



# E-Cigarettes

## What we really know, without blowing smoke up your....

Timothy Dougherty, MD, FAAEM, DACMT  
Medical Director, Cape Coral Emergency Physicians  
Medical Director, Disaster Preparedness  
Lee Memorial Health Systems

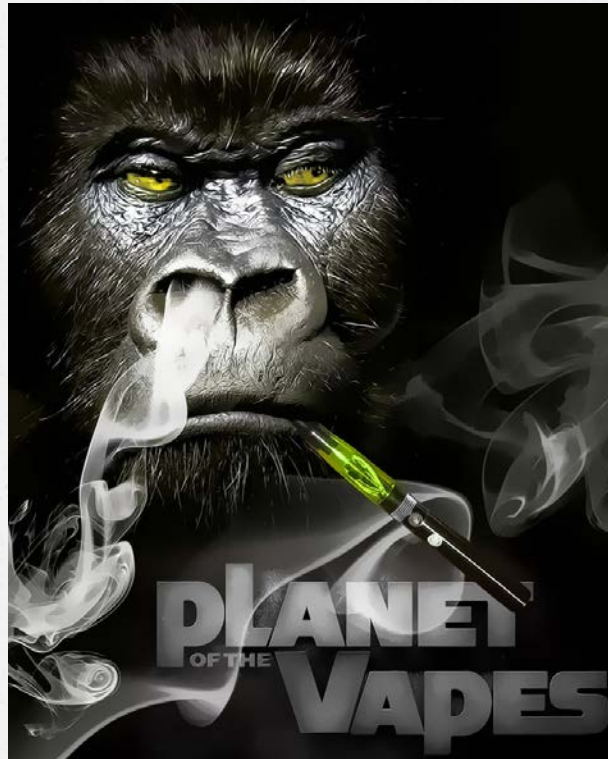
# Disclosure Statement of Financial Interest

- o I, Timothy Dougherty MD, DO NOT have a financial interest/arrangement or affiliation with one or more organizations that could be perceived as a real or apparent conflict of interest in the content of the subject of this presentation.

# Financial Disclaimer



# Ad Disclaimer



# E Cigarettes



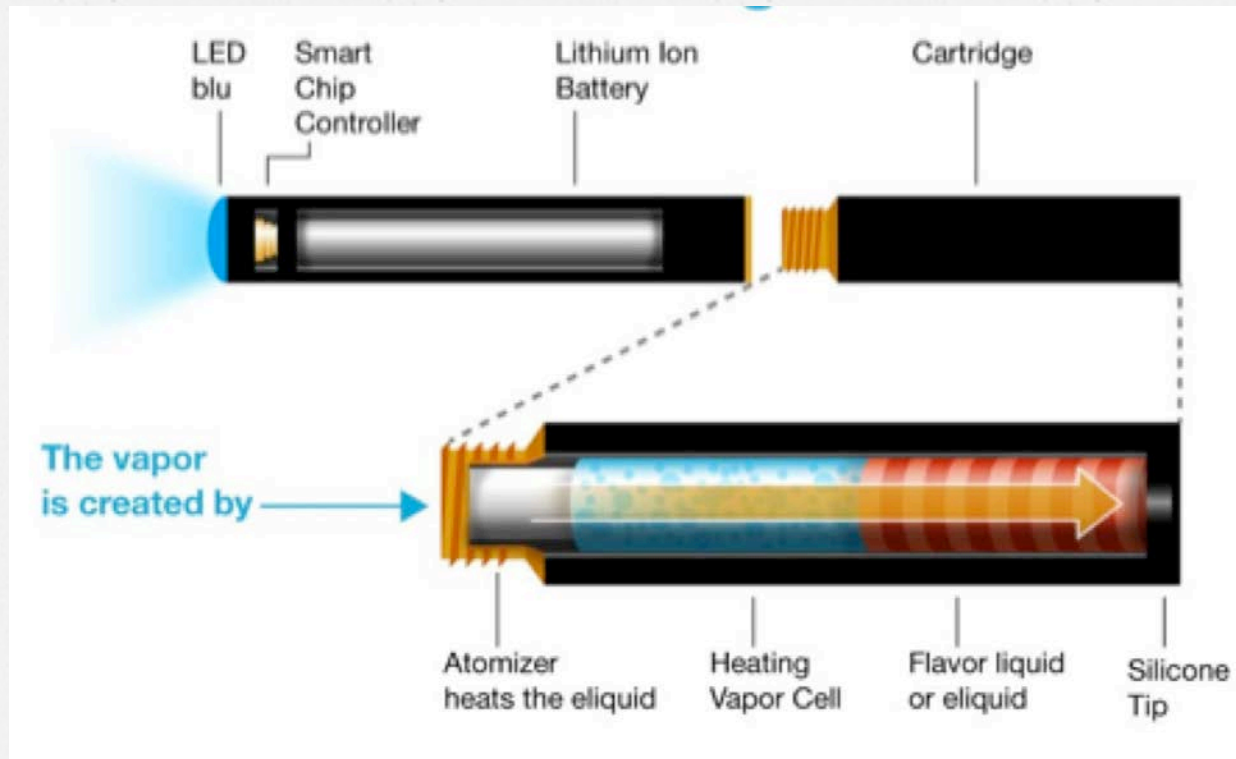
# Definition of an E-cigarette

- o Any electronic device that delivers nicotine or other substances to the person inhaling from the device, including but not limited to an electronic cigarette, cigar, pipe, or hookah, including any component, part, or accessory of such a device, whether or not sold separately.

