



Electronic nicotine delivery systems (ENDS) and Heated Tobacco Products (IQOS)



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Ass. prof. Zeina Aoun Bacha
Head of Department Pulmonology- Critical Care
Hotel Dieu de France UMC- St Joseph university

Objectives

- What are Heated Tobacco products: IQOS Description
- Electronic Nicotine Delivery systems or E cigarettes Description
- Nicotine Addiction
- Is it a Smoking Cessation Device?
- Benefits and Harms?
- Marketing Aspects of E Cigarettes

What are Heated Tobacco products



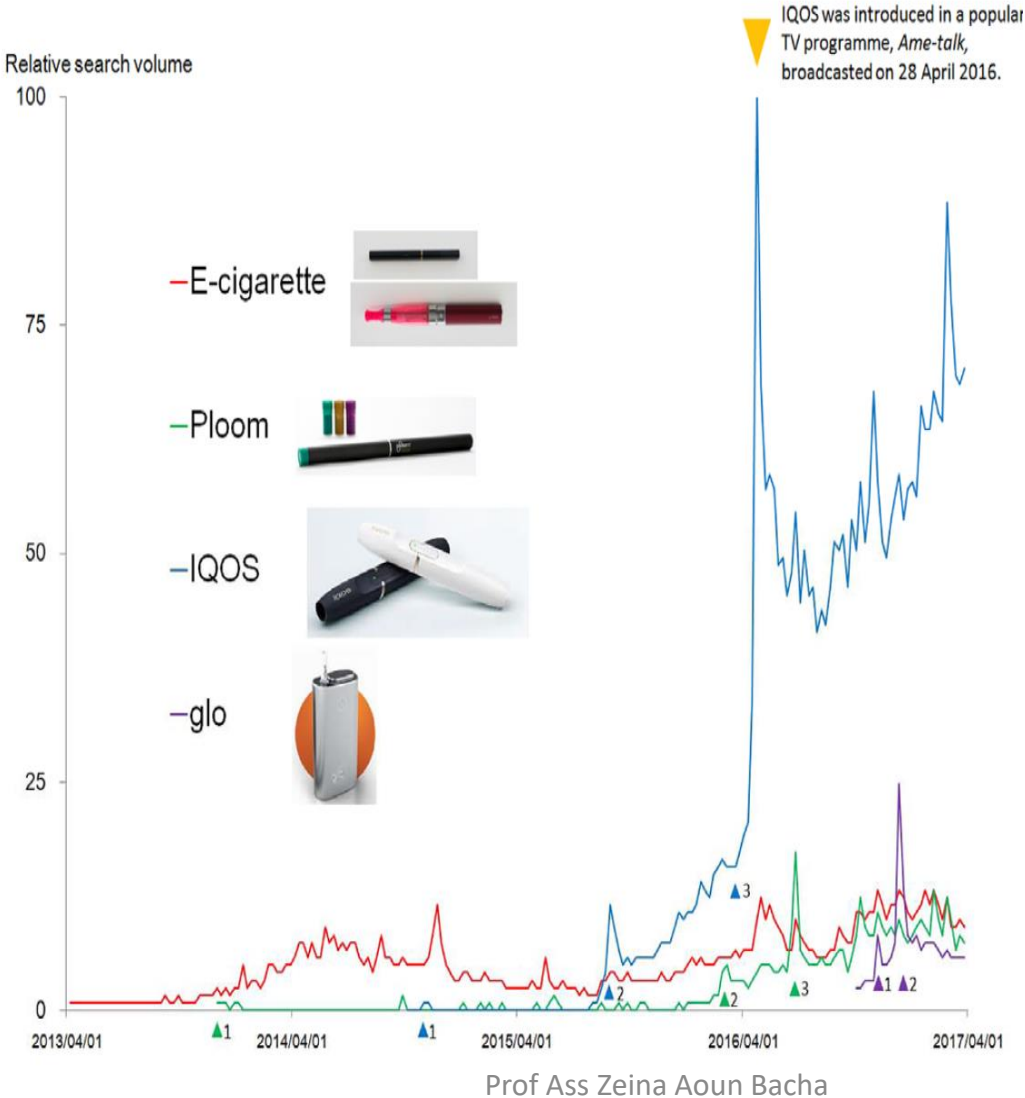
- A. Battery charger
- B. Battery device
- C. Tobacco sticks box



Farsalinos et al. Nicotine & Tobacco Research 2018

Google searches in Japan

• In 2022, 1% of U.S. middle and high school students, combined, reported having used heated tobacco products in the past 30 days.



