Emerging Tobacco Products

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*Centers for Disease Control and Prevention*

Maryland State Council on Cancer Control Cancer Conference  
November 18, 2014

*The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.*
The burden of death and disease from tobacco use in the United States is overwhelmingly caused by cigarettes and other combusted tobacco products; rapid elimination of their use will dramatically reduce this burden.

The health consequences of smoking – 50 years of progress: a report of the Surgeon General. – Atlanta, GA. : U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health, 2014.
Overview

1. What are emerging tobacco products?
2. Who is using emerging products?
3. What are health risks of emerging products?
4. Which policy approaches are appropriate for emerging products?
## What Are ENDS?

**Electronic Cigarettes and Vaping Devices**

<table>
<thead>
<tr>
<th>Product</th>
<th>Description</th>
<th>Some Brands</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disposable e-cigarette</td>
<td>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.</td>
<td>NJOY, OneJoy, Aer</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Disposable, Flavorvapes</td>
</tr>
<tr>
<td>Rechargeable e-cigarette</td>
<td>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.</td>
<td>Blu, GreenSmoke, EonSmoke</td>
</tr>
<tr>
<td>Pen-style, medium-sized rechargeable e-cigarette</td>
<td>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.</td>
<td>Vapor King Storm, Totally Wicked Tornado</td>
</tr>
<tr>
<td>Tank-style, large-sized rechargeable e-cigarette</td>
<td>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.</td>
<td>Volcano Lavatube</td>
</tr>
</tbody>
</table>
ENDS

- Delivers nicotine-containing aerosol by heating a solution (typically propylene glycol or glycerol/ glycerin nicotine, and flavoring agents, and other additives)
- Long-term health effects of inhaled propylene glycol and glycerin are unknown

**ENDS Aerosol is not “Harmless Water Vapor”**

- Nicotine: 0-36 mg/ml
- Flavorings/additives often not disclosed
- Some analyses show presence of potentially allergenic compounds such as cinnamic aldehyde (highly toxic to human embryonic stem cells)
- Overheating could lead to production of carcinogens, such as formaldehyde, acetaldehyde, acrolein


ENDS Other Purposes

- Some ENDS can be used to deliver other substances, like marijuana and caffeine.
ENDS As Cessation Devices
Not Approved as a Cessation Device
Center for Drug Evaluation and Research

- In 8 years companies have not approached FDA for approval

Original Article

Electronic Cigarette Use Among Patients With Cancer
Characteristics of Electronic Cigarette Users and Their Smoking Cessation Outcomes

Sarah P. Borderud, MPH; Yulin Li, PhD; Jack E. Burkhalter, PhD; Christine E. Sheffer, PhD; and James S. Ostroff, PhD

BACKGROUND: Given that continued smoking after a cancer diagnosis increases the risk of adverse health outcomes, patients with cancer are strongly advised to quit. Despite a current lack of evidence regarding their safety and effectiveness as a cessation tool, electronic cigarettes (E-cigarettes) are becoming increasingly popular. To guide oncologists’ communication with their patients about E-cigarette use, this article provides what to the authors’ knowledge is the first published clinical data regarding E-cigarette use and cessation outcomes among patients with cancer. METHODS: A total of 100 participants included smokers (patients with cancer who recently enrolled in a tobacco treatment program at a comprehensive cancer center. Standard demographic, tobacco use history, and follow-up cessation outcomes were assessed. RESULTS: A 3-fold increase in E-cigarette use was observed from 2012 to 2015 (16% vs. 38.5%). E-cigarette users were more nicotine-dependent than nonusers, had more prior quit attempts, and were more likely to be diagnosed with thoracic and head or neck cancer. Using a complete case analysis, E-cigarette users were as likely to be smoking at the time of follow-up as nonusers (odds ratio, 1.1; 95% confidence interval, 0.6-1.7). Using an intention-to-treat analysis, E-cigarette users were twice as likely to be smoking at the time of follow-up as nonusers (odds ratio, 2.5; 95% confidence interval, 1.3-4.5). CONCLUSION: The high rate of E-cigarette use observed is consistent with recent articles highlighting increased E-cigarette use in the general population. The current longitudinal findings raise doubts concerning the usefulness of E-cigarettes for facilitating smoking cessation among patients with cancer. Further research is needed to evaluate the safety and efficacy of E-cigarettes as a cessation treatment for patients with cancer. Cancer. 2014;000:000-000. © 2014 American Cancer Society

## ENDS and Cessation

### Table 2. Population Studies of the Association Between E-Cigarette Use and Cessation of Conventional Cigarette Smoking