# How Does it work?







# E-Mechanism





## Examples of different electronic cigarette (e-cigarette) products.

Product	Description	Some Brands
<b>Disposable e-cigarette</b> 	Cigarette-shaped device consisting of a battery and a cartridge containing an atomizer to heat a solution (with or without nicotine). Not rechargeable or refillable and is intended to be discarded after product stops producing aerosol. Sometimes called an e-hookah.	NJOY OneJoy, Aer Disposable, Flavorvapes
<b>Rechargeable e-cigarette</b> 	Cigarette-shaped device consisting of a battery that connects to an atomizer used to heat a solution typically containing nicotine. Often contains an element that regulates puff duration and /or how many puffs may be taken consecutively.	Blu, GreenSmoke, EonSmoke
<b>Pen-style, medium-sized rechargeable e-cigarette</b> 	Larger than a cigarette, often with a higher capacity battery, may contain a prefilled cartridge or a refillable cartridge (often called a clearomizer). These devices often come with a manual switch allowing to regulate length and frequency of puffs.	Vapor King Storm, Totally Wicked Tornado
<b>Tank-style, large-sized rechargeable e-cigarette</b> 	Much larger than a cigarette with a higher capacity battery and typically contains a large, refillable cartridge. Often contains manual switches and a battery casing for customizing battery capacity. Can be easily modified.	Volcano Lavatube

Grana R et al. *Circulation*. 2014;129:1972-1986

# Wide Variability

- o Nicotine Concentrations
- o Varying Volumes of product
- o Different carrying products
- o Range of additives and flavors
- o Battery Voltage
- o Quality Controls



