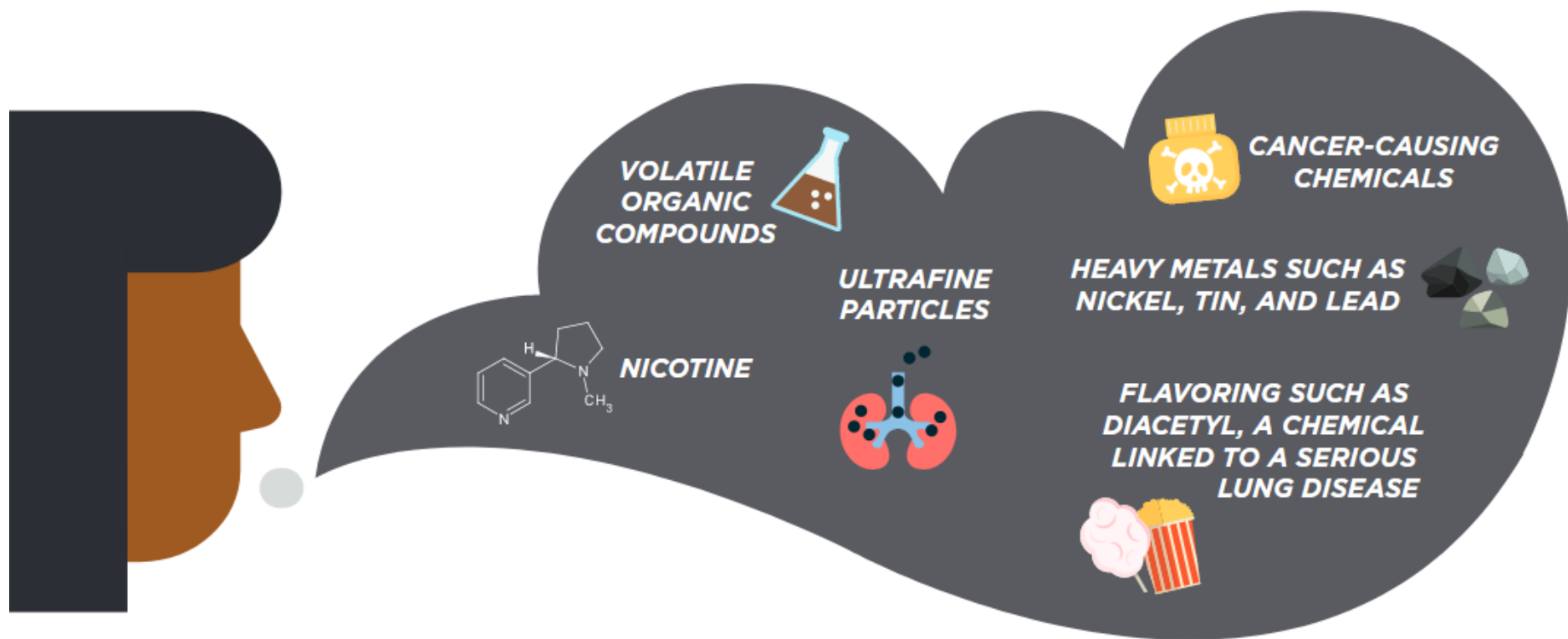
# How do e-cigarettes work?

- ▶ Produce an aerosol by heating a liquid
- ▶ Liquid usually contains:
  - ▶ Nicotine
  - ▶ Flavoring
  - ▶ Other chemicals to help with the aerosolization process



## WHAT IS IN E-CIGARETTE AEROSOL?

THE E-CIGARETTE AEROSOL THAT USERS BREATHE FROM THE DEVICE AND EXHALE CAN CONTAIN HARMFUL AND POTENTIALLY HARMFUL SUBSTANCES:



It is difficult for consumers to know what e-cigarette products contain. For example, some e-cigarettes marketed as containing zero percent nicotine have been found to contain nicotine.



### CADMIUM

Active component in battery acid



### METHANOL

A main component in rocket fuel



### FORMALDEHYDE

Embalming fluid



### AMMONIA

A common household cleaner



### ARSENIC

Used in rat poison



### CARBON MONOXIDE

Released in car exhaust fumes



### HEXAMINE

Found in barbecue lighter fluid



### NICOTINE

Used as insecticide

Hexamine  
Barbecue  
Lighter

BUTANE  
Lighter Fluid

Tolunene  
Industrial  
Solvent

Acetic Acid  
Vinegar

Methanol  
Rocket Fuel

Benzoic Acid  
Candle Wax

Benzene  
Petrol Fumes

Arsenic  
Poison

Carbon  
Monoxide

Cadmium  
Batteries

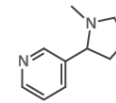
Acetone  
Paint stripper  
Nail varnish

## COMPOUNDS IN CIGARETTE SMOKE

### SUMMARY OF A SELECTION OF HAZARDOUS COMPOUNDS IN CIGARETTE SMOKE & THEIR EFFECTS

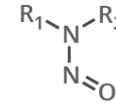
The compounds shown below are all found in cigarette smoke. The mass figures, given in  $\mu\text{g}$ , take into account both mainstream (inhaled) and sidestream smoke. 1  $\mu\text{g}$  is equal to 1 millionth of a gram. Amounts of these compounds vary in different brands of cigarettes - these figures are approximate.

#### NICOTINE



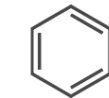
- Approx. 919 $\mu\text{g}$  per cigarette
- Addictive
- Increases heart rate
- Increases blood pressure
- Increases blood glucose
- Lethal dose: around 500-1000mg

#### N-NITROSAMINES



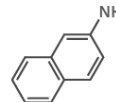
- Large class of compounds
- Several are tobacco-specific
- **Known human carcinogens**
- Most carcinogenic: NNK & NNN
- NNK: approx. 0.3 $\mu\text{g}$  per cigarette
- NNN: approx. 2-50 $\mu\text{g}$  per cigarette
- May cause reproductive damage

#### BENZENE



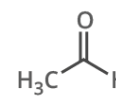
- Approx. 46-272 $\mu\text{g}$  per cigarette
- **Known human carcinogen**
- Damages bone marrow
- Lowers red blood cell count
- May harm reproductive organs