*Tabuchi et al.
Tobacco control 2018*

Heat-not-burn tobacco products: a systematic literature review

Erikas Simonavicius,¹ Ann McNeill,^{1,2} Lion Shahab,³ Leonie S Brose^{1,2}

Tob Control 2018;**0**:1–13.

Studies included in data extraction and synthesis ($n = 31$)

Environmental emissions ($n = 16$)

Use by humans ($n = 15$)

20 affiliated with the tobacco industry!

Conclusions of the systematic review

- Evidence on "heat not burn" secondhand emissions suggested that HnB exposes users and bystanders to substantially lower but measurable levels of particulate matter and harmful and potentially harmful components.

Simonavicius E, et al *Tobacco Control* 2018

Animal study on vascular effects of heated tobacco products

Vascular endothelial function is impaired by aerosol from a single IQOS HeatStick to the same extent as by cigarette smoke

Pooneh Nabavizadeh,¹ Jiangtao Liu,¹ Christopher M Havel,² Sharina Ibrahim,³
Ronak Derakhshandeh,¹ Peyton Jacob III,^{2,4} Matthew L Springer^{1,3,4}

Tob Control 2018;**0**:1–7.

Heated tobacco products vs conventional cigarettes

Analyzed Compound	HNB Cigarette		Conventional Cigarette		Proportion of the Chemical in HNB and Conventional Cigarettes, %
	Amount, Mean (SD)	No. of Replications for Each Assay	Amount, Mean (SD)	No. of Replications for Each Assay	
Volatile organic compounds, µg per cigarette ^a					
Acetaldehyde	133 (35)	5	610 ^b	1	22
Acetone	12.0 (12.9)	5	95.5 (13.5)	2	13
Acroleine	0.9 (0.6)	2	1.1	1	82
Benzaldehyde	1.2 (1.4)	5	2.4 (2.6)	2	50
Crotonaldehyde	0.7 (0.9)	5	17.4	1	4
Formaldehyde	3.2 (2.7)	5	4.3 (0.4)	2	74
Isovaleraldehyde	3.5 (3.1)	5	8.5 (10.8)	2	41
Propionaldehyde	7.8 (4.3)	5	29.6 (36.6)	2	26
Polycyclic aromatic hydrocarbons, ng per cigarette ^c					
Naphthalene	1.6 (0.5)	4	1105 (269)	7	0.1
Acenaphthylene	1.9 (0.6)	4	235 (39)	7	0.8
Acenaphthene	145 (54)	4	49 (9)	7	295
Fluorene	1.5 (0.6)	4	371 (56)	7	0.4
Anthracene	0.3 (0.1)	4	130 (18)	7	0.2
Phenanthrene	2.0 (0.2)	4	292 (44)	7	0.7
Fluoranthene	7.3 (1.1)	4	123 (18)	7	6
Pyrene	6.4 (1.1)	4	89 (15)	7	7
Benz[a]anthracene	1.8 (0.4)	4	33 (4.2)	7	6
Other measures					
Nicotine, µg per cigarette ^a	301 (213)	4	361	1	84
Temperature, °C	330 (10)	2	684 (197)	1	NA
Puff total count	12.6 (2.4)	32	13.3 (3.1)	6	NA