# Full Tobacco Experience



**SK**  
STARTER KIT  
**S803S-2**  
PATENT PENDING

**Genuine Soft Tip**  
Brings you the real feel

**S803S-2**  
PATENT PENDING

## Soft nozzle

Experience More Realistic

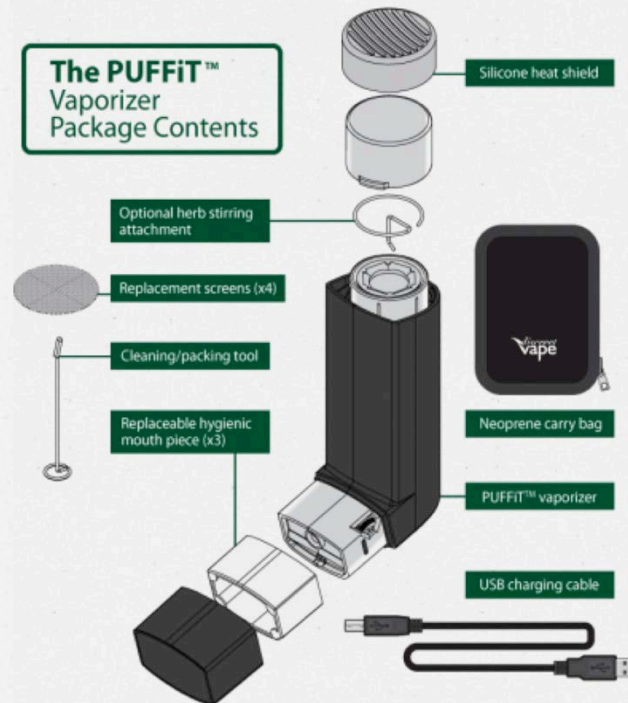


**E-Cig Shoppe**  
Soft nozzle

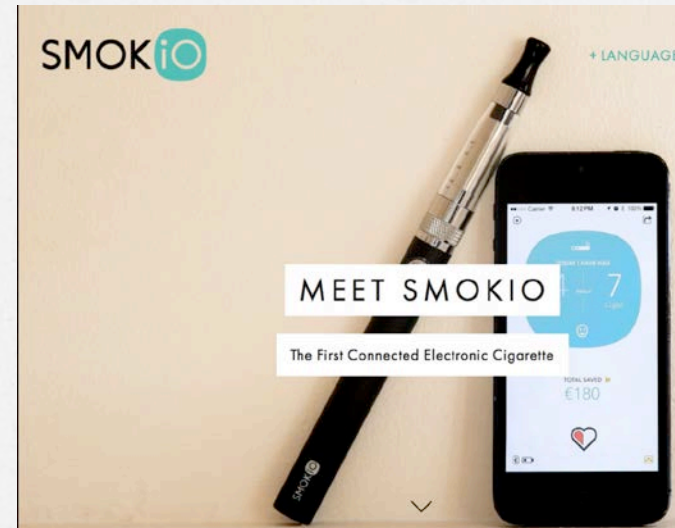
**Common E-cigar**  
Hard nozzle



# No more rules...

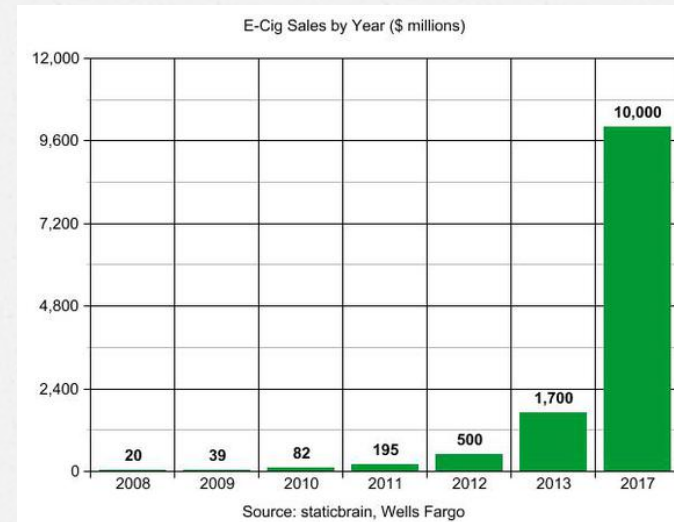


# Yeah, we got an app for that..



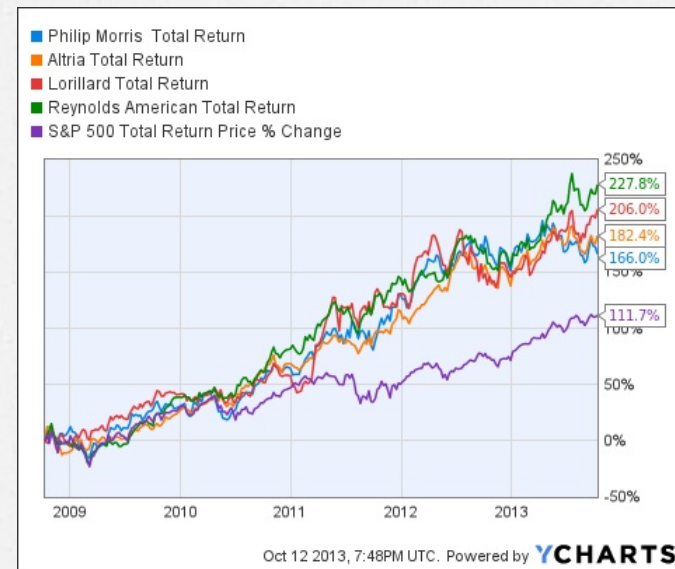
# How Big Is Big

- o Currently 466 brands
- o 7,764 unique flavors
- o Sales margins could grow to \$10 billion by 2017



# Tobacco Industry

- o The major tobacco companies have purchased or developed e-cigarette products
- o No evidence that this is a strategy to phase out conventional cigarettes
- o May share 75% of the profit pool in 10 years



# Prevalence

- o Most commonly being used concurrently with tobacco cigarettes
- o “Use in places where smoking is restricted”
- o “To cut down on smoking”
- o “Help with quitting smoking.”



**DEAR SMOKING BAN,**

**blu ELECTRONIC CIGARETTE**

Take back your freedom to smoke anywhere with blu electronic cigarettes. blu produces no smoke and no ash, only vapor, making it the smarter alternative to regular cigarettes. It's the most satisfying way to tell the smoking bans to kiss off. Okay, maybe the second-most satisfying way.

**blucigs.com**

18+ only. CALIFORNIA PROPOSITION 65 Warning: This product contains nicotine, a chemical known to the state of California to cause birth defects or other reproductive harm.



# Prevalence (US Survey, 2012)

- 7% have tried e-cigarette
- Highest rates-current smokers
- After watching Blu e-cigarette commercial,
  - 76% made them think of smoking a regular cigarette
  - 74% made them think of quitting
  - 66% likely to try an e-cigarette



# National Youth Tobacco Survey 2012

- Students (grades 6-12) current use increased from 1.1% to 2.1% and any use of e-cigarette increased from 3.3% to 6.8%
- 1.78 million middle school and high schoolers have tried e-cigarette (2012)
- 9.3% reported never smoked conventional cigarettes



