Non Cigarette Tobacco Products (NCTP) and Electronic cigarettes (e-cigs)

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Goals & Objectives

• Review NCTP definitions & products
• Discuss prevalence/trends of NCTP
• Discuss NCTP and addiction
• Review recommended treatments for NCTP
NCTP Definitions & Products
Pipes
Cigars

Images from www.trinketsandtrash.org
Cigar Definition

U.S. Department of Treasury (1996):

**Cigar**

“Any roll of tobacco wrapped in leaf tobacco or any substance containing tobacco.”

vs.

**Cigarette**

“Any roll of tobacco wrapped in paper or in any substance not containing tobacco.”
Types of cigars on the U.S. Market in 1996: (1) bidi (imported from India), (2) little cigar with filter tip, (3) small cigar with plastic mouth piece, (4) regular cigar, (5) and (6) premium cigar.
Smokeless Tobacco

Chewing tobacco

- Loose leaf (i.e., Redman)
- Plugs
- Twists

Snuff

- Moist (i.e., Copenhagen, Skoal)
- Dry (i.e., Honest, Honey bee, Navy, Square)
“Chewing Tobacco” = Cut tobacco leaves
“Snuff” = Moist ground tobacco
Type of ST Used in U.S.

Chewing Tobacco
Snuff

National Survey on Drug Use and Health (NSDUH)
“Spitless Tobacco” – Star Scientific
RJ Reynold’s

CAMEL SNUS
spice

CAMEL SNUS
frost

CAMEL SNUS
original

Camel Snus is a dry tobacco pleasure in a little pouch. Just place under your lips and chew. It's a pleasant taste, one pouch can last 10 to 20 minutes. (The nicotine is the only thing that has changed here.)

CAMEL SNUS
PLEASED TO SHAVE WITH.
“Swedish Style” ST

RJ Reynolds

Camel Snus is a tasty tobacco pouch in a little pouch. Just dip your finger in and suck on it and you'll find a pleasantME.

CAMEL SNUS original

CAMEL SNUS frost

CAMEL SNUS mellow

Camel Snus is a tasty tobacco pouch in a little pouch. Just dip your finger in and suck on it and you'll find a pleasantME.

CAMEL SNUS frost

CAMEL SNUS mellow
Phillip Morris (Altria)
New Product: “Fully Dissolvables”
Waterpipe

- Use dates back 4 centuries in Asia & Africa
- Typically consumed socially with friends and family
- Becoming trendy in US among youth
- Hookah “cafes” gaining popularity
- Smoke described as smoother and more flavorful
- Often (mis)perceived as healthier alternative due to water filtration, cooler mouth feel, and reduced irritation
Anatomy of a Waterpipe
Types of Waterpipe Tobacco

- **Maasel/Mu’essel**
  Combination of tobacco and molasses, honey or fruit

- **Tumbak/Ajami**
  Dark tobacco paste

- **Jurak**
  Combination of tobacco and fruits, oils, honey or molasses. May be flavored or flavorless

- **Moist tobacco** → requires charcoal to keep burning

“Vaping”
Looks like a cigarette, feels like a cigarette,
taste like a cigarette, but it isn’t a cigarette.
It’s just a much better way to smoke!
Better & healthier!

Smoking
Everywhere™
Electronic Cigarette

www.SmokingEverywhere.com
1-800-613-0337
It looks like a traditional cigarette,
It tastes like a traditional cigarette,
but it’s not a traditional cigarette

Same, Same, But Different

With Liberty Stix, You Have the Freedom To
SmokeAnywhere, No Carbon Monoxide, No Tar,
No Cancer causing agents!
ENDS

A battery-powered device that provides inhaled doses of vaporized nicotine solution. It is used as an alternative to smoked tobacco products, such as cigarettes, cigars, or pipes.
ENDS: Basic Structure

LED lights up where the smoker draws on the cigarette

Sensor detects when smoker takes a drag

MICROPROCESSOR controls heater and light

Battery

Heater vaporises nicotine

CARTRIDGE holds nicotine dissolved in propylene glycol
NCTP: Trends & Prevalence
Per-capita consumption of different forms of tobacco in the US 1880-1997