<table>
<thead>
<tr>
<th>Study</th>
<th>Location and Study Design</th>
<th>Odds of Quitting (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Longitudinal studies</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adkison et al(^4) (2013)</td>
<td>US, UK, Canada, Australia (ITC), surveyed, 1 y apart</td>
<td>0.81 (0.43–1.53)*</td>
</tr>
<tr>
<td>Vickerman et al(^8) (2013)</td>
<td>US quit-line callers from 6 states surveyed at enrollment and 7 mo later</td>
<td>0.50 (0.40–0.63)†</td>
</tr>
<tr>
<td>Grana et al(^7) (2014)</td>
<td>US sample drawn from a nationally representative internet panel, 1 y apart</td>
<td>0.76 (0.36–1.60)</td>
</tr>
<tr>
<td>Choi and Forster(^6) (2014)</td>
<td>Midwestern young adults, 1 y apart</td>
<td>0.93 (0.19–4.63)</td>
</tr>
<tr>
<td>Cross-sectional study</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Popova and Ling(^2) (2013)</td>
<td>US sample drawn from a nationally represented internet panel</td>
<td>0.69 (0.52–0.94) *</td>
</tr>
<tr>
<td>All studies</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pooled‡</td>
<td></td>
<td>0.61 (0.50–0.75)</td>
</tr>
</tbody>
</table>

CI indicates confidence interval; E-cigarette, electronic cigarette; and ITC, International Tobacco Control.

*Odds ratios obtained by contacting authors.
†Computed by authors of this report on the basis of the numbers reported.
‡Estimated with a random-effects meta-analysis using Stata 12.1 metan. There was no evidence of heterogeneity (P=0.28) or evidence of publication bias with the use of a funnel plot.

Cessation: Randomized Trials

• 2 trials conducted with control arms
  – Caponnetto et al., 2013 (3 e-cigarette arms)
    • Participants not interested in quitting
    • All arms reduced cigs/day, no difference in quits
  – Bullen et al., 2013
    • Participants wanted to quit
    • Nicotine e-cigarette, zero nicotine e-cigarette, NRT patch
    • 6 month follow-up
    • 50% reduction cigs/day (57%, 45%, 41%, p=0.08)
    • Quitting 7.3%, 4.1%, 5.8% (p=0.5)
Cessation in cancer patients

Borderud et al, 2014

- Patients presenting to Memorial Sloan Kettering Cancer Center 2012-2013 screened for tobacco use, users referred to Tobacco Cessation Program (n=4504)
- Those willing to enroll in treatment program included in study (n=1074)
  - Assessed for e-cigarette use
  - Follow up at 6-12 months for cessation status (n=414)

Findings:
- 26% reported past 30 day use of e-cigarettes at baseline; 92% of e-cigarette users were also smoking.
- Quarterly prevalence increased from 10.6% to 38.5%

Cessation in cancer patients

Continued

- **E-cigarette users:**
  - Smoked more cigarettes/day
  - Reported higher nicotine dependence scores
  - Had more frequent and longer duration of prior quit attempts
  - No difference in quitting motivation or confidence

- **At follow up:**
  - 7-day point prevalence of smoking abstinence was no different in e-cigarette users and non-users (44.4% vs. 43.1%).
  - E-cigarette users were less likely to have been abstinent for > 24 hrs
  - After adjustment, e-cigarette users as likely to be smoking at follow up as non-users.

Marketing
ENDS Advertising Expenditures across media markets

- 2011: $6.4 million
- 2012: $18.3 million
- 2013: >$80 million
Celebrity spokespeople

Glamorous women
Hundreds of flavors
Sports and music events sponsorship
Use in smoke-free areas

Smoke Anywhere
Smoke when and where you want.
Cheaper price

Smoking Everywhere E-Cigarette is cheaper than smoking real cigarettes. It also may have chemicals like traditional cigarettes, but at a lower cost...

Slide courtesy Pam Ling, UCSF
Social networking

Blu e-Cigs finally launches new 'Smart Pack' for social smoking, tweakable nicotine intake

THE LATEST SUPERSMOKER

BLUETOOTH

World first! In 2007, we introduced the first electronic cigarette in the world; 7 years later, we are changing the world of electronic smoking for good with the first Supersmoker that can be used to make calls and receive via Bluetooth and play music via the built-in microphone!
Placement Next to Candy

New research on the dangers of smoking to young women and their unborn babies can send chills down any woman’s spine. We now have several more compelling reasons to help women realize how important it is to quit smoking or switch to e-cigarettes - ideally e-cigarettes with no nicotine.

Quit smoking at any point during pregnancy reduces the chance of complications. Of course, the sooner, the better!
Physician Endorsement
What tactics lead to youth smoking?