# Adolescent Prevalence

- Korea rose 0.5% (2008 to 9.4% (2011)
- US rose 3.3% (2011) to 6.8% (2012)
- 10% High school students tried e-cig. (2012)
- 20.3% middle school and 7.2% of high school "ever e-cigarette" users never tried conventional cigarettes (2012)
- Utah Dept. Health 32% of ever e-cigarettes users never smoked conventional cigarettes



All we are saying...  
Is Give "E" a chance

The image shows a screenshot of the nicolites website homepage. The browser address bar displays 'www.nicolitesonline.co.uk/'. The website header includes the nicolites logo (ELECTRONIC CIGARETTES) and a navigation menu with links for HOME, STOCKISTS, SHOP, ABOUT, NEWS, and REVIEWS. The main promotional banner features the text 'swaptober. WILL YOU?' in large white letters on a blue background with smoke effects. A black and white photograph of a man with a beard and glasses holding a cigarette is positioned on the right side of the banner. A small graphic below the main text reads 'CAN'T STOP? JUST SWAP'. Below the banner is a row of four blue buttons: 'shop', 'what are nicolites?', 'look at the savings!', and 'my nicolites'. The footer contains social media icons for Twitter and Facebook, a 'join the discussion' link, and a list of retailers where the product is available: SPAR, WHSmith, Superdrug, and McColl's.

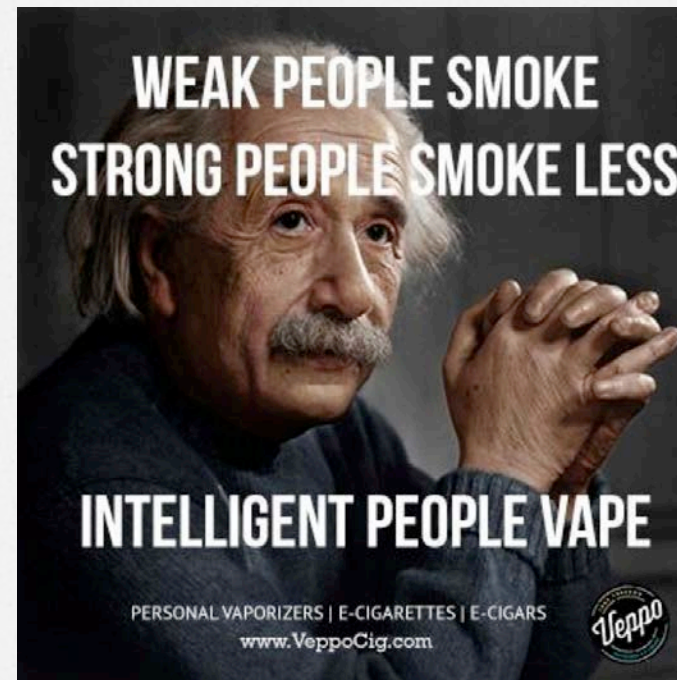
# Marketing

- o Marketing on internet, youtube.
- o On TV, radio, and print where broadcast cigarette ads banned since 1971.
- o Online search for e-cigarettes have surpassed nicotine replacement therapies