1900-2005 U.S. Per Capita Cigarette Consumption and 1930-2005 Age Adjusted Lung Cancer Death Rate per 100,000

NCHS Vital Statistics; death rates are age-adjusted to 2000 US standard population
Past Month Tobacco Use among Persons Aged 12 or Older

Results from the 2010 National Survey on Drug Use and Health
Cigar Smoking
< 18 years of age group constituted an increasingly greater proportion of the number of new cigar smokers:

Prevalence of current cigarette and cigar smoking among California males of different incomes, 1996

Prevalence of ST Use

- In 2010, 8.9 million (3.5%) used smokeless tobacco
SAMSHA

Percentages of Persons Aged 12 or Older Using Smokeless Tobacco in the Past Month, by Demographic and Geographic Characteristics: 2002 to 2007

<table>
<thead>
<tr>
<th>Demographic and Geographic Characteristic</th>
<th>Past Month</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age Group in Years</strong></td>
<td></td>
</tr>
<tr>
<td>12 to 17</td>
<td>2.2%</td>
</tr>
<tr>
<td>18 to 25</td>
<td>5.0%</td>
</tr>
<tr>
<td>20 or Older</td>
<td>3.0%</td>
</tr>
<tr>
<td><strong>Gender</strong></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>6.2%</td>
</tr>
<tr>
<td>Female</td>
<td>0.4%</td>
</tr>
<tr>
<td><strong>Race/Ethnicity</strong></td>
<td></td>
</tr>
<tr>
<td>White</td>
<td>4.1%</td>
</tr>
<tr>
<td>Black or African American</td>
<td>1.4%</td>
</tr>
<tr>
<td>American Indian or Alaska Native</td>
<td>7.1%</td>
</tr>
<tr>
<td>Native Hawaiian or Other Pacific Islander</td>
<td>2.9%</td>
</tr>
<tr>
<td>Asian</td>
<td>0.6%</td>
</tr>
<tr>
<td>Hispanic or Latino</td>
<td>0.9%</td>
</tr>
<tr>
<td>Two or More Races</td>
<td>2.9%</td>
</tr>
<tr>
<td><strong>County Type</strong></td>
<td></td>
</tr>
<tr>
<td>Large Metropolitan</td>
<td>1.9%</td>
</tr>
<tr>
<td>Small Metropolitan</td>
<td>3.7%</td>
</tr>
<tr>
<td>250,000 to 1 Million Population</td>
<td>3.2%</td>
</tr>
<tr>
<td>&lt;250,000 Population</td>
<td>4.7%</td>
</tr>
<tr>
<td>Non-Metropolitan</td>
<td></td>
</tr>
<tr>
<td>Urbanized</td>
<td>6.6%</td>
</tr>
<tr>
<td>Less Urbanized</td>
<td>5.5%</td>
</tr>
<tr>
<td>Completely Rural</td>
<td>8.4%</td>
</tr>
<tr>
<td><strong>Region</strong></td>
<td></td>
</tr>
<tr>
<td>Northeast</td>
<td>1.7%</td>
</tr>
<tr>
<td>Midwest</td>
<td>3.7%</td>
</tr>
<tr>
<td>South</td>
<td>4.2%</td>
</tr>
<tr>
<td>West</td>
<td>2.4%</td>
</tr>
</tbody>
</table>
Waterpipe

- After cigarettes, waterpipe use is the most common form of tobacco use among university students
- Predominantly young, males
- 30% ever use & 8.4% current use
- Used in a social context
  - More common in fraternities/sororities
- Most smoked < 2 years
  - 10% daily
- Most perceive less addictive and harmful
  - 67% said “cigarettes more harmful”

Odds of Trying Waterpipe, Snus, or ENDDs (n = 3158)