#### AROMATIC AMINES



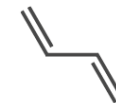
- Large class of compounds
- Includes 2-aminonaphthalene:
- **Known human carcinogen**
- Linked with bladder cancer
- Approx. 0.04 $\mu\text{g}$  per cigarette

#### ACETALDEHYDE



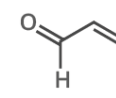
- Approx. 680-1571 $\mu\text{g}$  per cigarette
- **Known animal carcinogen**
- **Probable human carcinogen**
- Irritant to skin & eyes
- Irritant to respiratory tract

#### 1,3-BUTADIENE



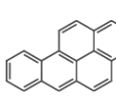
- Approx. 36-191 $\mu\text{g}$  per cigarette
- **Known human carcinogen**
- **Suspected human teratogen**
- Irritant to eyes & skin
- Irritant to upper respiratory tract

#### ACROLEIN



- Approx. 69-306 $\mu\text{g}$  per cigarette
- **Possible human carcinogen**
- **Known DNA mutagen**
- Irritant to skin & nasal passages
- May contribute to heart disease

#### POLYAROMATICS



- Large class of compounds
- Includes benzo[a]pyrene:
- **Known human carcinogen**
- **Known DNA mutagen**
- Affects reproductive capacity
- Up to 0.14 $\mu\text{g}$  per cigarette

## What's in a cigarette?

Ammonia  
(cleaning fluid)



Formaldehyde  
(preserves dead bodies)



Shellac  
(varnish)



Hydrogen cyanide  
(industrial pollutant)



cigarette  
smoke

Nicotine  
Carbon monoxide

Tar

### NUMBER OF CHEMICALS IN CIGARETTE SMOKE

7,357

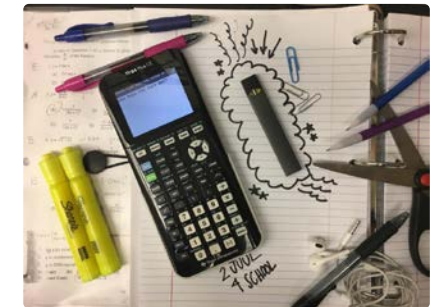
70

### NUMBER OF THESE COMPOUNDS WITH CONFIRMED CARCINOGENIC ACTIVITY



# What makes Juuling different?

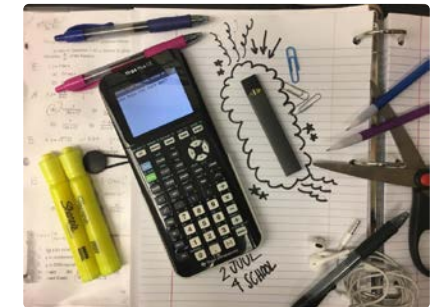
- ▶ The Juul pods contain:
  - ▶ 0.7mL "e-liquid" with 5% nicotine by weight



# What makes Juuling different?

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  - ▶ 0.7mL "e-liquid" with 5%

**nicotine**  
by weight





# It's the Nicotine.

## Amount of Nicotine

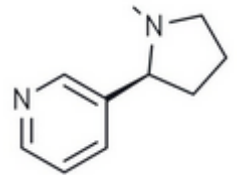
- ▶ Typical e-cigarettes contain between 6-30mg nicotine per 1mL of e-liquid
- ▶ 1 juul pod contains 59mg



## Type of Nicotine

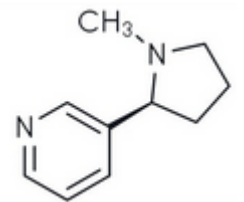
Most e-cigarettes

Freebase nicotine



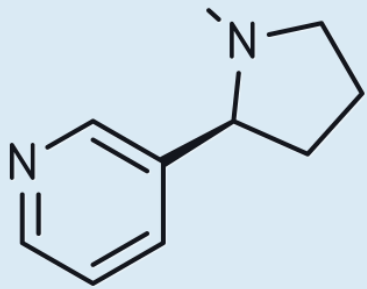
Juul

Nicotine salts



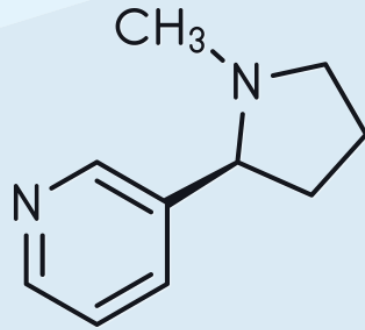
# Freebase Nicotine Vs. Nicotine Salt

## WHAT'S THE DIFFERENCE BETWEEN FREEBASE NICOTINE AND NICOTINE SALT?

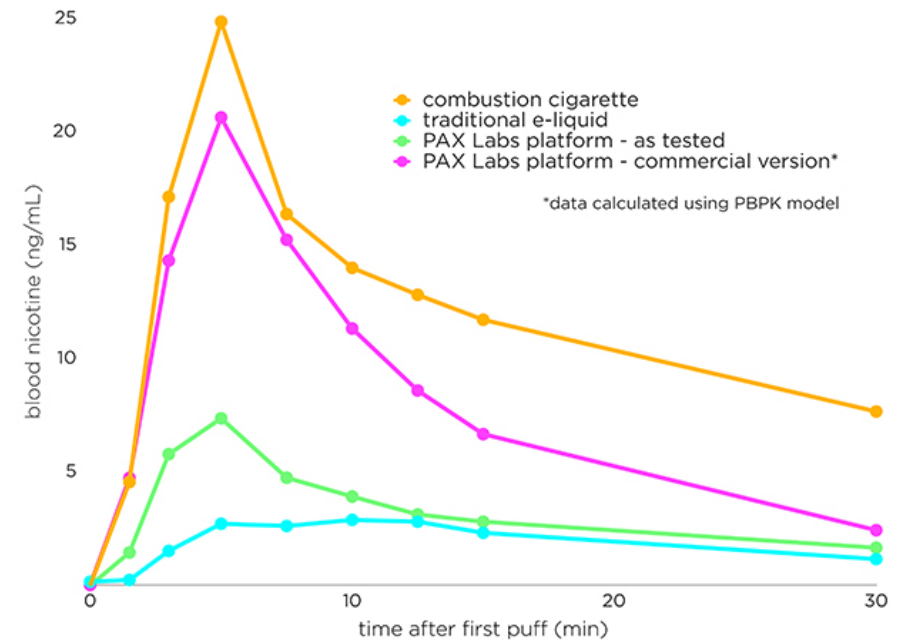


FREEBASE NICOTINE

VS



NICOTINE SALT



## WHO IS USING E-CIGARETTES?

E-CIGARETTES ARE NOW THE MOST COMMONLY USED TOBACCO PRODUCT AMONG U.S. YOUTH.

