

Smoke and Mirrors: Electronic Cigarettes and Child Health

**Satellite Conference and Live Webcast
Thursday, April 28, 2016
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Faculty

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Objectives

- **Review e-cigarette nomenclature and components**
- **Discuss e-cigarette user patterns and trends**
- **Review available scientific evidence of health concerns**
 - **For the user: safety of devices and aerosol**

Objectives

- **For the non-user:**
 - **Second and third-hand aerosol exposure**
 - **Poisoning risks**
- **Review public health concerns**
 - **Potential to glamourize and re-normalize smoking**

Objectives

- **Addiction potential**
- **Lack of data on use as a smoking cessation device**

Electronic Cigarette Take Home Points

- **Awareness and use of electronic cigarettes has skyrocketed over the past few years**
- **Electronic cigarette solution and aerosol have been found to contain toxicants, including nicotine, and carcinogens**

Electronic Cigarette Take Home Points

- Electronic cigarette solution often contain nicotine, which is a tobacco product

Electronic Cigarette Take Home Points: Recommended Actions

- Children should not be exposed to e-cigarettes, e-cigarette aerosol, or e-cigarette solution
- Screen children and adults for electronic cigarette use when asking about tobacco

Electronic Cigarette Take Home Points: Recommended Actions

- Counsel children and adults not to use electronic cigarettes and offer / recommend tobacco dependence treatment if they are using
- Electronic cigarettes should not be recommended for smoking cessation

Terminology: Electronic Cigarettes

- Electronic Nicotine Delivery Systems (ENDS)
- e-cigarettes
- Electronic cigars or e-cigars
- E-hookah or hookah sticks
- Vaping devices, vape pens, and personal vaporizers
- Mechanical mods or tanks

Electronic Cigarettes are Sold Everywhere!

- “Vape” shops
- Convenience stores
- Gas stations
- Retail outlets
- Mall kiosks
- Grocery stores
- Internet vendors

Electronic Cigarette Use National Youth Tobacco Survey (NYTS)

- Middle and high school students current use (past 30 days)
 - NYTS 2014: 13.4% (2 million students)
 - NYTS 2013: 4.5% (660,000 students)

Electronic Cigarette Use National Youth Tobacco Survey (NYTS)

- 2013 Data
 - 6.1% of youth (6-12 grades) had ever tried e-cigarette
 - > 3 x rate from 2011
 - 20.2% of ever-cigarette smokers and 0.9% of never smokers

What are the Ingredients Advertised to be in e-cigarette Solutions?

- Humectant
- Flavoring
- +/- Nicotine

What are the Ingredients FOUND in e-cigarette Solutions?

- Humectant
- Flavoring
- +/- Nicotine
- Toxicants
- Carcinogens
- Metallic nano-particles

What is GRAS Classification?

- Generally Recognized As Safe
- GRAS applicable for food, not inhalation
 - Based on scientific evidence, or, for a substance used in food before 1958, through experience based on common use in food by “substantial history of consumption for food use by a significant number of consumers”

What is GRAS Classification?

- Exclusions made for certain things
 - Propylene glycol is excluded from cat food due to Heinz body anemia

Constituents of e-cigarette Solution: Humectants

- Propylene glycol: general recognized as safe
 - Few human studies for inhalation, however has been used as a tobacco humectant historically
 - Can cause eye and respiratory irritation

Constituents of e-cigarette Solution: Humectants

- MSDS from Dow Chemical states “inhalation exposure to [propylene glycol] mists should be avoided”
- Vegetable glycerin: generally recognized as safe
 - When heated and vaporized, can form acrolein, which can cause upper respiratory irritation

Constituents of e-cigarette Solution: Humectants

- For all: unknown long-term health impacts from repeated inhalation

Constituents e-cigarette Solution: Flavorings

- Have NOT been assessed for safety as inhalants
- American e-Liquid Manufacturing Standards Association does not allow:
 - Diacetyl, whole tobacco alkaloids, medicinals, illegal or controlled substances, caffeine, vitamins, artificial food coloring