<table>
<thead>
<tr>
<th>Predictors</th>
<th>Have tried one of these products adjusted OR (95% confidence interval)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Smoking status</td>
<td></td>
</tr>
<tr>
<td>Former smoker</td>
<td>2.71 (2.06, 3.56)</td>
</tr>
<tr>
<td>Nondaily smoker</td>
<td>6.13 (4.02, 9.33)</td>
</tr>
<tr>
<td>Daily smoker</td>
<td>5.53 (4.03, 7.58)</td>
</tr>
<tr>
<td>Region</td>
<td></td>
</tr>
<tr>
<td>Northeast</td>
<td>1.68 (1.16, 2.42)</td>
</tr>
<tr>
<td>Midwest</td>
<td>1.65 (1.20, 2.28)</td>
</tr>
<tr>
<td>West</td>
<td>1.80 (1.36, 2.39)</td>
</tr>
<tr>
<td>Age</td>
<td></td>
</tr>
<tr>
<td>18–24</td>
<td>2.18 (1.60, 2.97)</td>
</tr>
<tr>
<td>Sex</td>
<td></td>
</tr>
<tr>
<td>Males</td>
<td>3.51 (2.77, 4.45)</td>
</tr>
<tr>
<td>Education</td>
<td></td>
</tr>
<tr>
<td>High school</td>
<td>1.58 (.99, 2.51)</td>
</tr>
<tr>
<td>Some college</td>
<td>2.67 (1.69, 4.22)</td>
</tr>
<tr>
<td>College degree</td>
<td>2.04 (1.26, 3.30)</td>
</tr>
</tbody>
</table>

Model also included race, not significant. Reference groups were as follows: never smokers, south region, 25 years of age and older, females, and no high school degree.

*Lifetime Use

Percentage of adults (≥18 years) who have heard of and used electronic nicotine delivery systems (ENDS)—2009 and 2010 ConsumerStyles.

Regan A K et al. Tob Control doi:10.1136/tobaccocontrol-2011-050044
How are People Using ENDDs?

- Internet-administered survey
- Men 77%
- Smoking status
  - Former smokers 63%
  - Daily smokers 23%
  - Occasional (non-daily) smokers 13%
- Smokers: 12 cpd

How are People Using ENDDs?

<table>
<thead>
<tr>
<th>Reason</th>
<th>Number of comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>To quit smoking</td>
<td>53</td>
</tr>
<tr>
<td>For health, as e-cigarettes were perceived to be less toxic than tobacco</td>
<td>49</td>
</tr>
<tr>
<td>Less expensive than regular cigarettes</td>
<td>26</td>
</tr>
<tr>
<td>Can be smoked everywhere, including smoke-free places</td>
<td>21</td>
</tr>
<tr>
<td>To avoid disturbing other people, or producing environmental tobacco smoke or the smell of stale smoke</td>
<td>20</td>
</tr>
<tr>
<td>For the pleasure of smoking, including the pleasure of inhaling and smoking-related actions</td>
<td>19</td>
</tr>
<tr>
<td>To reduce cigarette consumption</td>
<td>14</td>
</tr>
<tr>
<td>Curious to test a new product</td>
<td>10</td>
</tr>
<tr>
<td>Ecigarettes taste and smell good</td>
<td>8</td>
</tr>
<tr>
<td>Previously failed to quit with either nicotine patch or bupropion</td>
<td>3</td>
</tr>
<tr>
<td>To get nicotine</td>
<td>2</td>
</tr>
<tr>
<td>Total (from three open-ended fields)</td>
<td>225</td>
</tr>
</tbody>
</table>
Health Impact of NCTP
Adjusted relative risk* (95% CI) of death
Sustainer = No switching

<table>
<thead>
<tr>
<th>Deaths from</th>
<th>Never smoked</th>
<th>Pipe only (95% CI)</th>
<th>Cigarettes only (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Men (n=16 932 aged 20–49 years)</td>
<td>1.00</td>
<td>1.99 (1.73 to 2.27)</td>
<td>2.44 (2.27 to 2.62)</td>
</tr>
<tr>
<td>All causes</td>
<td>1.00</td>
<td>3.07 (2.35 to 4.00)</td>
<td>3.17 (2.69 to 3.73)</td>
</tr>
<tr>
<td>Ischaemic heart disease</td>
<td>1.00</td>
<td>1.54 (0.84 to 2.82)</td>
<td>2.30 (1.71 to 3.11)</td>
</tr>
<tr>
<td>Stroke</td>
<td>1.00</td>
<td>2.49 (1.99 to 3.10)</td>
<td>2.81 (2.48 to 3.20)</td>
</tr>
<tr>
<td>Cardiovascular disease</td>
<td>1.00</td>
<td>10.32 (5.55 to 19.18)</td>
<td>16.78 (10.31 to 27.33)</td>
</tr>
<tr>
<td>Lung cancer</td>
<td>1.00</td>
<td>1.47 (0.99 to 2.18)</td>
<td>1.95 (1.59 to 2.38)</td>
</tr>
<tr>
<td>Other smoking related cancer</td>
<td>1.00</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Tverdal et al. Tob Control 2011;20 123-130
Disease Risks