IN THE U.S.,  
YOUTH ARE  
MORE LIKELY  
THAN ADULTS  
TO USE  
E-CIGARETTES



**4.3%**  
MIDDLE SCHOOL  
STUDENTS

In 2016, more than  
**2 MILLION**  
U.S. middle and high school  
students used e-cigarettes in  
the past 30 days, including:

**11.3%**  
HIGH SCHOOL  
STUDENTS



AMONG CURRENT E-CIGARETTE USERS AGED 18-24 YEARS,  
**40.0%** had **NEVER BEEN** cigarette smokers



## WHO IS USING E-CIGARETTES?

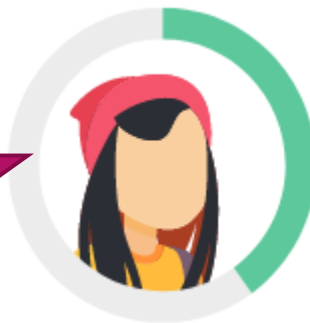
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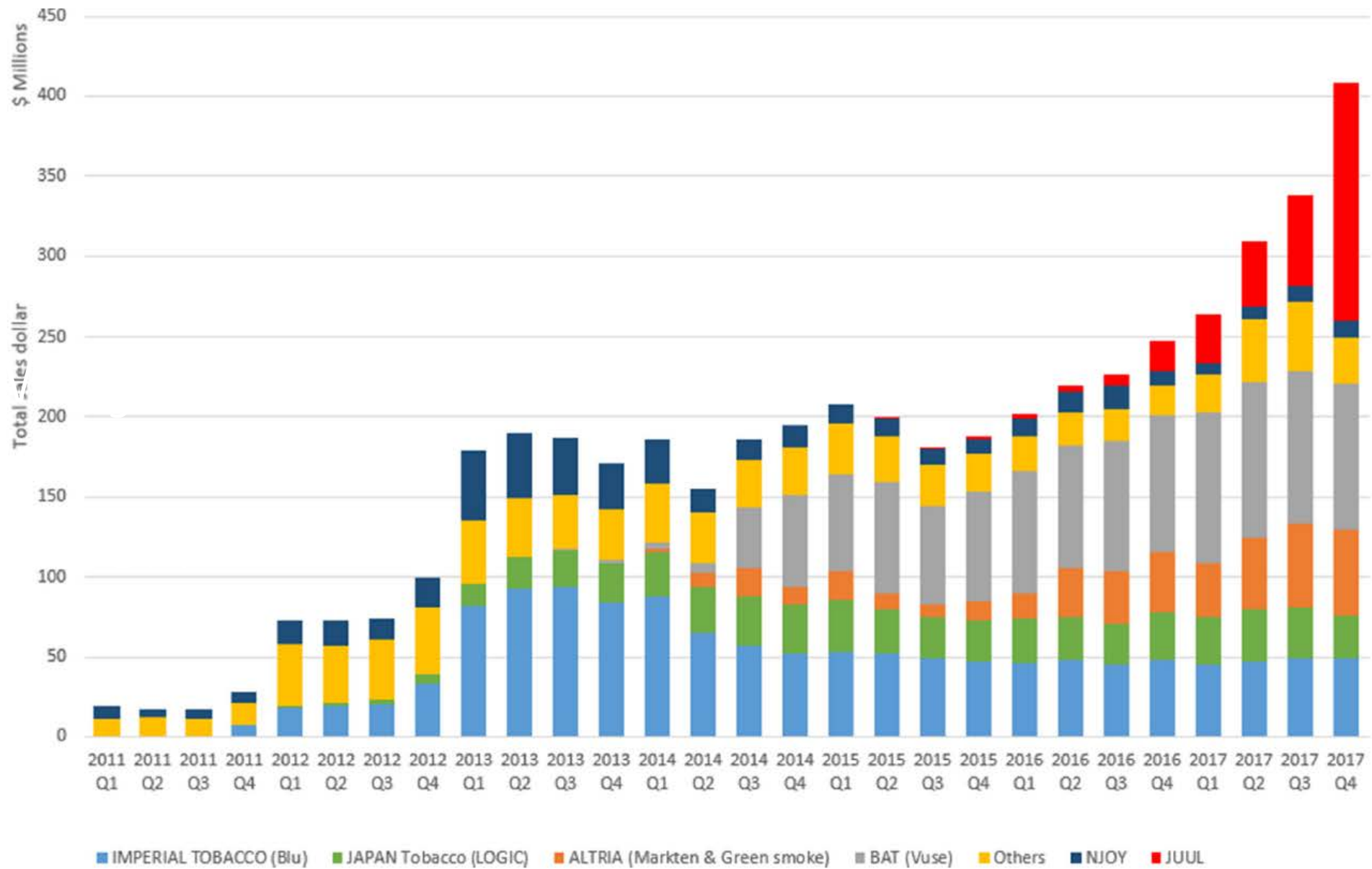


81.5% of current youth users state they use  
"BECAUSE IT COMES IN FLAVORS I LIKE"

63% of 15-24 year-old Juul users DO NOT KNOW that  
the product ALWAYS CONTAINS NICOTINE



AMONG CURRENT E-CIGARETTE USERS AGED 18-24 YEARS,  
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**Figure 1** Sales dollar of e-cigarettes in Nielsen-tracked retail channels: by brand 2011–2017.