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	Amount, Mean (SD)	No. of Replications for Each Assay	Amount, Mean (SD)	No. of Replications for Each Assay	
Volatile organic compounds, μg per cigarette ^a					
Acetaldehyde	Acetaldehyde: Carcinogen 22% of conventional cigarette				
Acetone	12.0 (12.9)	5	95.5 (13.5)	2	13
Acrolein	Acrolein: Irritant 82% of conventional cigarette				
Benzaldehyde	Formaldehyde: Carcinogen 74% of conventional cigarette				
Crotonaldehyde	Formaldehyde: Carcinogen 74% of conventional cigarette				
Formaldehyde	Formaldehyde: Carcinogen 74% of conventional cigarette				
Isovaleraldehyde	3.5 (3.1)	5	8.5 (10.8)	2	41
Propionaldehyde	7.8 (4.3)	5	29.6 (36.6)	2	26
Polycyclic aromatic hydrocarbons, ng per cigarette ^c					
Naphthalene	Acenaphthene: Potential carcinogen 295% of conventional cigarette				
Acenaphthylene	1.9 (0.6)	4	255 (39)	7	0.6
Acenaphthene	145 (54)	4	49 (9)	7	295
Fluorene	1.5 (0.6)	4	371 (56)	7	0.4
Anthracene	0.3 (0.1)	4	130 (18)	7	0.2
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Other measures					
Nicotine, μg	Nicotine: addictive 84% of conventional cigarette				
Temperature	Nicotine: addictive 84% of conventional cigarette				
Puff total count	12.6 (2.4)	32	13.3 (3.1)	6	NA

Symptoms after exposure to heated tobacco products

Table 4 Symptoms caused by HNB tobacco aerosol produced by others

Characteristics	Among total sample, n=8240	Among those exposed to aerosol of HNB tobacco, n=977				
	Exposed to aerosol of HNB tobacco, n (%)	Sore throat, %	Eye pain, %	Feeling ill, %	Other injury or symptom, %	Any symptom, %
Total	977 (11.9)	20.6	22.3	25.1	13.4	37.0
Sex						
Men	582 (14.1)	19.7	24.0	24.3	18.6	31.4
Women	395 (9.6)	21.9	19.9	26.3	5.7	45.3
Age groups, years*						
17–29	179 (10.6)	27.9	37.3	39.7	14.5	56.3
30–39	310 (18.5)	22.3	25.0	24.0	13.6	42.1
40–49	227 (12.0)	22.4	22.3	25.1	11.0	28.8
50–59	169 (12.2)	11.6	5.7	12.0	18.8	24.4
60–71	93 (5.8)	13.0	14.9	24.8	6.6	26.1
Combustible cigarette and HNB tobacco/e-cigarette use*						
Never/nevert	294 (6.9)	23.1	28.7	38.0	9.6	49.2
At least one former and no current‡	272 (13.1)	21.1	20.9	22.9	10.6	41.2
At least one current§	412 (21.5)	18.6	18.7	17.4	18.0	25.6

Tabuchi et al. Tobacco control 2018

ERS Recommendation

“Even though heated tobacco products may perhaps be less harmful for smokers they nevertheless remain both harmful and highly addictive, and there may be a risk that smokers will switch to heated tobacco products instead of quitting. ERS cannot recommend any product damaging the lungs and human health.”

ERS Position paper on heated tobacco products.

Electronic nicotine delivery systems (ENDS).

WE DON'T SMOKE WE VAPE

- Increasing E Cigarettes experience .
- from 11.7% in 2017 to 20.8% in 2018.
- In 2018, more than 3.6 million U.S. youth, including 1 in 5 high school students and 1 in 20 middle school students, currently use e-cigarettes.