• Tar of cigar is more carcinogenic than cigarette smoke tar

• Morbidity and mortality correlates with:
  • +/- inhalation
  • depth of inhalation
  • number of cigars they smoke
Levels of Inhalation, CPS-1 Study

Mortality Ratios for Cigar & Cigarette Smokers vs. Never Smokers

Data from the 12 year follow-up of CPS I

Lung cancer death rates for cigar smokers with different patterns of inhalation and number of cigars per day compared with one pack per day cigarette smokers.

- 20 cigarettes/day, initiation at age 18
- 5+ cigars/day, moderate inhalation
- 3-4 cigars/day, moderate inhalation
- 5+ cigars/day, no inhalation
- never smoker

Cigar Smoking – Pancreatic Cancer Risk

- Compared with never tobacco users, cigar-only smokers have an increased risk for pancreatic cancer
  - OR 1.6 (95% CI: 1.2-2.3)
- Comparable to that of cigarette-only smokers
  - OR 1.5 (95% CI 1.4-1.6)

ST – Health Consequences

Report on Carcinogens, 10th Edition, National Toxicology Program, USDHHS

Smokeless tobacco

“Known to be a human carcinogen”
28 Known Carcinogens in ST

- Including.....
- β-Angelica lactone
- Coumarin
- Ethyl carbamate (urethane)
- Formaldehyde
- Acetaldehyde
- Crotonaldehyde


- Tobacco-specific N-nitrosamines (TSNA)
  - N′-Nitrosonornicotine (NNN)
  - 4-(Methylnitrosamino)-1-(3-pyridyl)-1-butanone (NNK)
  - 4-(Methylnitrosamino)-1-(3-pyridyl)-1-butanol (NNAL)
  - N′-Nitrosoanabasine (NAB)
- Arsenic
- Nickel compounds
- Polonium-210
- Uranium-235
- Uranium-238
### Health Effects: Cancers – U.S. Data

<table>
<thead>
<tr>
<th>Location</th>
<th>OR (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cancer, Mouth and Gum</td>
<td>11.2 (4.1-30.7)</td>
</tr>
<tr>
<td>Gum &amp; Buccal Mucosa</td>
<td>4.2 (2.6-6.7)</td>
</tr>
<tr>
<td>Larynx</td>
<td>7.3 (2.9-18.3)</td>
</tr>
<tr>
<td>Salivary gland</td>
<td>5.3 (1.2-23.4)</td>
</tr>
<tr>
<td>Kidney</td>
<td>4.0 (1.2-12.9)</td>
</tr>
<tr>
<td>Pancreatic</td>
<td>3.6 (1.0-12.8)</td>
</tr>
</tbody>
</table>

ST Health Effects: CV Disease

CPS-II

*Current ST use vs. never associated with death from:
  - **All causes**: HR 1.18 (95% CI: 1.08-1.29)
  - **CHD**: HR 1.26 (95% CI: 1.08-1.47)
  - **Cerebrovascular dz**: HR 1.40 (95% CI: 1.10-1.79)

- No difference between snuff and chewing tobacco
- **Former use** did increase the risk of death in any category

*Multivariate-adjusted

ST – Oral Lesions

• Leukoplakia
• Oral cancer
• Dental disease
  • erosion of enamel
  • dental caries
• Periodontal Disease
  • gingival recession
  • soft tissue/hard tissue loss
  • gingivitis
Waterpipe – Health Effects

• 1-hour session involves inhaling 100-200 times volume of smoke from a single cigarette