# Marketing Points

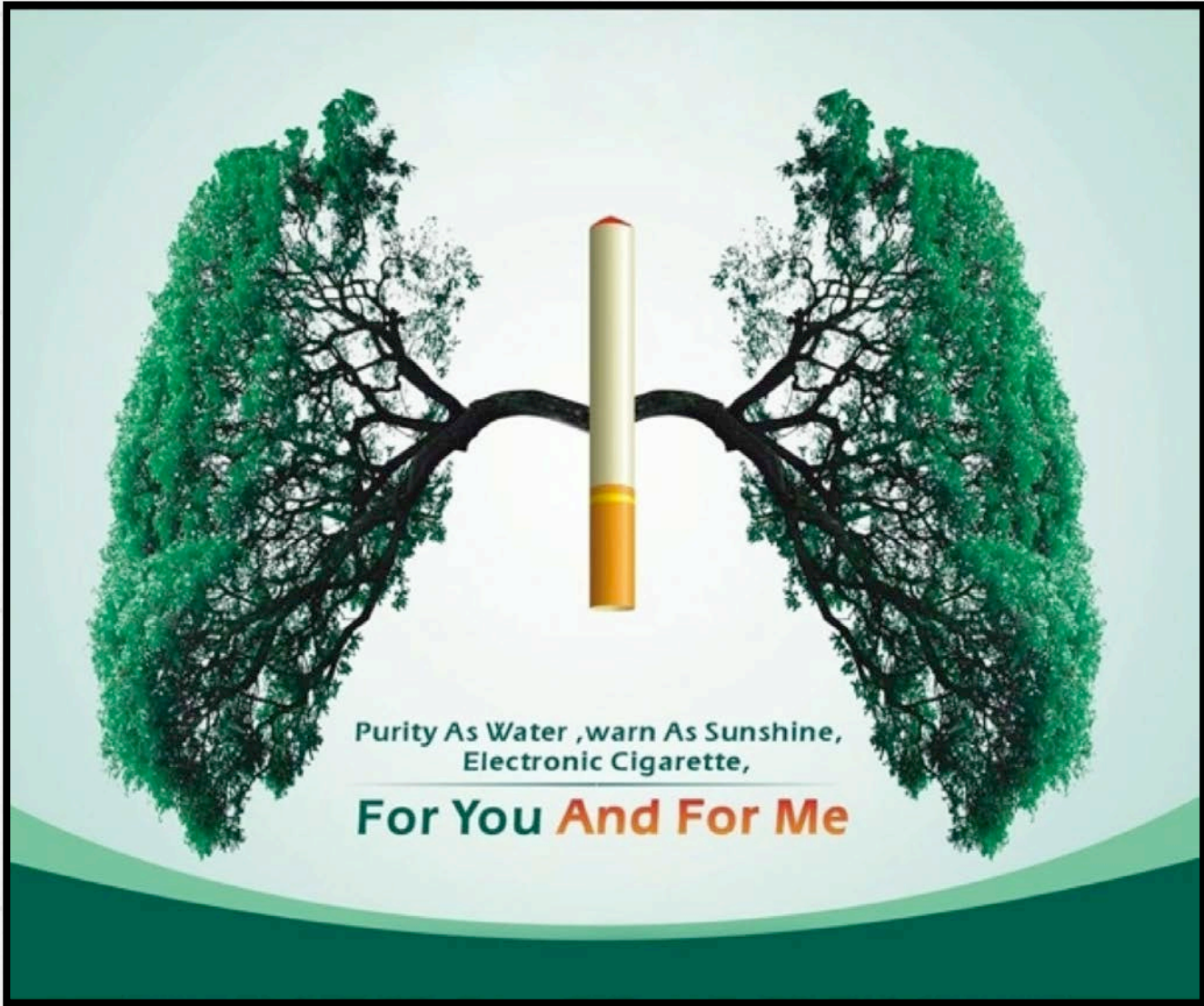
- Does not contain smoke, tar, CO
- Variability of size, nicotine concentration, e-liquid formulations
- Newer devices allow for multiple types of user configurations



# Marketing Claims

- o Healthier (95%)
- o Cheaper (93%)
- o Cleaner (95%)
- o Smoke Anywhere (88%)
- o Circumvent Smoke-free policies (71%)
- o No second hand smoke (76%)
- o Cessation-related claims (64%)





Purity As Water ,warn As Sunshine,  
Electronic Cigarette,

For You **And For Me**



# Cost Saving



# Healthy Habit



# Vitamin E?



Vitamin  
ELECTRONIC CIGARETTE.

- Nicotine-Free
- No Smoke, Second Hand Smoke, or Tar
- Just Vitamins + Flavored Vapor
- 500 Puffs per VitaCig (Disposable/Recyclable)
- Only \$2 per VitaCig
- Three Exciting Flavors:  
Relax, Refresh, Energize

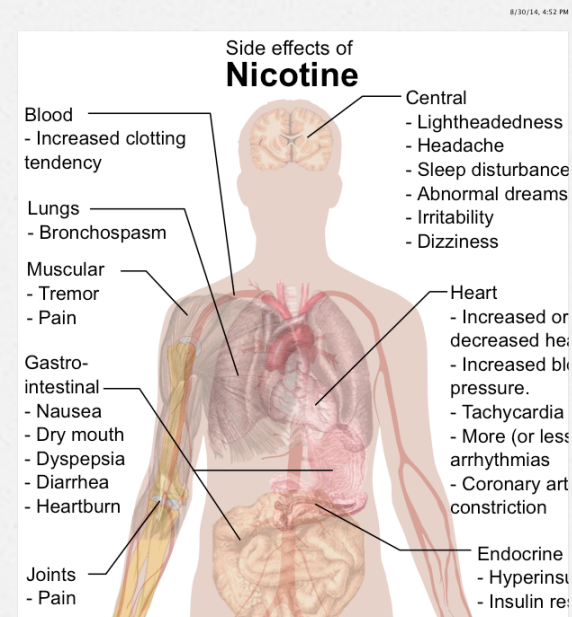


# Weight loss



# Nicotine

- Main health concern is maintenance of addiction
- Release catecholamines, adverse effects on lipids, induction of insulin resistance
- Reported to produce endothelial dysfunction and cause fetal teratogenicity
- ? Role in cancer and CAD



# Nicotine

- o Most contain 24 mg/ml, 18 mg/ml, 12 mg/ml or 6 mg/ml
- o Available over the internet 100mg/ml
- o 1 conventional cigarette contains = 10-15 mg nicotine and delivers systemic dose 1 mg of nicotine
- o Absorption may be from buccal or upper airways