CDC 2022

La batterie
alimente la résistance
en électricité



+

Le e-liquide
se mélange avec l'air
de l'aspiration



=



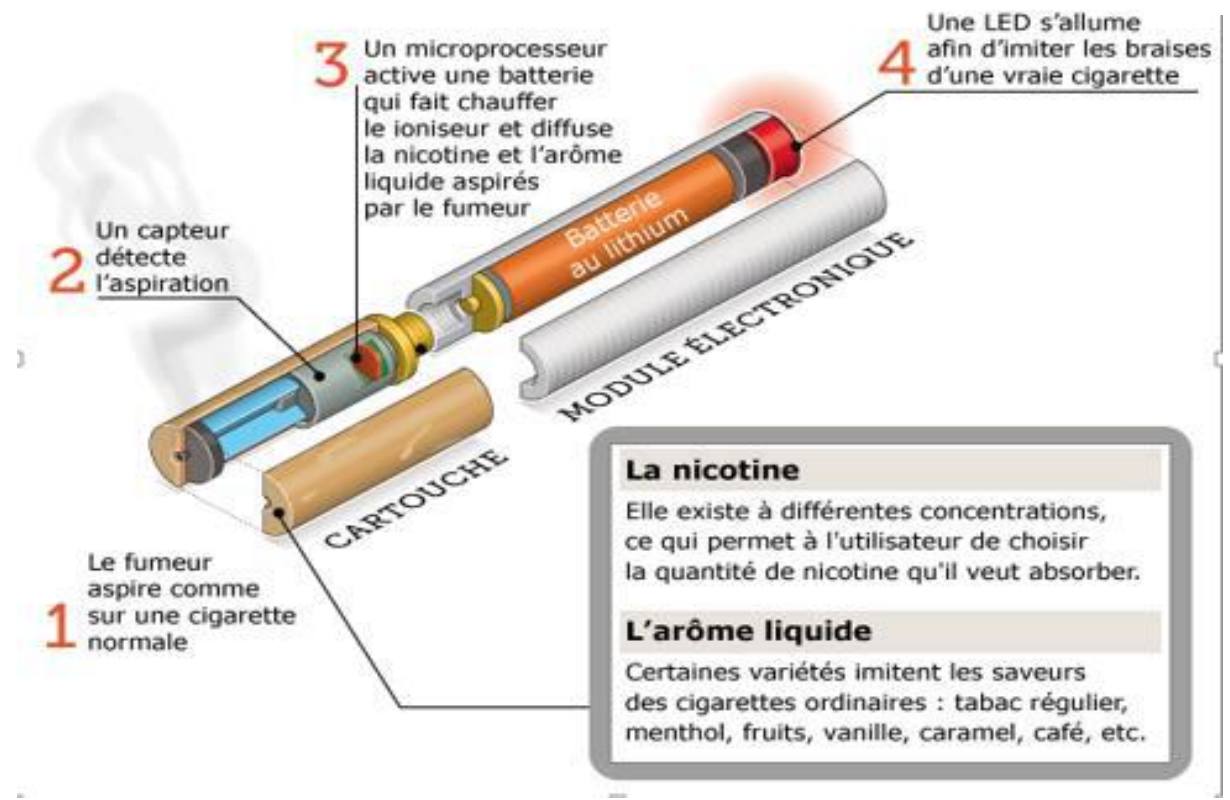
La vaporisation
crée un nuage de vapeur

La résistance
chauffe le e-liquide

How Does An E-Cig Work?



quit-smoking-comparison.com



When heated, the cartridge that contains the liquid nicotine converts the contents into a vapor that the user inhales