• Smoke contains CO, heavy metals, and carcinogens

• Charcoal added to keep tobacco burning increases health risks

• Sharing = tuberculosis & hepatitis

WHO. TobReg Advisory Note. Waterpipe Tobacco Smoking

Google: “who tobreg water pipe”
Waterpipe Analysis

Waterpipe vs. Cigarette

- Directly compare waterpipe use & cigarette smoking
- 31 participants reporting monthly waterpipe use & weekly cigarette smoking
- Cross-over: 45 minutes with waterpipe (WP) and 1 cigarette
- CO (carbon monoxide): 23.9 ppm WP vs. 2.7 C
- COHb (carboxyhemoglobin): 3.9% WP vs. 1.3% C
- Puff volume: 48.6 L WP vs. 1.0 L C
- Peak nicotine levels were comparable
  - 1.7 times the nicotine exposure

Disease Risks

- Burning charcoal is normally placed atop the tobacco to smoke the narghile waterpipe
- Waterpipe smokers thus also inhale large quantities of combustion-generated toxicants

Waterpipe – Health Effects

Single narghile smoking session:

- 50 times the quantities of carcinogens as one cigarette\(^A\)
- Many times the formaldehyde, acetaldehyde and acrolein typically found in a cigarette\(^B\)
- 2.25 mg nicotine\(^C\)
- 242 mg nicotine-free dry particulate matter (NFDPM)\(^C\)
- Higher levels of arsenic, chromium and lead than a cigarette\(^C\)

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Waterpipe

- Waterpipe tobacco smoking negatively affects lung function
  - Significant reduction in FEV1 compared to no smoking (4% lower FEV1)
  - Trend toward lower FVC (1.38% lower FVC) compared to no smoking
  - No statistically significant difference in FEV(1), FVC, and FEV(1)/FVC compared to cigarette smoking
- May be as harmful as cigarette smoking
- Likely to be a cause of COPD

Waterpipe

• Literature review
  • Cohort, case-control and cross-sectional studies

• Increased risk for
  • Lung cancer
  • Respiratory illness
  • Low birth-weight
  • Periodontal disease

• In 2009, FDA's Center for Drug Evaluation, Division of Pharmaceutical Analysis (DPA) analyzed:
  • 2 samples of electronic cigarettes & components from two leading brands
    • 18 of the flavored, nicotine, and no-nicotine cartridges
  • Nicotine inhaler (control)
• DPA's analysis:
  • Diethylene glycol in one cartridge @ 1%
    • Ingredient used in antifreeze & toxic to humans
  • Tobacco-specific nitrosamines (TSNA’s) in 1/2 of samples
    • Human carcinogen
  • Tobacco-specific impurities detected in a majority of the samples tested
    • May be harmful to humans
      • Anabasine
      • Myosmine
      • β-nicotyrine

www.fda.gov
**Propylene glycol**: pharmaceutical solvent, food additive, moisturizer (cosmetics & toothpaste), hand sanitizer, non-toxic antifreeze, deodorants, aircraft de-icer.

en.wikipedia.org

<table>
<thead>
<tr>
<th>Substance</th>
<th>Recipe 1</th>
<th>Recipe 2</th>
<th>Recipe 3</th>
<th>Recipe 4</th>
<th>Recipe 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Propylene glycol</td>
<td>85%</td>
<td>80%</td>
<td>90%</td>
<td>80%</td>
<td>&lt;65%</td>
</tr>
<tr>
<td>Nicotine</td>
<td>6%</td>
<td>4%</td>
<td>2%</td>
<td>0.1%</td>
<td>&lt;3%</td>
</tr>
<tr>
<td>Glycerol</td>
<td>2%</td>
<td>5%</td>
<td>-</td>
<td>5%</td>
<td>&lt;20%</td>
</tr>
<tr>
<td>Tobacco essence</td>
<td>-</td>
<td>4%</td>
<td>4.5%</td>
<td>1%</td>
<td>&lt;5%</td>
</tr>
<tr>
<td>Essence</td>
<td>2%</td>
<td>-</td>
<td>1%</td>
<td>1%</td>
<td>&lt;5%</td>
</tr>
<tr>
<td>Organic acid</td>
<td>1%</td>
<td>-</td>
<td>-</td>
<td>2%</td>
<td>&lt;1%</td>
</tr>
</tbody>
</table>
Propylene glycol