Constituents e-cigarette Solution: Flavorings

- Flavors are KNOWN to be appealing to youth

Constituents of e-cigarette Solution: Nicotine

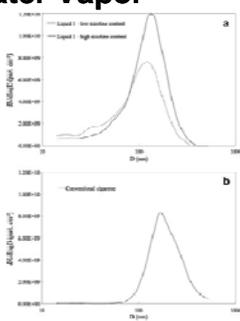
- There are ENDS solutions that claim no nicotine
- What is nicotine and where does it come from?
 - Nicotine is considered a toxin
 - Nicotine is commercially available only from the tobacco plant

Constituents of e-cigarette Solution: Nicotine

- Nicotine is the primary psychoactive ingredient in tobacco

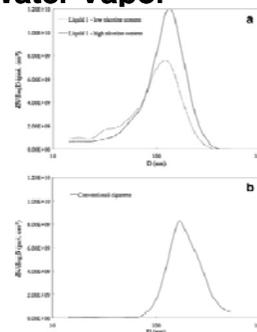
Secondhand Aerosol: Not Just Water Vapor

- Emit variable levels of nicotine (1/10th that of cigarettes),
- Emit fine particles of similar size to that of cigarettes and comparable concentration of fine particles



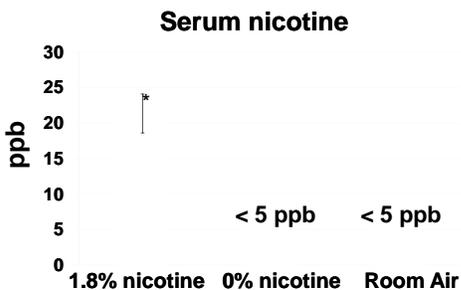
Secondhand Aerosol: Not Just Water Vapor

- Emit low levels of other toxins: formaldehyde, acetaldehyde, metals



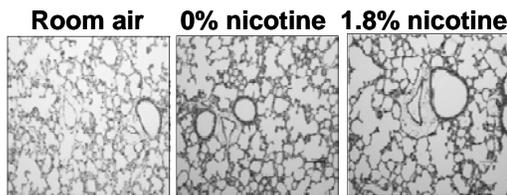
What are Potential Harms to Children?

Serum nicotine levels are elevated in neonatal mice exposed to 1.8% e-cig emissions twice a day for ten days



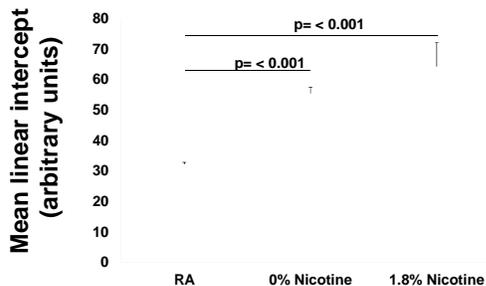
What are Potential Harms to Children?

Alveolar growth is impaired in newborn mice exposed to e-cigarette emissions

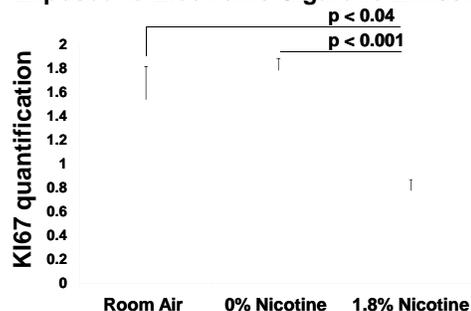


What are Potential Harms to Children?