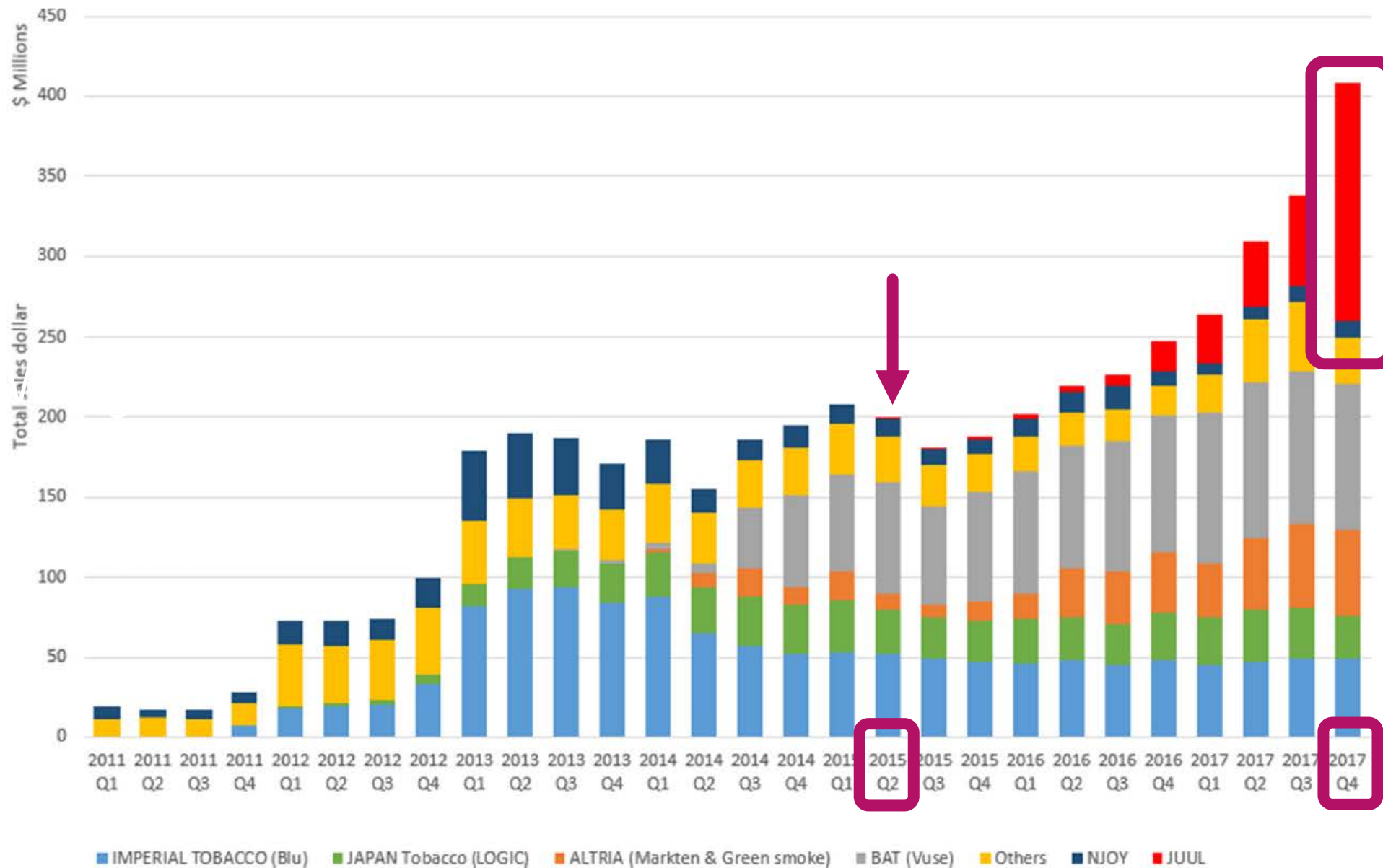


Figure 1 Sales dollar of e-cigarettes in Nielsen-tracked retail channels: by brand 2011–2017.



How did this happen?