- Exposure to ads
- Themes in advertising that resonate with youth
- Low prices and price-reducing promotions
- Ease of access to a product
- Candy and fruit-flavored products
- Health claims
- Products that are easier to use
Trends in Use
E-cigarette ever use more than doubled* between 2011 and 2012 among students

*Statistically different (p<0.05)

Current e-cigarette use among students more than doubled between 2011 and 2012

Current E-Cigarette Use*, National Youth Tobacco Survey, United States

<table>
<thead>
<tr>
<th></th>
<th>2011</th>
<th>2012</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Students</td>
<td>1.1%</td>
<td>2.1%</td>
</tr>
<tr>
<td>High School</td>
<td>1.5%</td>
<td>2.8%</td>
</tr>
<tr>
<td>Middle School</td>
<td>0.6%</td>
<td>1.1%</td>
</tr>
</tbody>
</table>

554,000 Students

130,000 students

* Current use is defined as use on one or more days in the last 30 days

E-Cigarette Ever Use
2010-2011

Health Effects

**Figure 1A** The health consequences causally linked to smoking

**Cancers**
- Trachea, bronchus, and lung
- Acute myeloid leukemia
- Liver
- Pancreas
- Kidney and ureter
- Cervix
- Bladder
- Colorectal

**Chronic Diseases**
- Stroke
- Blindness, cataracts, age-related macular degeneration
- Congenital defects—maternal smoking; orofacial clefts
- Periodontitis
- Aortic aneurism, early abdominal aortic aneurysms in young adults
- Coronary heart disease
- Pneumonia
- Atherosclerotic peripheral vascular disease
- Chronic obstructive pulmonary disease, *tuberculosis*, asthma, and other respiratory effects
- Diabetes
- Reproductive effects in women (including reduced fertility)
- Hip fractures
- Ectopic pregnancy
- Male sexual function—erectile dysfunction
- Rheumatoid arthritis
- Immune function
- Overall diminished health

*Note: The condition in red is a new disease that has been causally linked to smoking in this report.*
ENDS Potential for Harm

- **Direct harm**
  - Expose children and adolescents, pregnant women, and non-smokers to 2nd hand aerosol, nicotine
  - Poisonings among users or non-users
  - Uncertain health effects of long term exposure
    - Pulmonary delivery of propylene glycol, glycerin, nicotine
    - Lower toxin burden than cigarettes, but not water vapor
Nicotine
2014 Surgeon General’s Report

1. At high enough doses, nicotine causes **acute toxicity**
2. Nicotine **activates** multiple biological pathways through which smoking increases risk for disease
3. Nicotine exposure during fetal development has lasting adverse consequences for **brain development**
4. Nicotine adversely affects maternal and fetal health during pregnancy, contributing to multiple adverse outcomes including preterm delivery and stillbirth.

5. The evidence is suggestive that nicotine exposure during adolescence may have lasting adverse consequences for brain development.

6. The evidence is inadequate to infer the presence or absence of a causal relationship between exposure to nicotine and risk for cancer.
Number of calls to poison centers for cigarette or e-cigarette exposures, by month — United States, September 2010–February 2014

http://www.cdc.gov/mmwr/preview/mmwrhtml/mm6313a4.htm
ENDS Aerosol Second Hand Exposure

- Use of e-cigarettes in the home or car could expose children/nonsmokers to nicotine, as well as to propylene glycol and/or glycerin, and other toxicants, through inhaled aerosolized vapor and surface deposits.
  - Studies of third hand tobacco smoke found that smoke components, including nicotine, are deposited and reemitted from indoor surfaces over time, and can result in substantial nicotine exposure levels.
  - Nicotine from e-cigarettes also deposits on indoor surfaces, creating a reservoir of nicotine that could be ingested, absorbed transdermally, or inhaled by children.

Cigarettes vs. e-cigarettes: Passive exposure at home measured by means of airborne marker and biomarkers

Montse Ballbé, Jose M. Martínez-Sánchez, Xisca Sureda, Marcela Fu, Raúl Pérez-Ortuño, José A. Pascual, Esteve Saltó, Esteve Fernández

Background: There is scarce evidence about passive exposure to the vapour released or exhaled from electronic cigarettes (e-cigarettes) under real conditions. The aim of this study is to characterize passive exposure to nicotine from e-cigarettes' vapour and conventional cigarettes' smoke at home among non-smokers under real-use conditions.