Vegetable glycerine
“E-Juice” or “Smoke Juice”

- Total nicotine = 720 mg
- Lethal nicotine dose = 40–60 mg (0.5-1.0 mg/kg)
ENDDs: Health Effects

- 30 healthy smokers (Athens, Greece)
  - Minimum of 5 pack-years
  - Aged 19-56 years
  - 14 male
- E-cigarette for 5 minutes
- ENDDs associated with a significant increase in airway resistance

ENDDs Properties

• E-cigarettes required stronger suction to smoke than conventional brands

• Amount of aerosol produced by e-cigarettes decreased during smoking
  • Necessitated increasing puff strength to produce aerosol.

• “Decreased efficiency of aerosol production during e-cigarette smoking makes dosing nonuniform over time and calls into question their usefulness as nicotine delivery devices.”

Trtchounian A,. Nicotine Tob Res. 2010 Sep;12(9):905-12.
Pharmacology
NCTP Bioavailability of Nicotine (aka “Smoke Yields”)

<table>
<thead>
<tr>
<th>Type</th>
<th>Nicotine (mg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cigarette (filter)</td>
<td>1.1</td>
</tr>
<tr>
<td>Pipe</td>
<td>5.2</td>
</tr>
<tr>
<td>Smokeless tobacco</td>
<td></td>
</tr>
<tr>
<td>Chewing tobacco</td>
<td>4.5</td>
</tr>
<tr>
<td>Moist snuff</td>
<td>3.6</td>
</tr>
<tr>
<td>Cigars</td>
<td></td>
</tr>
<tr>
<td>Little cigars, Swishers</td>
<td>3.8</td>
</tr>
<tr>
<td>Premium, Macanudo</td>
<td>13.3</td>
</tr>
<tr>
<td>4 mg nicotine gum</td>
<td>1.9</td>
</tr>
</tbody>
</table>
Smokeless Tobacco Nicotine “Content”

- 4.8 mg nicotine/gm of moist snuff x 30 gm/can = 144 mg
- 144 mg nicotine/(1.8 mg nicotine/cigarette) = 80 cigarettes
- 80 cigarettes/(20 cigarettes/pack) = 4 packs
- 1 can snuff = 4 packs of cigarettes
- ST Users are exposed to as much, and possibly more, daily nicotine than cigarette smokers

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Table 1. Tobacco-specific nitrosamines, pH, total and unprotonated nicotine, and minor tobacco alkaloids in smokeless tobacco products.

<table>
<thead>
<tr>
<th>Product</th>
<th>TSNAs(^a), µg/g dry weight</th>
<th>Alkaloids, mg/g dry weight</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>NNN(^a)</td>
<td>NNK(^a)</td>
</tr>
<tr>
<td>New products</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Taboka</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Original</td>
<td>1.05</td>
<td>0.077</td>
</tr>
<tr>
<td>Green</td>
<td>0.948</td>
<td>0.092</td>
</tr>
<tr>
<td>Marlboro Snus</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rich</td>
<td>1.27</td>
<td>0.259</td>
</tr>
<tr>
<td>Mild</td>
<td>1.52</td>
<td>0.229</td>
</tr>
<tr>
<td>Spice</td>
<td>1.56</td>
<td>0.257</td>
</tr>
<tr>
<td>Mint</td>
<td>3.28</td>
<td>0.215</td>
</tr>
<tr>
<td>Camel Snus</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Original</td>
<td>1.15</td>
<td>0.270</td>
</tr>
<tr>
<td>Spice</td>
<td>1.27</td>
<td>0.157</td>
</tr>
<tr>
<td>Frost</td>
<td>1.20</td>
<td>0.267</td>
</tr>
<tr>
<td>Skoal Dry</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Regular</td>
<td>3.57</td>
<td>0.360</td>
</tr>
<tr>
<td>Cinnamon</td>
<td>5.30</td>
<td>0.313</td>
</tr>
<tr>
<td>Menthol</td>
<td>2.53</td>
<td>0.279</td>
</tr>
<tr>
<td>Mean for new products</td>
<td>2.05</td>
<td>0.231</td>
</tr>
<tr>
<td>Traditional products</td>
<td></td>
<td></td>
</tr>
<tr>
<td>General Snus</td>
<td>1.66</td>
<td>0.464</td>
</tr>
<tr>
<td>Copenhagen Snuff</td>
<td>5.12</td>
<td>1.40</td>
</tr>
<tr>
<td>Copenhagen Long Cut</td>
<td>3.76</td>
<td>1.10</td>
</tr>
<tr>
<td>Skoal Long Cut</td>
<td>4.66</td>
<td>1.64</td>
</tr>
<tr>
<td>Kodiak Wintergreen</td>
<td>6.86</td>
<td>1.41</td>
</tr>
<tr>
<td>Mean for traditional products</td>
<td>4.41</td>
<td>1.20</td>
</tr>
</tbody>
</table>