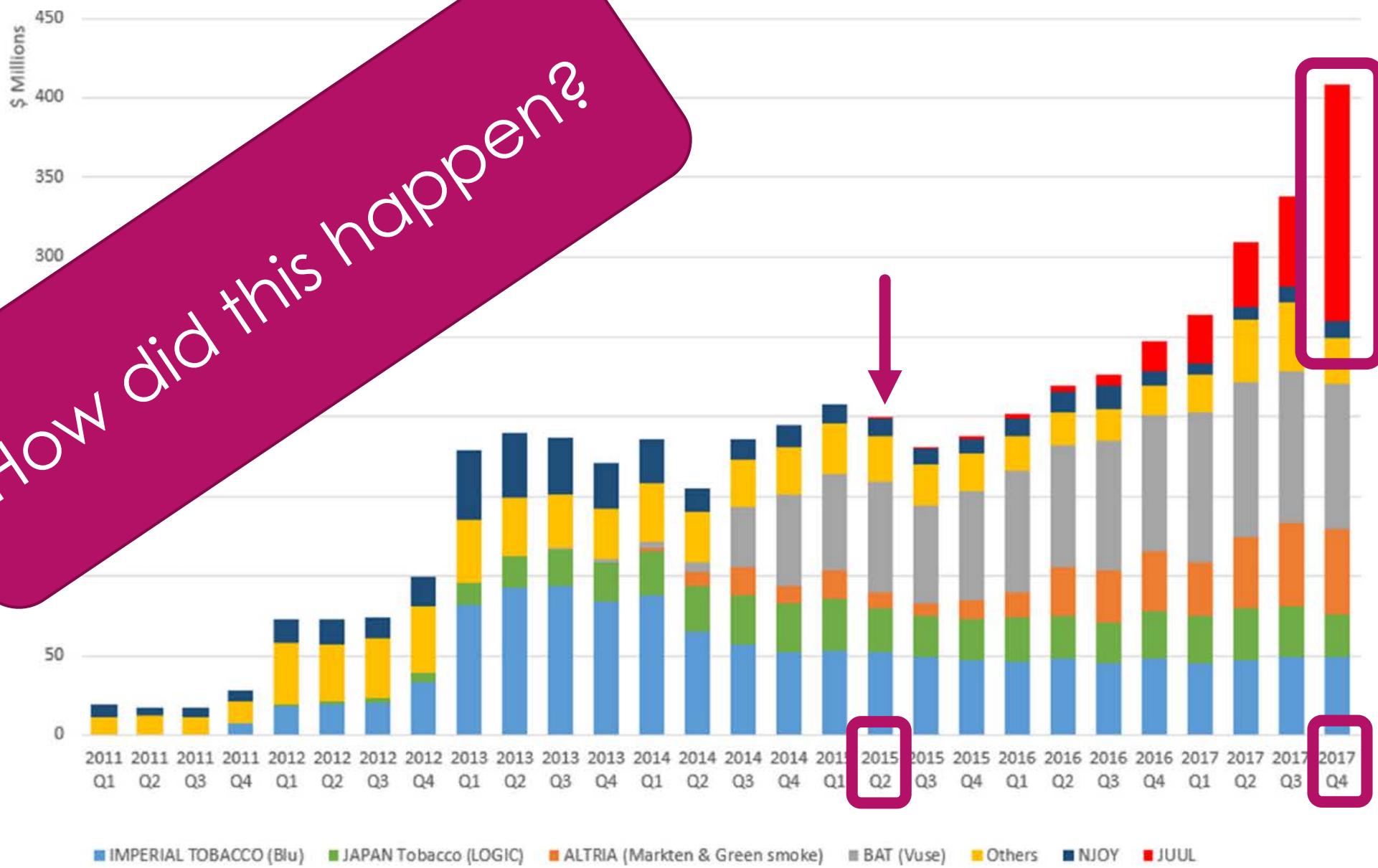


Figure 1 Sales dollar of e-cigarettes in Nielsen-tracked retail channels: by brand 2011–2017.

# Marketing

# Marketing





# Marketing



# Marketing





# Marketing





# Marketing

The collage features several overlapping elements:

- Top Left:** A social media post with a geometric pattern and the text "JUUL JUUL".
- Top Center:** A social media post with the text "\$50.00 Starter" and "VAPOR".
- Top Right:** A social media post with the text "#JUULVAPORIZED" and a woman's face.
- Center:** A magazine-style advertisement for Juul. It features a woman in a black dress holding a Juul device. The text includes "JUUL SMOKING EVOLVED", "STARTER KITS \$49.99", "BUILT TO SATISFY", and "NOW AVAILABLE ONLINE & IN-STORE".
- Bottom Left:** A social media post with the text "This might just be the first great e-cig" and the "WIRED" logo.
- Bottom Center:** A social media post with the text "Refills Per P" and "VAPOR".
- Bottom Right:** A social media post with the text "CLICK TO BUY YOUR JUUL AND JUUL PODS DIRECT" and a woman's face.

# Backlash

- ▶ Juul's ads changed
  - ▶ Now about current smokers



# Backlash

- ▶ Juul's ads changed
  - ▶ Now about current smokers





# Backlash

- ▶ Juul's ads changed
  - ▶ Now about current smokers
- ▶ New warnings
  - ▶ In ads





# Backlash

- ▶ Juul's ads changed
  - ▶ Now about current smokers
- ▶ New warnings
  - ▶ In ads
  - ▶ On packaging



# But...

- ▶ Even with the changes to advertising **SOCIAL MEDIA** has helped fuel Juul's popularity
  - ▶ Company Instagram, Twitter, and Facebook accounts
  - ▶ #Hashtags

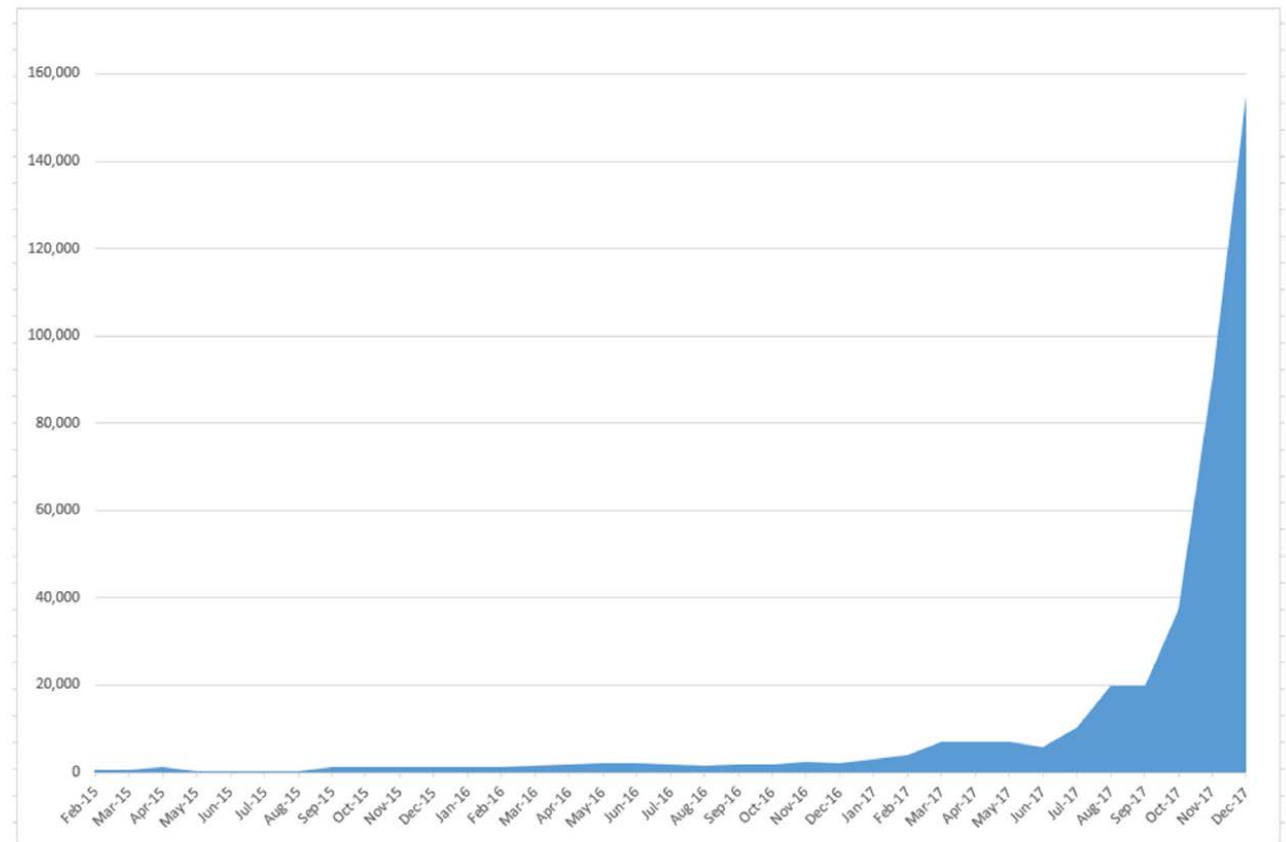
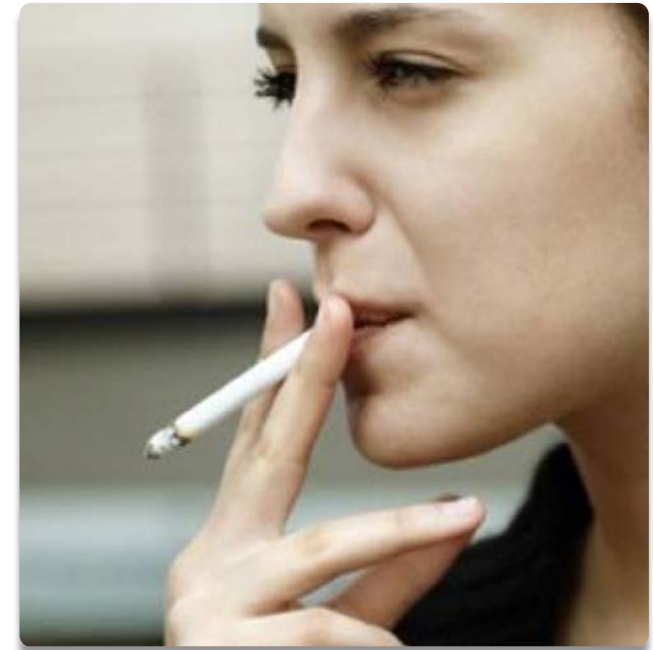