# E- Liquid

- Nicotine content of e liquid from some brands reveal poor concordance of its label
- Individual puffs contain from 0-35  $\mu\text{g}$  per puff
- 30  $\mu\text{g}$ /puff takes  $\approx$  30 puffs to equal 1 mg nicotine delivered from conventional cigarette
- A person inhaling nicotine aerosol usually absorbs 80% of the nicotine



# Increased # of Poison Center Calls (161%-333%)





# Accidental Nicotine Toxicity

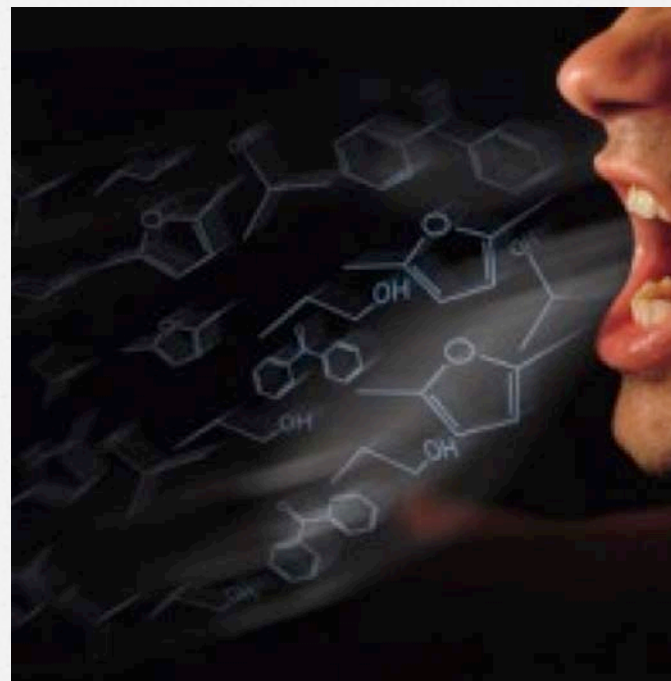
- o May result from ingestion of the e-liquid or dermal exposure
- o Well absorbed through skin in alkaline solution
- o Toxicity: dizziness, N/V/D, pallor, sweating, tachycardia, abd. Pain
- o Confusion, agitation, Seizure and death
- o Resp. arrest from resp. muscle weakness

# Nicotine Toxicity

- o Usually begin with 15 minutes after acute liquid ingestion. Resolves in 1-2 hours
- o Cutaneous exposure may lead to delayed and prolonged symptoms
- o Concentrations high enough to cause fatalities in children even in only a few ml ingestion

# Propylene glycol

- Can cause eye and resp. irritation
- Prolonged and repeat inhalation in industrial settings may effect nervous system, behavior, and the spleen
- “Inhalation exposure to propylene glycol mist should be avoided.” (Dow Chemical)
- Heated and vaporized can change into propylene oxide (class 2B carcinogen)



# Safety



# Goniewicz et al

- o Analyzed aerosol from 12 brands of e- cig., a conventional cigarette, and nicotine inhaler
- o Tested for toxic or carcinogenic compounds
- o Levels of toxicants in aerosol were 1- 2 orders of magnitude lower than cigarette smoke but higher than nicotine inhaler

# Cytotoxicity

- Varied among products from highly toxic to low to no toxicity
- Nicotine did not cause cytotoxicity
- Some were noncytotoxic to pulmonary fibroblasts but cytotoxic to stem cells
- Cytotoxicity related to concentrations and number of flavorings used
- Raises questions regarding pregnant women using e-cigarettes or exposed to second hand aerosol.



# Toxicity Studies

- o Flavoring Extracts
- o Ceylon cinnamon
- o Cinnamaldehyde-  
approved in food but  
dangerous if inhaled



**KEEP  
CALM**

...but

**I'm allergic  
to cinnamon!**

# What are they smoking?

Enjoy Freedom from

Acetic Acid  
Ammonia  
Arsenic  
Butane

Cadmium  
Carbon Monoxide  
Hexamine  
Methane

Methanol  
Paint  
Stearic Acid  
Toluene





# Second Hand Exposure



# Second Hand Exposure (Schripp et al)

- Found low levels of formaldehyde, acetaldehyde, isoprene, acetic acid, 2-butanodione, acetone, propanol, propylene glycol, diacetyl, and nicotine emitted in the air.
- Toxins in e cigarette aerosol was much lower than conventional cigarette (5-40 x lower)



# Second Hand Exposure (Schober et al)

- o Measured indoor pollution from 3 e-cigarette users over a 2 hour period in a café.
- o Found elevated nicotine, 1,2-propanediol, glycerin, aluminum, and 7 polycyclic aromatic hydrocarbons- Probable Carcinogens (International Agency for Research on Cancer)



The advertisement shows a man in a blue and white striped shirt smiling and holding a glass of beer, with a young boy in a green shirt sitting next to him. The man is holding a lit cigarette. In the background, there is a sign that says "Cigarette Technology Alert" and a smartphone displaying the "regal" logo. Below the image, the text reads "Find Out How James Can Smoke Anywhere" and "Learn More". At the bottom, it lists "Featured On:" with logos for CNN, NBC, USNews, and Scientific American. The address "Regal Cigs 405 W. Fairmont Drive Tempe, Arizona 85282" is printed at the very bottom.