Methods: We conducted an observational study with 54 non-smoker volunteers from different homes.
Potential Harmful Interaction with Cigarettes

- Glamorize and renormalize tobacco use
- Lead to regular use of nicotine and/or use of cigarettes in youth or adult non-smokers
- Delay quitting and/or diminish the chances a smoker will quit by leading to long-term dual use
- Discourage smokers from using proven quit methods
- Increase former smoker relapse
ENDS Potential for Benefit

Only under two circumstances:

- Are completely substituted for all combusted tobacco products in established adult smokers who would otherwise continue smoking

- Assist in rapid transition to a society with little or no use of burned products
Dual Use

- Most e-cigarette users are current or former smokers
- Smokers often begin using e-cigarettes to cut back or quit smoking and become dual users
- Cutting back on traditional cigarettes does not reduce risk of all-cause mortality
- Cutting back on traditional cigarettes does not reduce risk of CVD in a linear fashion


Bjartveit and Tverday. Health Consequences of smoking 1-4 cigarettes per day. Tobacco Control 2005.
Reducing smoking without quitting

Provider knowledge and beliefs

- **Statewide sample of physicians and NPs providing care to children 11-17 years of age in MN, 2013**
  - Self-reported knowledge about e-cigarettes
    - 18% “nothing at all”
    - 65% “a little”
  - Very or somewhat uncomfortable talking to patients: 53%

- **National survey of obstetricians/gynecologists 2012**
  - 14% e-cigarettes have no adverse effects during pregnancy
  - 2/3 wanted to know more about the potential health effects of noncombustible tobacco products;
  - Only 5% believed themselves to be fully informed

Provider knowledge and beliefs

- Random sample of NC physicians surveyed in 2013
  - 48% reported that patients sometimes or frequently ask about e-cigarettes
  - 67% indicated that e-cigarettes are a helpful smoking cessation aid
  - 35% recommend e-cigarettes to their patients
  - 13% believed that e-cigarettes are approved by the FDA for smoking cessation

What do existing recommendations say?
US Preventive Services Task Force

Nominating a Topic

The USPSTF makes recommendations about three types of clinical preventive services: screening tests, preventive medications, and counseling. Recommendations on preventive services are made for asymptomatic people (people without signs and symptoms of the conditions targeted by the preventive services). For more information and to nominate a topic, [click here](http://www.uspreventiveservicestaskforce.org/Page/Name/topics-in-progress).

III. Contextual Questions

Contextual questions will not be systematically reviewed and are not shown in the Analytic Framework.

1. What is the efficacy and safety of electronic cigarettes as an aid for smoking cessation in current adult smokers?
Tobacco dependence treatment professionals, including quitlines, are struggling with how to address e-cigarette use in the context of cessation. In the absence of established best practices, quitlines are creating treatment protocols for counseling and medications delivery. In the fall 2014, NAQC will publish an evidence synthesis on the topic to address these important questions.

Other Recommendations

• American Heart Association
• Forum of International Respiratory Societies (FIRS)
• American Lung Association
• CDC (Division of Reproductive Health)
• International Association for the Study of Lung Cancer

Information for Health Care Providers and Public Health Professionals: Preventing Tobacco Use During Pregnancy

What are the health effects of tobacco use on pregnancy?

- Smoking during pregnancy increases the risk of preterm birth and low birthweight for the baby.
- Smoking during pregnancy can cause complications for the mother, including bleeding, higher blood pressure, and a greater risk of miscarriage.

What is the prevalence of smoking before, during, and after pregnancy?

- CDC data show that 18.3% of adults report smoking 100 or more cigarettes during their lifetime.
- Smoking prevalence is highest among those who are younger, less educated, and have lower incomes.
- Smoking prevalence is also higher among those who are unmarried, and those who have a history of smoking.

What is the risk associated with smoking during pregnancy?

- Smoking during pregnancy can increase the risk of maternal complications, such as miscarriage, preterm labor, and stillbirth.
- Smoking during pregnancy can also increase the risk of infant complications, such as low birthweight, prematurity, and respiratory distress syndrome.

What is the best way to prevent smoking during pregnancy?

- Encouraging women to quit smoking before pregnancy can help reduce the risk of complications for both the mother and the baby.
- Providing support and resources to women who are trying to quit smoking can help them successfully quit during pregnancy.

E-Cigarettes and Cancer Patients

K. Michael Cummings, PhD, MPH, Carolyn M. Dresser, MD, MPH, John K. Field, PhD, FRCPath, Jesse Fox, MB ChB, MBA, Ellen R. Gratz, PhD, Navzer H. Hanna, MD, Noriko Koda, MD, PhD, Jason Jacobs, MD, PhD, James L. Maloney, MD, Matthew J. Peters, MD, FRACP, Nine H. Yamaguchi, MD, PhD, Graham Warren, MD, PhD, and Cecilia Zhou, MD, PhD

The increasing popularity and availability of electronic cigarettes (e-cigarettes) in many countries have prompted debates among health professionals as to what can be recommended to their patients who are smoking. E-cigarettes are often marketed as a safe alternative to traditional cigarettes, but the evidence is limited. The World Health Organization estimates that e-cigarettes contain hundreds of chemicals, many of which are known to cause cancer.