Shapes and Size



1^{ère} génération



2^{ème} génération



3^{ème} génération

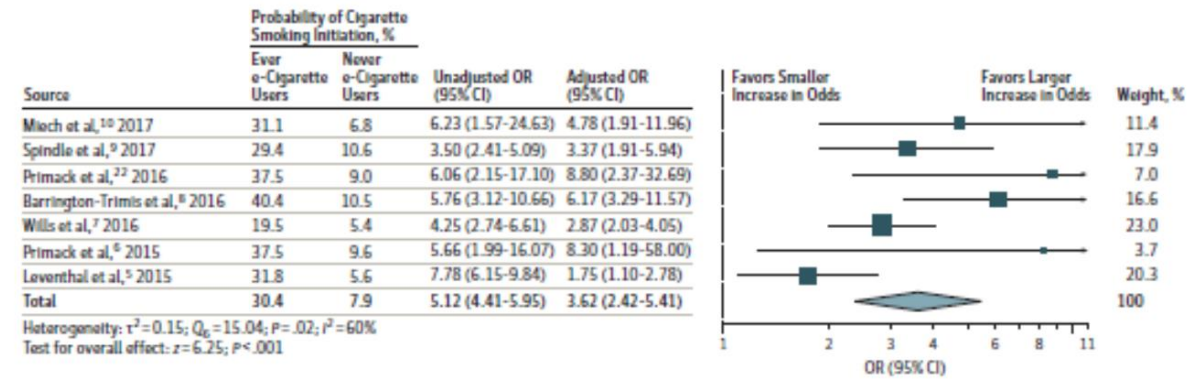


4^{ème} génération

© 2019

CE et jeunes

Figure 2. Meta-analysis of Adjusted Odds of Cigarette Smoking Initiation Among Never Cigarette Smokers at Baseline and Ever e-Cigarette Users at Baseline Compared With Never e-Cigarette Users at Baseline

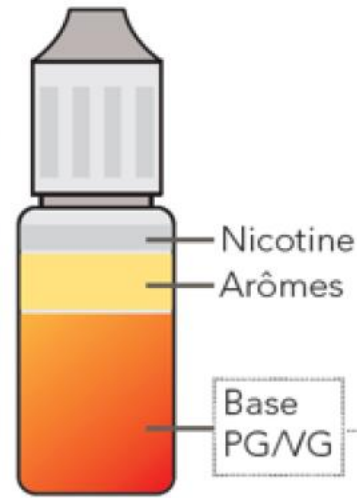


The odds ratios (OR) for the studies^{5-10,22} are adjusted for a study-specific set of demographic, psychosocial, and behavioral risk factors. The size of the point estimates and horizontal lines represent the 95% confidence intervals. The plot uses a random-effects meta-analysis model. The weights add to 99.9% and not 100% because of rounding. Q indicates Cochran Q.

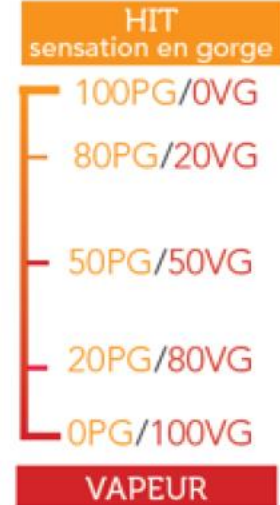
La probabilité est 3,62 fois plus élevée de devenir fumeur si on a déjà utilisé la CE.

Soneji et al. JAMA Pediatrics. 2017; 171(8):788-797. Association Between Initial Use of e-Cigarettes and Subsequent Cigarette Smoking Among Adolescents and Young Adults: A Systematic Review and Meta-analysis.

E Liquid composition...



Chaque liquide possède une répartition PG/VG différente, à vous de trouver ce qui vous plaît :



Composition des e-liquides Pharmanath		
Support	Propylène Glycol USP	> 75 %
	Glycérine Végétale USP	< 19 %
Arôme	Arôme Alimentaire	< 2 %
Autres	Eau	< 3 %
	Alcool	< 2 %
	Nicotine	0 à 19,9 mg/ml