Find Out How James Can  
**Smoke Anywhere**

Learn More

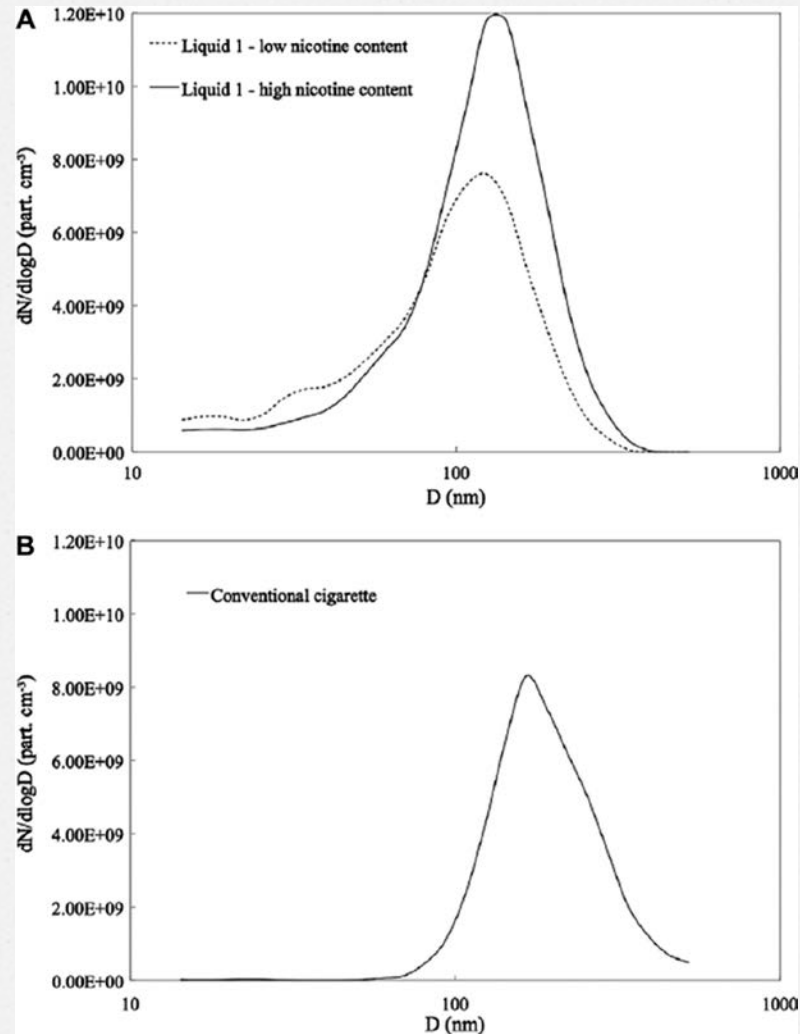
Featured On:  
CNN NBC USNews SCIENTIFIC AMERICAN

Regal Cigs 405 W. Fairmont Drive Tempe, Arizona 85282

# Particulate Matter

- Create an aerosol of ultrafine particles
- Unclear health effects and toxicity
- Evidence that frequent low or short term levels of exposure can contribute to pulmonary and systemic inflammatory processes than could increased risk of CV, Resp. disease
- May contain metals including tin, lead, cadmium, copper, nickel and chromium nanoparticles

# Particle number distribution from (A) mainstream aerosol in e-liquid 1 and from (B) conventional cigarette.



Grana R et al. *Circulation*. 2014;129:1972-1986

# Fire Hazard



# Are They Safe?



# Health Effects

- o Very little research has been conducted
- o No serious adverse effects with >6 month of use compared to nicotine patches
- o Immediate effects of e-cigarette use constricts peripheral airways (increased impedance and resp. resistance)
- o Immediate effect- decreased fraction of exhaled nitric oxide {FENO} (pulmonary inflammation).
- o Long term biological effects are unknown



# Cessation Claims



✓ NO TAR  
✓ NO TOBACCO  
✓ NO ADDITIVES  
✓ NO CARCINOGENS  
✓ NO SMELL

JOIN HUNDREDS WHO HAVE SUCCESSFULLY STOPPED SMOKING WITH OUR ELECTRONIC CIGARETTES



CHOOSE FROM A VARIETY OF FLAVORS AND NICOTINE LEVELS  
FEELS LIKE A REAL CIGARETTE

**FlickTheCig.com**

- Order Online
- Order By Phone
- Local Pickup

*“An electronic cigarette is a device that delivers nicotine through water vapor instead of smoke. The device is filled up with our special flavored “Smoke Juice” and puffed on just like a cigarette. You still get the same “cigarette” feel when you inhale minus the dangerous carcinogens that are found in traditional cigarettes.*”

Call Gershie Goldberg at 216-214-1025 or visit us online at



# Mixed Messages



## WHY QUIT? SWITCH TO BLU

blu is the smart choice for smokers wanting a change. Take back your freedom to smoke when and where you want without ash or smell. blu is everything you enjoy about smoking and nothing else. Nobody likes a quitter, so make the switch today.