Alveolar growth is impaired in newborn mice exposed to e-cigarette emissions



Lung Function is Impaired in Neonatal Mice Exposed to Electronic Cigarette Emissions



Electronic Cigarette Thirdhand Aerosol

- Nicotine collects on surfaces after ENDS use
- Nicotine then combines with indoor substances such as ozone and nitrous oxide to make irritants and carcinogens

Summary: Health Harms

- Safety of e-cigarette liquid components when heated and inhaled is unknown
- Toxicants, including nicotine, and carcinogens are found in e-cigarette solution and secondhand aerosol

Summary: Health Harms

- Growing concerns for health effects with decreased lung function and immune function
- Unregulated industry so you don't know what you are getting

Public Health Concerns

- Potential to glamourize and re-normalize smoking
- Addiction potential, particularly for youth
- Nonsmokers and former smokers may become addicted
- Used as a non-FDA approved smoking cessation device
- May maintain combusted tobacco use

Renormalizing Smoking

- Allowed in places where smoking is not allowed
- Advertising is completely unrestricted, with TV ads for the first time since 1971
- Largely indistinguishable from cigarettes



Nicotine's Addiction Potential

- The adolescent brain is thought to be uniquely susceptible to nicotine addiction
- Animal studies show that nicotine exposure during adolescence period has long-standing effects in the brain including cell damage that leads to both immediate and persistent behavior changes.
- Gateway drug to cocaine and other drugs of abuse

Recruiting to Smoking?

- Never smoking youth who used ENDS were 2.3 times more likely to be smoking cigarettes or other combustible tobacco products a year later

Recruiting to Smoking?

- There was also a reverse effect, with kids who start smoking more likely to use e-cigarettes

Is there evidence that electronic cigarettes helps people quit smoking traditional cigarettes?

Is there evidence that electronic cigarettes helps people quit smoking traditional cigarettes?

Current evidence suggests that most smokers who use e-cigarettes for cessation become dual users i.e. use both conventional cigarettes and e-cigarettes. More studies are needed.

Clear Need for Regulation: What happens now?

- Expected that the market will continue to explode
- ANYONE currently can manufacture and sell
- Quality control – adulterated products have been found
- Most of the market still comes from China

Clear Need for Regulation

- FDA has issued their Deeming Document with expected jurisdiction in 2016
 - Improved quality control and production standards
 - No sales <18 years
 - Health warning labels
 - No vending machine sales
 - No marketing implying “healthy” or “safe”

Clear Need for Regulation

- Final rule has not yet come...
 - Would go into effect 2 years AFTER final rule
 - Misses several aspects: flavors, child-proof packaging, marketing, online sales
- Might come out in summer 2016?
- No Consumer Products Safety Commission oversight

American Academy of Pediatrics Recommendations

- Reduce youth access to and demand for e-cigarettes
- Eliminate exposure to e-cigarettes aerosol and solution
- Increase purchase age of all tobacco products to 21 years of age
- Prohibit flavors

American Academy of Pediatrics Recommendations

- Limit advertising and media depictions
- Tax e-cigarettes and solution similar to other tobacco products

Protecting Children from ENDS Solution Poisoning

- Child Nicotine Poisoning Prevention Act
- Signed with bipartisan support January 2016
- Requires liquid nicotine refills to have child-resistant packaging
- Enforced by the US Consumer Product Safety Commission
- Enforcement to begin in July 2016

Recommendations: What Can You Do in Clinical Practice

- Screen children for electronic cigarette use and exposure when asking about tobacco use and exposure
- Counsel children about the harms of e-cigarettes and strongly recommend they do not use them
- Counsel parents and other caretakers not to use electronic cigarettes or other tobacco products

Recommendations: What Can You Do in Clinical Practice

- For youth and parents who do use e-cigs, offer or recommend tobacco dependence treatment
- Advocate for completely smoke - free home and vehicle bans (including e-cigs)

Recommendations: What Can You Do in Clinical Practice

- Recommend e-cig liquid is stored as a medication (child resistant packaging and out of reach of children)
- Do not recommend e-cigs for smoking cessation

Recommendations: What Can You Do as a Healthcare Provider

- Advocate for comprehensive smoke free policies in your organization and community that include electronic cigarettes

Recommendations: What Can You Do as a Healthcare Provider

- Advocate for policies that reduce youth demand for electronic cigarettes
 - Ban flavors in electronic cigarette solution
 - Increase age of purchase of tobacco to 21 years of age
 - Ban Internet access to electronic cigarette products

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