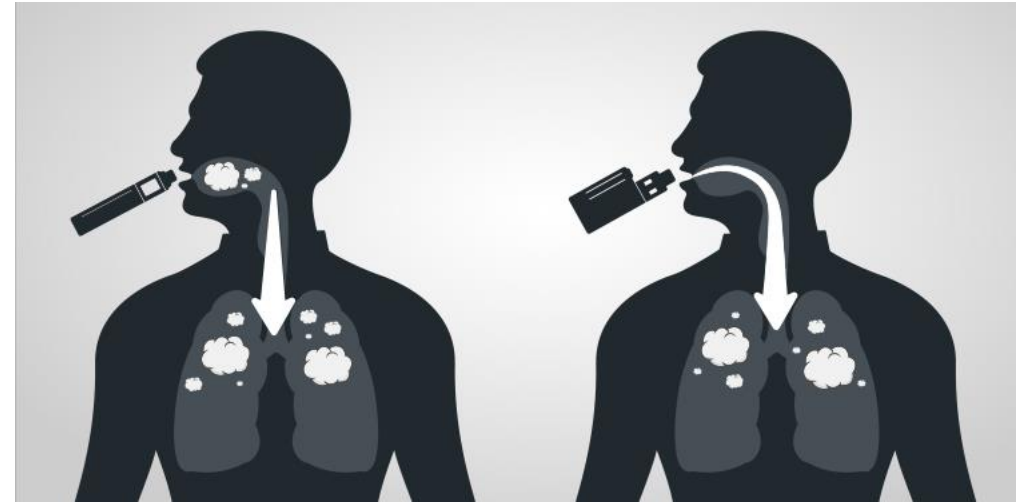
E-liquides: les arômes

- Les arômes: plus de **150 saveurs** (tabac, fruitées, gourmandes)
- Arômes **naturels ou artificiels**
- On connaît les arômes ingérés mais qu'en est-il des arômes **inhalés de façon chronique?**
- Toxicité de certains arômes (menthol, réglisse, cannelle)



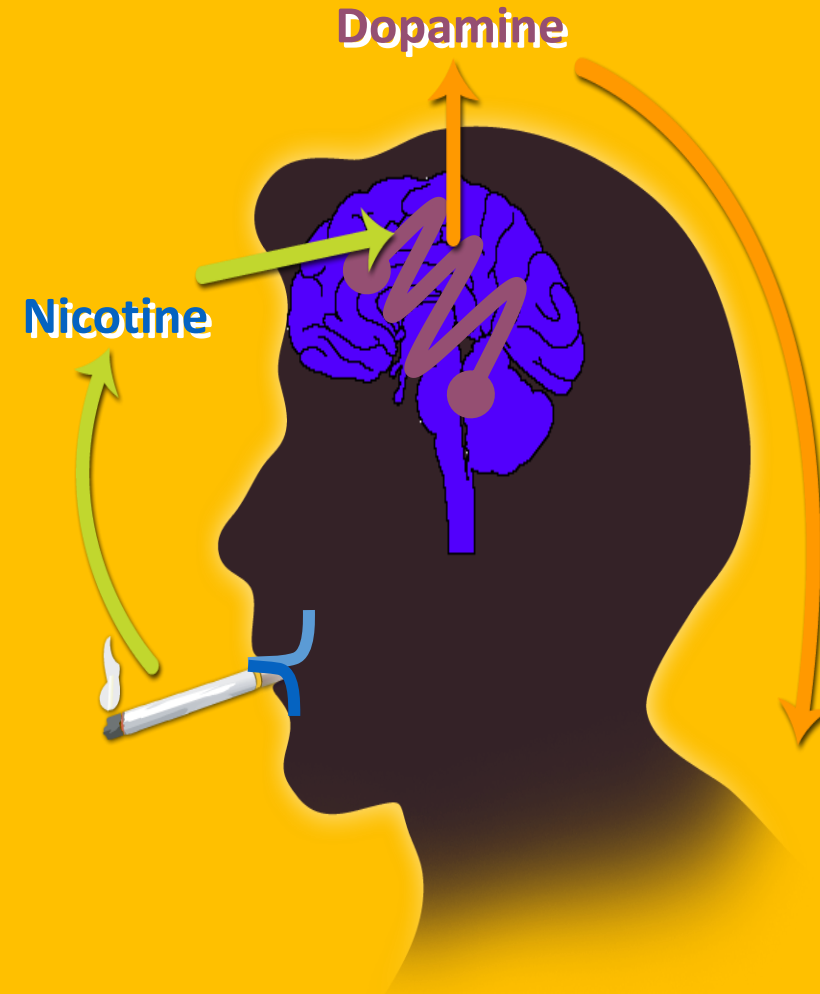
The E cigarette must appeal in 3 ways

1. A pleasing aesthetic object
2. a thrilling Throat hit within 6 seconds
3. A satisfactory supply of Nicotine to the brain after 5 seconds