American Lung Association Statement on E-Cigarettes

The American Lung Association is concerned about the potential health consequences of electronic cigarettes, as well as the consumer claims that they can be used to help quit smoking. There is currently no government oversight of these products, and the Food and Drug Administration (FDA) is negotiating with the tobacco industry to require product testing and labeling. The FDA has not approved any e-cigarettes as safe and effective methods to help smokers quit. Other clinicians are not ready to tell their patients that e-cigarettes are a safe and effective way to quit smoking. However, we refer patients to the FDA for more information on the potential health consequences of electronic cigarettes.
State action on ENDS

- No sales to minors (34 states)
- No use where smoking is not allowed (3 states)
- Additional promising strategies may include retailer licensing, marketing restrictions, taxation

- CDC will soon track ENDS legislation on [http://www.cdc.gov/tobacco/state_system/](http://www.cdc.gov/tobacco/state_system/)
States and Communities
Rationale for prohibiting ENDS use in all places where smoking is not allowed

- Compare to clean air, not cigarette smoke
- There are no manufacturing standards
- Potential to expose youth, pregnant women, and non-smokers to aerosolized nicotine and other toxins
- No evidence public use is necessary for smokers to “switch” – could enable dual use
Smokeless Tobacco
Smokeless Tobacco

- **Types of smokeless tobacco:**
  - Chewing tobacco (loose leaf, plug, or twist and may come in flavors)
  - Snuff (moist, dry, or in packets [U.S. snus])
  - Dissolvables (lozenges, sticks, strips, orbs)
Snus

- A type of moist snuff
- Packaged in ready-to-use pouches that resemble small tea bags
- Pouch is placed between cheek or teeth and gums, does not require spitting
- Market share data unavailable
# Dissolvables

<table>
<thead>
<tr>
<th>Form</th>
<th>Description</th>
<th>Market Share (in 2011)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lozenges</td>
<td>Resemble pellets or tablets</td>
<td>Data unavailable</td>
</tr>
<tr>
<td>Orbs</td>
<td>Resemble small mints</td>
<td>Data unavailable</td>
</tr>
<tr>
<td>Sticks</td>
<td>Toothpick-like appearance</td>
<td>Data unavailable</td>
</tr>
<tr>
<td>Strips</td>
<td>Thin sheets like breath or medication strips</td>
<td>Data unavailable</td>
</tr>
</tbody>
</table>
Health Effects (Smokeless)

- Nicotine addiction
- Cancer of the mouth, esophagus and pancreas
- Leukoplakia, gum disease
- Increased risk for preterm birth and stillbirth when used during pregnancy (Swedish snus)
- Nicotine poisoning in children
- May increase the risk of death from heart disease and stroke

## US Snus

### Table 3
Mean values of total moisture, total nicotine, and pH and unprotonated nicotine using either 10 mL or 20 mL of water for each domestic oral tobacco product type.

<table>
<thead>
<tr>
<th>Tobacco type</th>
<th>Number of brands</th>
<th>Total moisture (%)</th>
<th>Total nicotine (mg/g, wet)</th>
<th>pH Mean</th>
<th>pH 10 mL</th>
<th>pH 20 mL</th>
<th>Unprotonated nicotine (mg/g, wet)</th>
<th>Unprotonated nicotine 10 mL</th>
<th>Unprotonated nicotine 20 mL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dry snuff</td>
<td>5</td>
<td>6.52</td>
<td>17.6</td>
<td>5.86</td>
<td>5.99</td>
<td>0.13</td>
<td>0.13</td>
<td>0.18</td>
<td></td>
</tr>
<tr>
<td>Loose leaf</td>
<td>3</td>
<td>21.9</td>
<td>6.29</td>
<td>5.74</td>
<td>5.82</td>
<td>0.04</td>
<td>0.04</td>
<td>0.04</td>
<td></td>
</tr>
<tr>
<td>Twist</td>
<td>3</td>
<td>15.0</td>
<td>30.6</td>
<td>5.34</td>
<td>5.39</td>
<td>0.10</td>
<td>0.10</td>
<td>0.11</td>
<td></td>
</tr>
<tr>
<td>Plug</td>
<td>4</td>
<td>18.3</td>
<td>8.68</td>
<td>5.48</td>
<td>5.55</td>
<td>0.03</td>
<td>0.03</td>
<td>0.03</td>
<td></td>
</tr>
<tr>
<td>Dry snuff (pouch)</td>
<td>4</td>
<td>6.18</td>
<td>11.7</td>
<td>6.94</td>
<td>6.98</td>
<td>1.06</td>
<td>1.06</td>
<td>1.14</td>
<td></td>
</tr>
<tr>
<td>Snus</td>
<td>3</td>
<td>25.9</td>
<td>10.1</td>
<td>7.64</td>
<td>7.64</td>
<td><strong>2.97</strong></td>
<td>2.97</td>
<td><strong>3.01</strong></td>
<td></td>
</tr>
</tbody>
</table>