Visit [blucigs.com](http://blucigs.com)

blu

PREMIUM ELECTRONIC CIGARETTE

18+ only

CALIFORNIA PROPOSITION 65 - Warning: This product contains nicotine, a chemical known to the state of California to cause birth defects or other reproductive harm.

# Effects on Cessation of Conventional Cigarettes

- o 4 longitudinal studies and 1 cross sectional
- o Combining these results yield a pooled Odds of quitting  $<1.0$ .
- o Population based studies reflect real world e-cigarette use found e-cigarette use is not associated with successful quitting

# Clinical Trials

- o 4 clinical trials, and 3 did not have control group who were not using e- cigarettes
- o 1 study compared it to 21 mg nicotine patch
- o E-cigarette no better (with or without nicotine) than the nicotine patch
- o All treatments produce very modest quit rates without counseling

# Dual Use

- o Both duration and intensity determine negative health effects of smoking
- o “ Reducing the # cig/day is much less effective than quitting entirely.” (US Surgeon General 2014)
- o Light smoking even 1-4 cigarettes a day associated with increased risk of CV disease
- o Still delivers fine particles

# Cessation

- The safest and most proven smoking cessation pharmacotherapies are the nicotine replacement medications Varenicline and Bupropion
- If failed initial treatment, intolerant or refuses to use conventional smoking cessation medication, reasonable to support decision to try e-cigarette

# Informed Patient

- o Although e-cigarette aerosol is likely to be less toxic than cigarette smoking...
- o Products are unregulated
- o Contain Toxic chemicals
- o Have NOT been proven as cessation devices
- o Advise NOT to use indoors or around children
- o Urge to set a quit date
- o Should quit smoking entirely as soon as possible

# United States (March 2014)

- o Remain unregulated by any federal authority
- o FDA does not have authority to regulate where e-cigarettes are used (domain of state and local government)
- o 27 States restrict sales to minors
- o MN taxed e-cigarette products as tobacco
- o 3 states (NY, ND, Utah) prohibit use in 100% smoke free indoor





# American Heart Association

## March 2014

- o “Policy makers in many countries are under considerable pressure to provide regulatory guidance regarding e-cigarettes, often on the basis of the assumption that e-cigarettes will contribute to reducing the harms of smoking either by serving as a smoking cessation aid or replacing combusted cigarettes”

# American Heart Association

## March 2014

- o “The data reviewed here, together with evidence of dual use and youth initiation of e-cigarette use, do not demonstrate any hypothesized harm-reducing effect.”

# AHA Policy Statement

## (8/25/14)

- o Inclusion of e-cigarettes in smoke-free air laws
- o Inclusion of e-cigarettes in state, federal laws and regulation that prohibit sale to minors.
- o Inclusion of e-cigarettes in laws that restrict the marketing and advertising of e-cigarettes to minors
- o Taxing e-cigarettes at a rate high enough to discourage youth use, while retaining or increasing differentials with combustible products by increasing taxes on combustibles

# AHA Policy Statement

## (8/25/14)

- o Support effective FDA regulation of e-cigarettes that addresses marketing, youth access, labeling, quality control over manufacturing, free sampling, and standards for contaminants
- o Cartridges and bottles should have proper warning and child-proof packaging
- o Companies should not be able to claim e-cigarettes are cessation aid until they are proven by FDA for that purpose

# AHA Policy Statement (8/25/14)

- Should be part of tobacco screening questions that are part of every health examination
- Clinicians should be educated about e-cigarettes and be prepared to counsel their patients regarding comprehensive tobacco cessation strategies
- Not enough evidence yet for clinicians to counsel their patients who are using combustible tobacco products to use e-cigarettes as a primary cessation aid

# AHA Policy Statement

## (8/25/14)

- For patients with existing CVD or stroke, or at risk of a CVD event, intensive cessation counseling and pharmacotherapy should be offered as soon as possible.
- Recognizes the need to improve and increase surveillance on e-cigarette use through the US and global population and establish a research agenda to elucidate the longititude public health impact
- Supports including e-cigarettes in the definition of tobacco products and smoking.

# AHA Policy Statement

## (8/25/14)

- o Employers will have to decide whether employees who use e-cigarettes exclusively will be considered tobacco users
- o Employers may charge tobacco users up to 50% more for their health insurance under the new Affordable Care Act
- o Insurance companies may also assess the 50% penalty in the individual market.

# Questions?