Note. \(^a\)Abbreviations: TSNAs, tobacco-specific N-nitrosamines; NNN, N'-nitrosornicotine; NNK, 4-(methylnitrosamino)-1-(3-pyridyl)-1-butane; NAT, N'-nitrosoanatabine; NAB, N'-nitrosoanabasine. \(^b\)ND, not detected.
ST Characteristics Affecting Nicotine Blood Concentrations

• Concentration of nicotine in ST product

• Size of the tobacco cuttings
  • Long cut
  • Fine cut (higher)

• Ammonium bicarbonate (additive)
  • Lower acid level of product = higher free nicotine

• Acetic acid (additive)
  • Increases salivation – enhances absorption

pH Manipulation by Industry

- October 1994, Wall Street Journal:
  - "US Tobacco routinely adds chemicals to its snuff to deliver the free nicotine faster and to make the product stronger."
    - Larry Story, former UST chemist

- "It (Copenhagen) was brought up to a pH of 7.8 by adding more sodium bicarbonate and ammonium carbonate."
  - Larry Story, former UST chemist

Connolly, G. N. *Tob Control* 4: 73-79.
Impact of pH Manipulation: Long-Term

• Likelihood of choosing a brand with higher nicotine content is related to:
  • Increasing duration of use
  • Increasing intensity of use
  • Frequency of ST use

• ST users who have used higher nicotine-containing products are more likely to report:
  • More nicotine withdrawal symptoms
  • Continued use because of difficulty quitting

Waterpipe

- Data indicates that daily waterpipe use of the produced a 24-hr urinary cotinine level of: 0.785 microg/ml (95% CI = 0.578-0.991 microg/ml)
- Daily waterpipe smoking is equivalent to smoking 10 cigarettes (95% CI: 7-13)

Crown 7 Hydro

Njoy NPRO

Eisenberg T. Tob Control. 2010 Feb;19(1):87-8..
ENDDs – Are the “Addicting”? 

- 20 participants
  - Smoked >15 cigarettes per day
  - Aged 18-55 years

- ENDDS were associated with:
  - Significant nicotine delivery
  - Tobacco abstinence symptom suppression
  - Increased product acceptability ratings

Current Recommendations for Treatment
Pipes, Cigars, & Waterpipe
Treatment Options

Non-daily users
- Nicotine gum
- Nicotine lozenge
- Nicotine inhaler
- Nicotine nasal spray

Daily users
- Nicotine patch
- Bupropion SR
- Varenicline
Smokeless Tobacco (ST)
Assessing Dependence in ST Users

Number of cans per week

• Strongest correlation with nicotine/cotinine blood concentrations

• Used for dosing guidelines
## Nicotine Patch Dosing Algorithm for ST Users

<table>
<thead>
<tr>
<th>Peak serum nicotine concentrations (ng/mL)</th>
<th>Cans or pouches per week</th>
<th>Patch dose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>0-10</td>
<td>&lt; 2</td>
</tr>
<tr>
<td>Intermediate</td>
<td>11-20</td>
<td>2-3</td>
</tr>
<tr>
<td>High</td>
<td>&gt; 20</td>
<td>&gt; 3</td>
</tr>
</tbody>
</table>

Ebbert. JSAT. 2004
Snuff Substitutes

- Smokey Mountain®
- Golden Eagle®
- Oregon Mint®
- KIK IT®
- Jerky®
- Bacc-Off®
Nicotine Lozenge