## US Snus

<table>
<thead>
<tr>
<th>Tobacco product type</th>
<th>Brand</th>
<th>NAB (^a) (ng/g, wet)</th>
<th>NAT (ng/g, wet)</th>
<th>NNK (ng/g, wet)</th>
<th>NNN (ng/g, wet)</th>
<th>NNAL (ng/g, wet)</th>
<th>Total TSNAs (ng/g, wet)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Mean (SD)</td>
<td>Mean (SD)</td>
<td>Mean (SD)</td>
<td>Mean (SD)</td>
<td>Mean (SD)</td>
<td>Sum</td>
</tr>
<tr>
<td>Plug</td>
<td>Days o Work</td>
<td>30 (10)</td>
<td>762 (79)</td>
<td>340 (28)</td>
<td>2920 (500)</td>
<td>41 (1.1)</td>
<td>4090</td>
</tr>
<tr>
<td></td>
<td>Conwood Sun Cured</td>
<td>69 (10)</td>
<td>1520 (260)</td>
<td>844 (226)</td>
<td>3130 (260)</td>
<td>11 (11)</td>
<td>5580</td>
</tr>
<tr>
<td></td>
<td>Levi Garrett</td>
<td>199 (29)</td>
<td>1330 (100)</td>
<td>941 (78)</td>
<td>5140 (90)</td>
<td>140 (49)</td>
<td>7750</td>
</tr>
<tr>
<td></td>
<td>Taylor's Pride Plug Chew</td>
<td>183 (6.1)</td>
<td>1400 (100)</td>
<td>803 (83)</td>
<td>4640 (350)</td>
<td>188 (44)</td>
<td>7210</td>
</tr>
<tr>
<td>Loose Leaf</td>
<td>Beech-Nut Chew</td>
<td>23 (2.3)</td>
<td>563 (28)</td>
<td>300 (32)</td>
<td>1640 (60)</td>
<td>21 (0.9)</td>
<td>2550</td>
</tr>
<tr>
<td></td>
<td>Taylor's Pride Chew</td>
<td>76 (17)</td>
<td>796 (72)</td>
<td>306 (22)</td>
<td>2830 (240)</td>
<td>90 (80)</td>
<td>4100</td>
</tr>
<tr>
<td></td>
<td>Red Man Chew</td>
<td>16 (2.5)</td>
<td>351 (27)</td>
<td>238 (23)</td>
<td>942 (22)</td>
<td>20 (23)</td>
<td>1550</td>
</tr>
<tr>
<td>Snus</td>
<td>Camel Snus Frost</td>
<td>28 (1.3)</td>
<td>265 (37)</td>
<td>146 (13)</td>
<td>425 (53)</td>
<td>20 (3.0)</td>
<td>884</td>
</tr>
<tr>
<td></td>
<td>Camel Snus Spice</td>
<td>28 (8.5)</td>
<td>259 (35)</td>
<td>84 (22)</td>
<td>369 (59)</td>
<td>21 (12)</td>
<td>751</td>
</tr>
<tr>
<td></td>
<td>Camel Snus Original</td>
<td>26 (10)</td>
<td>251 (32)</td>
<td>140 (58)</td>
<td>389 (111)</td>
<td>20 (14)</td>
<td>826</td>
</tr>
<tr>
<td>Dissolvable</td>
<td>Stonewall Wintergreen</td>
<td>10 (0.2)</td>
<td>218 (9.3)</td>
<td>49 (5.4)</td>
<td>94 (5.8)</td>
<td>n.d. (--)</td>
<td>874</td>
</tr>
<tr>
<td></td>
<td>Stonewall Java</td>
<td>11 (1.3)</td>
<td>251 (8.0)</td>
<td>63 (3.5)</td>
<td>103 (17)</td>
<td>n.d. (--)</td>
<td>428</td>
</tr>
<tr>
<td></td>
<td>Stonewall Natural</td>
<td>11 (1.5)</td>
<td>247 (4.0)</td>
<td>73 (6.4)</td>
<td>117 (8.5)</td>
<td>n.d. (--)</td>
<td>448</td>
</tr>
<tr>
<td></td>
<td>Ariva Java</td>
<td>7.0 (1.4)</td>
<td>178 (11)</td>
<td>54 (5.2)</td>
<td>74 (6.8)</td>
<td>n.d. (--)</td>
<td>313</td>
</tr>
<tr>
<td></td>
<td>Ariva Wintergreen</td>
<td>8.0 (0.8)</td>
<td>176 (3.8)</td>
<td>52 (1.4)</td>
<td>77 (14)</td>
<td>n.d. (--)</td>
<td>313</td>
</tr>
<tr>
<td></td>
<td>Camel Orbs Mellow</td>
<td>15 (0.4)</td>
<td>176 (15)</td>
<td>147 (7.1)</td>
<td>189 (3.7)</td>
<td>5.6 (1.4)</td>
<td>533</td>
</tr>
<tr>
<td></td>
<td>Camel Orbs Fresh</td>
<td>17 (0.4)</td>
<td>194 (26)</td>
<td>202 (4.4)</td>
<td>193 (8.7)</td>
<td>5.8 (1.8)</td>
<td>512</td>
</tr>
</tbody>
</table>