The Cycle of Nicotine Addiction

- **Nicotine** binding causes an increase in release of **Dopamine**^{1,2}
- **Dopamine** gives feelings of pleasure and calmness¹
- The **Dopamine** decrease between cigarettes leads to withdrawal symptoms of irritability and stress¹
- The smoker craves **Nicotine** to release more **Dopamine** to restore pleasure and calmness¹
- Competitive binding of **Nicotine** to nicotinic acetylcholinergic receptors causes prolonged activation, desensitization, and upregulation²
- As **Nicotine** levels decrease, receptors revert to an open state causing hyperexcitability leading to cravings^{1,2}



What is Direct-Lung inhale?DL

- Direct-Lung inhale is when you inhale the vapour directly into your lungs, without holding it in your mouth first. It's almost like taking a deep breath of air, only while pursing your lips.
- Direct-Lung vaping requires greater airflow to cool the vape down.
- As a result, DL devices are designed to draw more air over the coil.
- Direct-Lung inhale can also be known as Straight-to-Lung inhale.

What is Mouth-to-Lung inhale? MTL

- Mouth-to-Lung refers to a type of inhaling. When you MTL inhale, you take the vapour into your mouth. You then hold it in your mouth before inhaling it into your lungs.
- With its tighter, more restricted draw, the MTL experience is much closer to that of a cigarette.
- What's more, the combination of less air drawn over the coil, the higher PG levels used and the inhaling technique provoke the "throat hit".

Taux de nicotine

Hit

Nbe de cigarettes par jour

0mg/ml



Juste pour le geste !

6mg/ml



< 7 cigarettes par jour

12mg/ml



< 10 cigarettes par jour

16mg/ml



+ 20 cigarettes par jour

Choisir un e-liquide

19.9 mg/ml : très fort	Tabac brun / sans filtre
16 mg/ml : fort	Tabac blond
11 mg/ml : moyen	Cigarettes "light"
6 mg/ml : faible	Cigarettes "ultra-light"
0 mg/ml	Plaisir du geste

“Different elements
of juices come out at
different settings.

This is because specific
flavourings vaporize at
different temperatures”

Flavour **Chasing** 101

www.ecigarettedirect.co.uk/ashtray-blog

e-cigarette
DIRECT



Les températures de la vaporisation

Formation acroléine et autres aldéhydes

> 315°C

288°C ébullition du glycérol (GV)
plus bas si solution aqueuse)

188°C ébullition
du propylène glycol (PG)

100°C ébullition de l'eau

78°C ébullition de l'alcool

300°C

Température de surface de la résistance où l'on peutvapoter (sans tenir compte des spécificité