- 2 mg & 4 mg
- Dissolves in mouth over 20-30 minutes
- Delivers 25% more nicotine than the gum
Nicorette “Mini” – 2 mg/4 mg

Generic (large) lozenge
Nicotine Lozenge: Dosing

- Not to be chewed or swallowed whole
- Avoid eating or drinking food during and 15 minutes prior to use
- Monotherapy
  - 2 mg
    - First dip ≥ 30 min
    - ≤ 3 cans/week
  - 4 mg
    - First dip < 30 min
    - > 3 cans/week
- Combination may be optimal (patch)
- 1-2 lozenges every 1-2 hours
- Minimum of 9/day
- Taper over 12 weeks
Nicotine Gum

• Monotherapy
  • 2 mg
    • First dip ≥ 30 min
    • ≤ 2 cans/week
  • 4 mg
    • First dip < 30 min
    • > 2 cans/week

• “Chew and Park”

• Combination with nicotine patch may be optimal
Scandinavian Snus

32% of men aged 16-35 use snus daily

19% adult snus use prevalence
Varenicline (Chantix™) for Snus Users

- Norway (7 sites) & Sweden (9 sites)
- Male/female daily ST users
  - Use at least 8 times/day
- Randomized to:
  - Varenicline for 12 weeks
  - Placebo
- Biochemical confirmation of abstinence
  - Salivary cotinine > 15 ng/mL

Your Path to Smokeless Tobacco Freedom
Your brain and nicotine: The physical challenge of quitting

You use these for many reasons. One main reason is because smoking tobacco contains an addictive drug called nicotine. This is the substance that makes it so difficult to stop, even though you want to.

You’re prepared! It’s your quit day!

It’s the start of your tobacco-free life

My Quit Date is:

In preparation for today I will:

☐ Clear out my car
☐ Make plans with my support people
☐ Plan activities or projects
☐ Dispose of all tobacco (check my gym bag, glove compartment and other storage areas)
☐ Make an appointment to see a health care provider
☐ Make an appointment to see a counselor
☐ Get the medications necessary
☐ Other:

You may find it helpful to keep notes of your experiences during this time.

List ways that you might feel during the first week:

CHW CHECKS: List these “cheers checks” at the base of your desk or draw an outline of the CDW to keep them on the desk. Carry these with you and record each time you smoke a cigarette — see page 24 for instructions.
Blood nicotine levels of chewing tobacco vs. nicotine gum.

Nicotine in chewing tobacco is absorbed very rapidly and peaks within minutes. Even after the chew is removed, nicotine is absorbed through the lining of the mouth and small intestine. In comparison, the nicotine absorbed through the lining of the mouth from gum is absorbed much more slowly and often is not obtained with chewing tobacco.

Normal inside cheek

Snuff dipper pouch (where chew is placed)
Recommended ST Treatment Approach

- Bupropion SR
  - Weight gain prevention
  - Craving reduction
- Tailored nicotine patch therapy
  - Craving reduction
  - Short-term (end-of-treatment) abstinence
- Nicotine lozenge (short-term abstinence)
- Nicotine gum (craving reduction)
- Varenicline
Treatment Not Recommended for ST Users

• Nicotine inhaler
  • Designed to replicate the tactile sensation of a cigarette

• Nicotine nasal spray
  • Speed of intranasal delivery designed to the speed of delivery of a cigarette
ENDDs – Are the “Addicting”? 

- 20 participants
  - Smoked >15 cigarettes per day
  - Aged 18-55 years

- ENDDS were associated with:
  - Significant nicotine delivery
  - Tobacco abstinence symptom suppression
  - Increased product acceptability ratings

Comparison of intention to quit smoking and past year quit attempts among US smokers (adults who reported having smoked 100 cigarettes in their lifetime and currently smoke everyday or on some days) who have tried an electronic nicotine delivery system (ENDS) and smokers who have not—ConsumerStyles 2010.

Regan A K et al. Tob Control doi:10.1136/tobaccocontrol-2011-050044
Goals & Objectives

• Review NCTP definitions & products
• Discuss prevalence/trends of NCTP
• Describe NCTP pharmacology
• Discuss NCTP addiction
• Review recommended treatments for NCTP