Figure 2 Number of JUUL-related tweets on twitter 2015–2017.

# Risks

- ▶ Tobacco use is the leading cause of preventable disease and death in the United States
- ▶ Most tobacco use starts in youth and young adulthood



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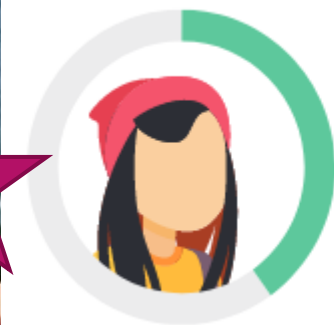










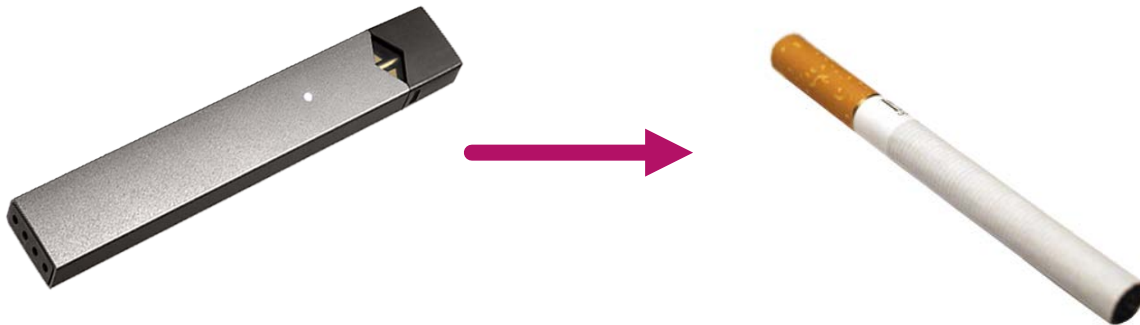


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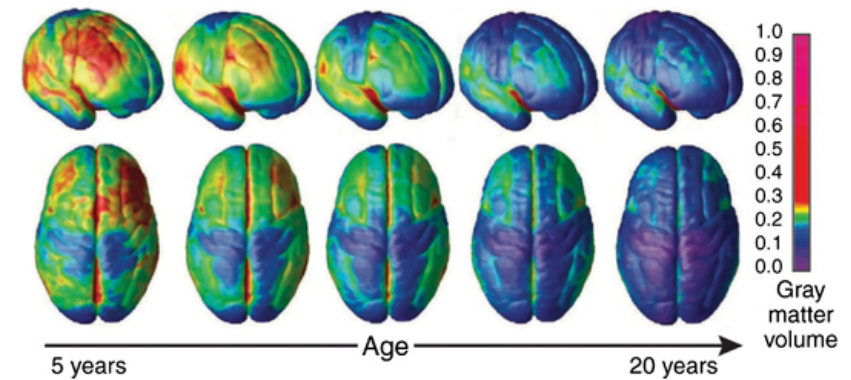


# Risks



- ▶ Insufficient research on e-cigarettes in general but:
  - ▶ Entryway to nicotine addiction and use of regular cigarettes



- ▶ Health impact of nicotine salts is largely unknown
  - ▶ Nicotine can have lasting effects on adolescent brain development




## **ELECTRONIC CIGARETTES** **WHAT'S THE BOTTOM LINE?**

- 
- 
- » E-cigarettes have the potential to benefit adult smokers who are not pregnant if used as a complete substitute for regular cigarettes and other smoked tobacco products.
  - » E-cigarettes are not safe for youth, young adults, pregnant women, or adults who do not currently use tobacco products.
  - » While e-cigarettes have the potential to benefit some people and harm others, scientists still have a lot to learn about whether e-cigarettes are effective for quitting smoking.
  - » If you've never smoked or used other tobacco products or e-cigarettes, don't start.