US Snus

- Camel and Marlboro Snus are top-selling brands
- 2006-2010, 147 samples
- Compared with 2006
  - Pouch size increased in both brands
  - Camel snus pouches were higher in total, unprotonated nicotine and NNN /NNK by 1.9, 2.4, 3.3-fold respectively.
  - Marlboro snus pouches were higher in total, unprotonated nicotine by 2.1, 1.9, fold, respectively but 1.5-fold lower in NNN /NNK.

US Snus

- 2011, 216 samples gathered from 6 US regions, compared with samples collected in 2010
  - TSNA levels increased in Marlboro and Camel snus, and in some Camel dissolvables
  - Unprotonated nicotine levels did not change compared with 2010, but varied by region, as much as 3.2-fold

Swedish Match submits 100,000+ page Modified Risk Tobacco Product (MRTP) application to FDA to truthfully market General Snus to smokers as less hazardous alternative to cigarettes

RICHMOND, Va. — Copyright 2014 The Associated Press - Smokeless tobacco maker Swedish Match is asking the Food and Drug Administration to certify its General-branded pouches of tobacco as less harmful than cigarettes.

The company, with its North American headquarters in Richmond, Virginia, is filing an application with the FDA to approve the snus (pronounced "snoose") products as "modified risk."

R.J. Reynolds scales back marketing of dissolvable tobacco products

Richard Craver/Winston-Salem Journal

After spending more than 4 1/2 years in five test markets, including Charlotte, R.J. Reynolds Tobacco Co. has struggled to gain consumer traction for its trio of dissolvable tobacco products.

It has struggled to the extent that it is limiting future marketing of the products: a pellet (Camel Orbs), a twisted stick the size of a toothpick (Camel Sticks) and a film strip for the tongue (Camel Strips).

The goal has been making its tobacco products more accessible within a society that's clamping down on smoking. Reynolds

Hookah

- Water pipes that are used to smoke specially made tobacco that comes in different flavors, such as apple, mint, cherry, chocolate, coconut, licorice, cappuccino
- Also called *narghile*, *argileh*, *shisha*, *hubble-bubble*, and *goza*
- Often smoked in groups, mouthpiece shared.

http://www.cdc.gov/tobacco/data_statistics/fact_sheets/tobacco_industry/hookahs/
Many users think it is less harmful, hookah smoking has many of the same health risks as cigarette smoking (cancer, cardiovascular disease)

- Hookahs produce high levels of carcinogens and carbon monoxide
- An hour-long hookah session can involve 200 puffs, and 90,000 ml of smoke inhaled, compared with 20 puffs from smoking a single cigarette, or 500 ml smoke

http://www.cdc.gov/tobacco/data_statistics/fact_sheets/tobacco_industry/hookahs/
Hookah

- **High school seniors**
  - 1 of 5 boys, 1 of 6 girls used hookah in the last year

- **College students**
  - 22-40% used in last year

- **Adults**
  - 18.2% of 18-24 year olds use everyday, some days, or rarely

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1. Prevalence and Correlates of Smoking and Cessation-Related Behavior among Survivors of Ten Cancers: Findings from a Nationwide Survey Nine Years after Diagnosis, Cancer Epidemiol Biomarkers Prev, Published online Aug 6, 2014 doi: 10.1158/1055-9965.EPI-14-0046
Study of 2 universities in the Southeast, 2000 students

Marijuana (19.2%) and hookah (16.4%) were the most commonly used products in the last month