180°C

Rôle mouvement des molécules

Rôle de la ventilation de la chambre

< 100 °C

Pas de vapeur

Liquide

Résistance

JUUL: la nouvelle e-cigarette qui rend les ados accros*

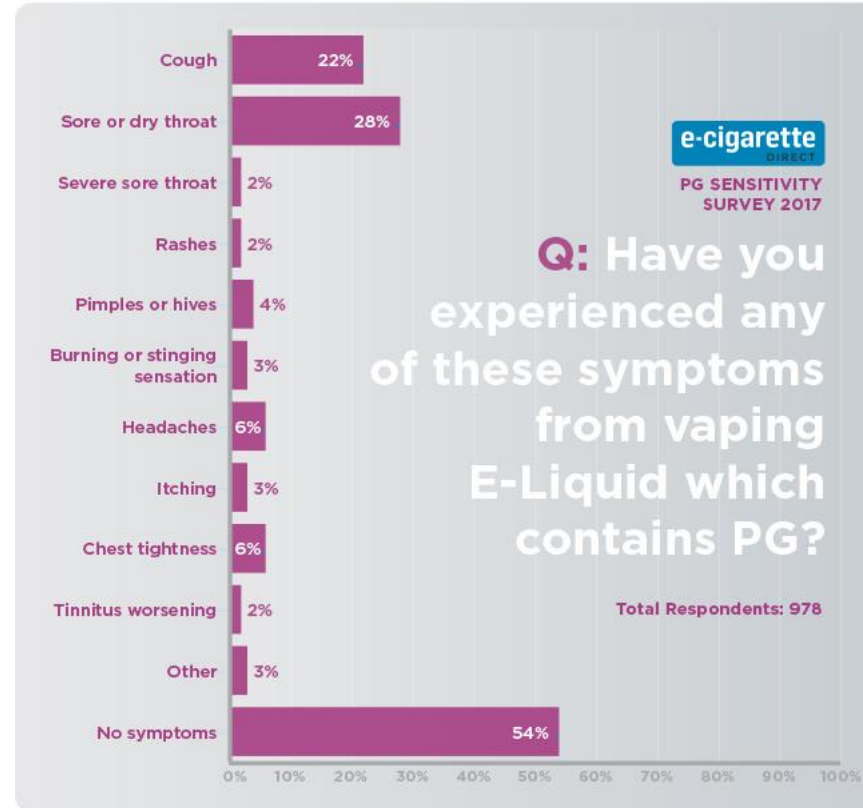


Sels de nicotine + acide benzoïque → **délivrance de nicotine extra-rapide**

<http://www.journaldemontreal.com/2018/05/30/juul-la-nouvelle-e-cigarette-qui-rend-les-ados-accros>

PG Allergy: What Are the Symptoms and How Common Is It?

They conducted a survey of 1,018 vapers in an attempt to shed more light on the issue of PG sensitivity and allergy.



Ashtrey BLOG

News Headlines of Health Effects

tobaccopreventiontoolkit.stanford.edu



SCIENCE \ HEALTH \

Nicotine in e-cigs is not only addictive, it might also increase your risk of heart disease

26

Nicotine can affect a smoker's health in more than one way

Home / Health



🕒 AUGUST 20, 2018

E-cigarettes can damage DNA

by American Chemical Society

AJMC Managed Markets Network

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Newsroom – Published on: March 07, 2019

t

e-Cigarettes Boost Heart Attack Risk, Emotional Stress, Findings Show

in

Wallace Stephens

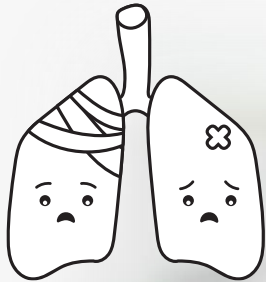
✉

Those who use e-cigarettes face higher risks of having a heart attack, experiencing emotional distress.



Hit or Miss, the Case of EVALI

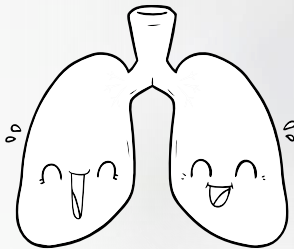
tobaccopreventiontoolkit.stanford.edu



For the first time, we have seen a vaping device cause sudden, immediate, serious and sometimes fatal damage to the lungs.



The Centers for Disease Control and Prevention (CDC) recommends to not use THC-containing e-cigarette/vape products particularly from informal sources like family/friends, dealers, online or other sources.



Since these products are not regulated, there is no guarantee that any part of an e-cigarette is safe for your health. Your lungs are the most happy and safe when you only breathe in oxygen and clean air.

Marketing Aspect of Electronic Cigarettes

- E-cigarette brands are employing a number of marketing strategies used by tobacco companies
 - Among them: fun flavors, endorsements using kids and celebrities
- E-cigarette ads currently fall into a loophole for federal regulation
 - Control misleading or false product claims



Health Care Providers Role

- Learn about the different types of tobacco products and the risks of using tobacco products.
- Ask about use of all forms of tobacco products, including heated tobacco products, when screening patients for the use of tobacco products.
- Talk to children, teens, and young adults about why all forms of tobacco products are harmful for them.
- Encourage patients to quit using tobacco products.

Take home messages

- The popularity of E cigarettes is a recent phenomenon.
- The available literature is new and relatively limited.
- ENDS are not FDA approved as smoking cessation devices.
- Heated tobacco products are **not an FDA-approved method** for quitting smoking.
- The American Heart Association, American Cancer Society, AACR and ASCO recognize the potential for ENDS to alter existing smoking behaviors.
- They also recognize the lack of definitive data regarding associated benefits and harms.

Thank you
Ready for questions