## **ELECTRONIC CIGARETTES** **WHAT'S THE BOTTOM LINE?**




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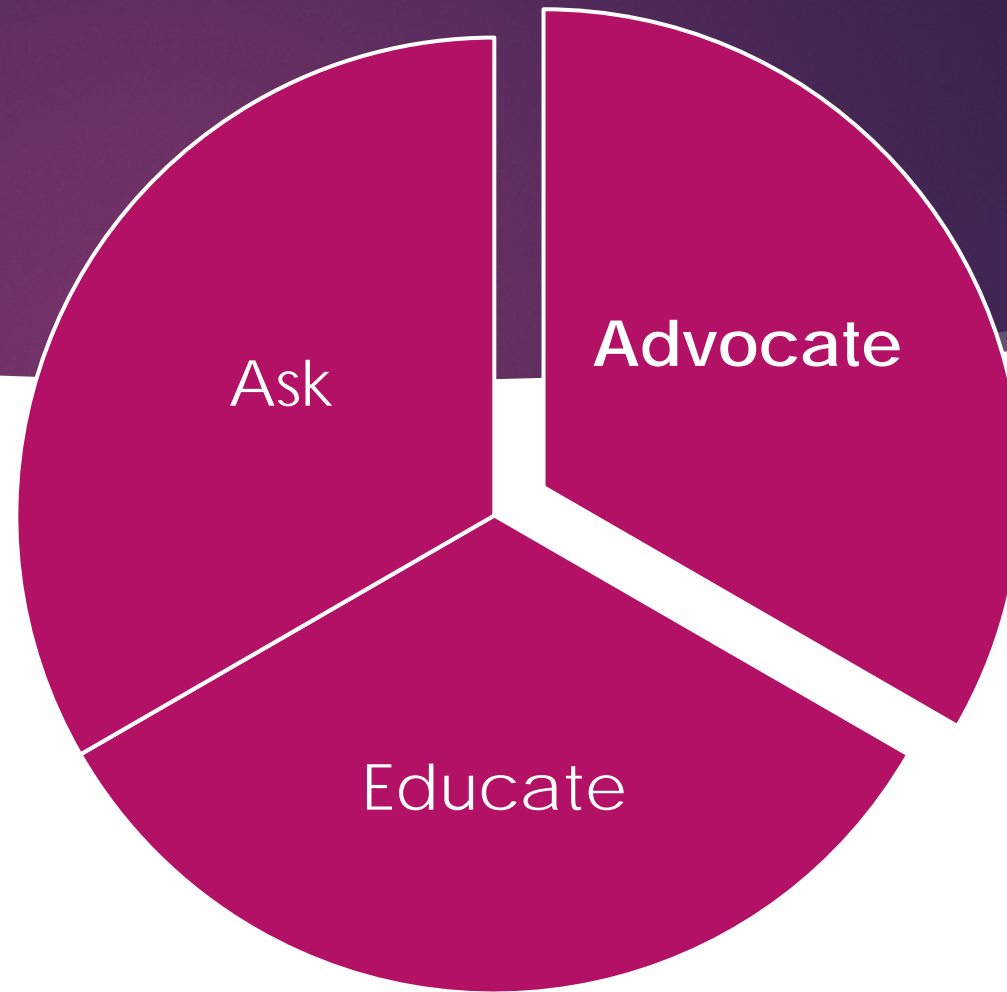
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Now what?



# It works!

- ▶ After pressure from advocates, the FDA, and the public:
  - ▶ Juul is developing lower 3% nicotine pods
  - ▶ Flavored pods will no longer be sold in retail stores

## Current Juul pod offerings

Tobacco and  
menthol-based products  
(in-store sales)



Virginia  
Tobacco



Classic  
Tobacco



Mint



Menthol

Flavored products  
(online only)



Cucumber



Mango



Creme



Fruit

# It works!

## FDA Statement

### Statement from FDA Commissioner Scott Gottlieb, M.D., on proposed new steps to protect youth by preventing access to flavored tobacco products and banning menthol in cigarettes

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For Immediate  
Release

November 15, 2018

#### 1. Flavored ENDS products that are not sold in an age-restricted, in-person location.

- Have all flavored ENDS products (other than tobacco, mint and menthol flavors or non-flavored products) sold in age-restricted, in-person locations. All ENDS products, including e-liquids, cartridge-based systems and cigalettes, in flavors except tobacco, mint and menthol, would be included. For instance, the proposed policy would apply to flavors such as cherry, vanilla, crème, tropical, melon and others.
- To advance this goal, the FDA is revisiting the compliance policy on PMTA authorization for such flavored products sold in physical locations where people under the age of 18 are permitted.
- The FDA is not revisiting the compliance policy with respect to ENDS products sold exclusively in age-restricted locations – for instance, a stand-alone tobacco retailer (such as a vape shop) that adequately prevents persons under the age of 18 from entering the store at any time; or, a section of an establishment that adequately prevents entry of persons under the age of 18 and the flavored ENDS products are not visible or accessible to persons under the age of 18 at any time.
- At this time, ENDS products with tobacco, mint or menthol flavors, as well as any non-flavored ENDS products, sold in any location, would not be included in any policy revisions. This distinction among flavors seeks to maintain access for adult users of these products, including adults who live in rural areas and may not have access to an age-restricted location, while evidence of their impacts continues to develop. It also recognizes that combustible cigarettes are currently available in menthol in retail locations that are not age-restricted. This approach is informed by the potential public health benefit for adult cigarette smokers who may use these ENDS products as part of a transition away from smoking.
- The FDA, however, will not ignore data regarding the popularity of mint- and menthol-flavored ENDS among kids. We will continue to use all available surveillance resources to monitor the rates and use patterns among youth and adults for these products, and we will reconsider our policies with respect to these products, if appropriate.

# It works!

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1. Flavored ENDS products that are not sold in an age-restricted, in-person location
  2. Flavored ENDS products (other than tobacco, mint and menthol flavors or non-flavored products) that are sold online.
    - In addition, we will seek to curtail the sale of applicable flavored ENDS products that are sold online without heightened age verification processes.
    - The FDA will be working to identify these heightened measures for age verification and other restrictions to prevent youth access via online sales. These best practices would be available soon, so sites can quickly adopt them.
    - Because no tobacco products should be sold to kids (including non-flavored ENDS products or those with tobacco, mint and menthol flavors), the FDA will continue to enforce the law whenever we see online sales of these products to minors and will closely monitor online sales of mint and menthol ENDS products.
  3. Flavored cigars.
    - Research shows that, compared to adults (25 or older) who smoke cigars, a higher proportion of youth who smoke cigars use flavored cigars. This data also indicates that eliminating flavors from cigars would likely help prevent cigar initiation by young people.
    - Given these public health concerns, I believe flavored cigars should no longer be subject to the extended compliance date for premarket authorization — regardless of the location in which the products are sold.
    - The FDA's proposal to revisit the compliance policy for flavored cigars that are new tobacco products does not apply to the entire product category, as some products were considered "grandfathered." Accordingly, the FDA intends to propose a product standard that would ban flavors in all cigars.
    - In July, the comment period for our [ANPRM on flavors in tobacco products](#) closed. The FDA has expedited review and analysis of these comments, and we intend to proceed with developing a proposed regulation. As included in the most recent Unified Agenda, the FDA intends to prioritize the issuance of this proposed rule.
- respect to these products, if appropriate.