E-cigarettes were lower (4.5%)

There were high rates of concurrent use, esp. in e-cigarette users

Marijuana was the most positively perceived product followed by hookah and e-cigarettes
### Hookah

#### Table 2. Concurrent use of tobacco products and marijuana

<table>
<thead>
<tr>
<th>Product</th>
<th>Cigarettes n = 315 16.0%</th>
<th>Cigar products n = 293 14.9%</th>
<th>Smokeless tobacco n = 51 2.6%</th>
<th>Hookah n = 322 16.4%</th>
<th>Electronic cigarettes n = 88 4.5%</th>
<th>Marijuana n = 377 19.2%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cigarettes</td>
<td>–</td>
<td>43.3%</td>
<td>56.9%</td>
<td>41.0%</td>
<td>71.6%</td>
<td>38.7%</td>
</tr>
<tr>
<td>Cigar products</td>
<td>40.3%</td>
<td>–</td>
<td>54.9%</td>
<td>39.8%</td>
<td>46.6%</td>
<td>47.5%</td>
</tr>
<tr>
<td>Smokeless tobacco</td>
<td>9.2%</td>
<td>9.6%</td>
<td>–</td>
<td>7.1%</td>
<td>17.0%</td>
<td>5.0%</td>
</tr>
<tr>
<td>Hookah</td>
<td>41.9%</td>
<td>43.7%</td>
<td>45.1%</td>
<td>–</td>
<td>54.5%</td>
<td>41.1%</td>
</tr>
<tr>
<td>Electronic cigarettes</td>
<td>20.0%</td>
<td>14.0%</td>
<td>29.4%</td>
<td>14.9%</td>
<td>–</td>
<td>12.5%</td>
</tr>
<tr>
<td>Marijuana</td>
<td>46.3%</td>
<td>61.1%</td>
<td>37.3%</td>
<td>48.1%</td>
<td>53.4%</td>
<td>–</td>
</tr>
</tbody>
</table>

*Note: All chi-squared p-values < 0.001. To interpret, among users of column heading, % also using row heading in the past 30 days. Example: Of the 315 cigarette smokers, 40.3% also smoked cigar products in the past 30 days.*

Berg, Stratton, Schauer et al. Perceived Harm, Addictiveness, and Social Acceptability of Tobacco Products and Marijuana Among Young Adults: Marijuana, Hookah, and Electronic Cigarettes Win. Substance use and misuse 2014
FDA Center for Tobacco Products

Proposed newly “deemed” products would include electronic cigarettes, cigars, pipe tobacco, certain dissolvables that are not “smokeless tobacco,” gels, and waterpipe tobacco. Once the proposed rule becomes final, FDA can use regulatory tools, such as age restrictions and requiring scientific review of new tobacco products and claims to reduce tobacco-related disease and death.
Summary

- ENDS are not “safe”
- Unregulated sale and distribution driving demand
- Cessation claims are unproven
- Potential for harm and benefit depends on the context of combusted tobacco products
- Dual use/delayed quitting is a major concern
Emerging smokeless products are not without risk and their use can result in exposure to high levels of nicotine and carcinogens.

Hookah is used less frequently than cigarettes, but a single hookah session can result in high levels of exposure to carcinogens and carbon monoxide.

Many young adults who use hookah use other tobacco products concurrently.
Contact

Lucinda England, MD, MSPH
LBE9(@cdc.gov)

CDC Office on Smoking and Health

www.cdc.gov/tobacco
Resources

USPHSTF

- [http://www.fda.gov/TobaccoProducts/default.htm](http://www.fda.gov/TobaccoProducts/default.htm)
- [http://www.tobaccofreekids.org/tobacco_unfiltered/tag/e-cigarettes](http://www.tobaccofreekids.org/tobacco_unfiltered/tag/e-cigarettes)

CDC

- [http://www.cdc.gov/tobacco/campaign/tips/](http://www.cdc.gov/tobacco/campaign/tips/)
- [http://www.cdc.gov/reproductivehealth/TobaccoUsePregnancy/Providers.html](http://www.cdc.gov/reproductivehealth/TobaccoUsePregnancy/Providers.html)

Online training

- [http://iml.dartmouth.edu/education/dsr/](http://iml.dartmouth.edu/education/dsr/)
- [https://www.smokingcessationandpregnancy.org/](https://www.smokingcessationandpregnancy.org/)
Resources

Electronic cigarettes

- http://www.fda.gov/TobaccoProducts/default.htm
- http://www.tobaccofreekids.org/tobacco_unfiltered/tag/e-cigarettes
- http://publichealthlawcenter.org/programs/tobacco-control-legal-consortium