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  5. Menthol in combustible tobacco products.
    - Informed by the comments from our ANPRM, the FDA will advance a Notice of Proposed Rulemaking that would seek to ban menthol in combustible tobacco products, including cigarettes and cigars.
    - The FDA started this process several years ago with an ANPRM. That ANPRM issued alongside the FDA's preliminary scientific evaluation, which suggested menthol use is likely associated with increased smoking initiation by youth and young adults.
    - Now, armed with the additional years of data, comments from the public – and with the perspective of our Comprehensive Plan and its implementation – the FDA will accelerate the proposed rulemaking process to ensure that our policies on flavored tobacco products protect public health across the continuum of risk.
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# It works!



**JUUL**

November 13 · ⚙️



JUUL labs has made the decision that this official JUUL Facebook account will no longer be active as of November 13th, 2018. We will not be posting any future content here and will not respond to any comments or private messages.

The JUUL community and our customers are very important to us. If you need customer support our team can assist you at <http://support.juulvapor.com> and on our official Twitter account (<http://twitter.com/juulvapor>).

To learn more about our decision visit [JUUL.com](http://JUUL.com) and continue to hear from us make sure to subscribe to our newsletter.

Thank you.



8,619 likes

**juulvapor** JUUL labs has made the decision that this official #JUUL Instagram account will no longer be active as of November 13, 2018. We will not be posting any future content here and will not respond to any direct messages.

The JUUL community and our customers are very important to us. If you need customer support our team can assist you at <http://support.juulvapor.com> and on our official Twitter account (<http://twitter.com/juulvapor>). To learn more about our decision visit [JUUL.com](http://JUUL.com) and to continue to hear from us make sure to subscribe to our newsletter.

Thank you.

NOVEMBER 13

It works!



**JUUL**

November 13 · ⚙

JUUL labs has made the decision that this account will no longer be active and will no longer be posting any future content here. We will not be responding to comments or private messages.

The JUUL community and our customer support team need customer support our team. Visit <http://support.juulvapor.com> and <http://twitter.com/juulvapor>.

To learn more about our decision, visit <http://newsroom.juul.com/juul-labs-action-plan>. We encourage you to continue to hear from us. Thank you.



Pinned Tweet



**JUUL** @JUULvapor · Nov 13

JUUL Labs' priority is to decrease youth use, while still serving the adult smoker community. Today, we announced our action plan to combat underage use: [newsroom.juul.com/juul-labs-acti...](http://newsroom.juul.com/juul-labs-action-plan)

**JUUL**

**JUUL TAKES ACTION  
TO COMBAT YOUTH  
E-CIGARETTE USE**



274



260



864



the decision that this account will no longer be active. We will not be responding to comments or private messages and will not respond to direct messages.

Customers are very important to us. We encourage you to continue to hear from us. Visit [support.juulvapor.com](http://support.juulvapor.com) and [twitter.com/juulvapor](http://twitter.com/juulvapor) to learn more about our decision. We encourage you to continue to hear from us. Thank you.



# Good resources:

- ▶ How Juul made nicotine go viral:  
<https://www.youtube.com/watch?v=AFOpoKBUyok>

- ▶ Factsheets

- ▶ <https://truthinitiative.org/news/what-is-juul>
- ▶ <https://truthinitiative.org/news/6-important-facts-about-juul>
- ▶ <https://www.aap.org/en-us/Documents/AAP-JUUL-Factsheet.pdf>
- ▶ <https://www.healthychildren.org/English/health-issues/conditions/tobacco/Pages/Juuling-Get-the-Facts.aspx>



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# But wait there's more!

MarkTen Elite



PAX Era



PHIX



# But wait there's more!

MarkTe

## Juul and Similar Products



Juul



KandyPen's  
Rubi



MLV's  
Phix



Mylé



ITG Brands'  
myblu



Altria's  
MarkTen Elite





# Conclusions

- ▶ Juul has skyrocketed in popularity since it's introduction to the market in 2015.
  - ▶ But, it isn't the only product out there.
- ▶ While there is little data about e-cigarette use, what data we do have indicates that use is not entirely safe.
- ▶ Thus, it is important to ask patients about e-cigarette use.



# Resources

- ▶ Willett JG, Bennett M, Hair EC, et al. Recognition, use and perceptions of JUUL among youth and young adults. Tobacco Control Published Online First: 18 August 2018. doi: 10.1136/tobaccocontrol-2018-054273
- ▶ What is JUUL? Annals of Family Medicine 2018;16:471-472 <https://doi.org/10.1370/afm.2304>.
- ▶ Huang J, Duan Z, Kwok J, Binns S, Vera LE, Kim Y, Szczypka G, Emery SL. Vaping versus JUULing: how the extraordinary growth and marketing of JUUL transformed the US retail e-cigarette market. Tobacco Control, 2018 May 21. doi: 10.1136/tobaccocontrol-2018-054382
- ▶ Gibson-Young L & Martinasek M. JUULing: What kids don't know will hurt them. Contemporary Pediatrics June 2018.
- ▶ Wang T et al. Tobacco Product Use Among Middle and High School Students in the United States 2011-2017. Morbidity and Mortality Weekly Report (CDC) June 8, 2018. Vol 67 No 22
- ▶ National Academies of Sciences. Public health consequences of e-cigarettes. Washington, DC: National Academies of Sciences, 2018.
- ▶ Singh T, Marynak K, Aranzola RA, et al. Vital signs: exposure to electronic cigarette advertising among middle school and high school students – United States, 2014. MMWR Morb Mortal Wkly Rep 2016;64:1403–8.
- ▶ 3 Duke JC, Lee YO, Kim AE, et al. Exposure to electronic cigarette television advertisements among youth and young adults. Pediatrics 2014;134:e29–e36
- ▶ <https://truthinitiative.org/news/what-is-juul>
- ▶ <https://truthinitiative.org/news/6-important-facts-about-juul>
- ▶ <https://www.aap.org/en-us/Documents/AAP-JUUL-Factsheet.pdf>
- ▶ <https://www.healthychildren.org/English/health-issues/conditions/tobacco/Pages/Juuling-Get-the-Facts.aspx>

Thank you!

