Smokeless Tobacco and other Non-Cigarette Products

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Objectives

• Review NCTP definitions & products
• Discuss prevalence/trends of NCTP
• Identify tools to assess dependence on smokeless tobacco products
• Discuss strategies for addressing this addiction, including pharmacotherapy and counseling
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.”

**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
“Snus” = Moist ground tobacco
Type of ST Used in U.S.

Chewing Tobacco
Snus

National Survey on Drug Use and Health (NSDUH)
“Spitless Tobacco” – Star Scientific
Product Content

- Ariva = 1.5 mg nicotine/piece
  - Wintergreen
  - Java
- Stonewall = 4 mg nicotine/piece
  - Wintergreen
  - Natural
  - Java

RJ Reynold's
“Swedish Style” ST
Phillip Morris (Altria)
“Fully Dissolvables”
Tobacco-less Nicotine Product - Altria

Package of 16 discs, each containing about 1.5 milligrams of nicotine = $3

Virginia test market
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
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

ENDS:

Electronic Nicotine Delivery Systems

*aka*

“E-cigarettes”
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.
“Vaping”
ENDS: Basic Structure

LED lights
- up when the smoker draws on the cigarette

Microprocessor
- controls heater and light

Sensor
- detects when smoker takes a drag

Heater
- vaporizes liquid and nicotine

Cartridge
- holds nicotine dissolved in propylene glycol

Battery

Steam aspiration

ENDS – Liquid Solution Composition

<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: pharmaceutical solvent, food additive, moisturizer (cosmetics & toothpaste), hand sanitizer, non-toxic antifreeze, deodorants, aircraft de-icer.

en.wikipedia.org
“E-Juice” or “Smoke Juice”

- **Total nicotine** = 720 mg
- **Lethal nicotine dose** =
  - 40–60 mg (0.5-1.0 mg/kg)
Propylene glycol

Vegetable glycerine
NCTP: Trends & Prevalence
Per-capita consumption of different forms of tobacco in the US 1880-1997

Past Month Tobacco Use among Persons Aged 12 or Older

Results from the 2010 National Survey on Drug Use and Health
Cigar Smoking
Total U.S. cigar consumption 1880-1997 and significant events in the use of cigars

- Ban on TV Advertising of little cigars
- First Surgeon General’s Report
- Modern blended cigarettes introduced
- Great Depression
- Advertising of little cigars begins on TV
- Cigar Aficionado begins publishing

U.S. Cigar Consumption (Billions)

Year


< 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

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>26 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>
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<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>6.6%</td>
</tr>
<tr>
<td>Urbanized</td>
<td>5.5%</td>
</tr>
<tr>
<td>Less Urbanized</td>
<td>7.1%</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>

*Lifetime Use

Preferred Snus Products

- Skoal
- Copenhagen
- Kodiak
- Timber Wolf
- Red Seal
- Grizzly

National Survey on Drug Use and Health
E-Cigarettes

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
Leader of the Pack

blu ELECTRONIC CIGARETTE

Leaders know freedom never goes out of style. Control when and where you want to smoke with blu electronic cigarettes. blu produces no smoke and no ash, only vapor, making it the ultimate gadget and the smarter alternative to regular cigarettes.

blucigs.com

Available Now at: SHEETZ, 7-11, Scolaari's, H-E-B, meijer

18+ only.

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

SURGEON GENERAL'S WARNING: Quitting Smoking Now Greatly Reduces Serious Risks to Your Health.
• 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

www.fda.gov
• E-cigarette cartridges labeled as “no nicotine”
  • Low levels of nicotine present in all cartridges tested, except one.

• 3 different E-cigarette cartridges
  • Same label
  • Markedly different amount of nicotine with each puff.
  • Range: from 26.8 to 43.2 mcg nicotine/100 mL puff

• One high-nicotine cartridge delivered 2 x as much nicotine as the nicotine inhaler

www.fda.gov
Health Effects of ENDS

• Research limited
  • Short-term and long-term

• Two unpublished studies analyzing short-term effects
  • Significant increases in airway resistance within 5-10 minutes of E-cigarette use
  • Found in both non-smokers and daily smokers


Crown 7 Hydro

Njoy NPRO
ENDS: Effect on desire to smoke


40 participants were randomised to use ENDS containing 16 mg nicotine, 0 mg nicotine, nicotine inhaler or usual cigarette on each of four study days 3 days apart, with overnight smoking abstinence before use of each product.
January, 2010

Judge Orders F.D.A. to Stop Blocking Imports of E-Cigarettes From China

By DUFF WILSON
Published: January 14, 2010

A federal judge on Thursday ordered the Food and Drug Administration to stop blocking the importation of electronic cigarettes from China and indicated that the devices should be regulated as tobacco products rather than drug or medical devices.

- Appeal denied April 2011… FDA will not pursue further
- E-Cigarette regulated as tobacco product, not a drug
- FDA expected to offer further guidance in 2013
Big Tobacco Entering ENDS Market

• Lorillard purchases Blu Cigs - April 2012

• Reynolds American testing an electronic cigarette called Vuse

• Philip Morris has been in negotiations with Ruyan Group
  • Manufacturer of the original e-cigarette
ENDS
Summary

• ENDS- “e-cigarettes”- electronic nicotine delivery systems

• Deliver nicotine solution by heating and vaporizing for inhalation

• Safety concerns have been raised

• No evidence to support use as a treatment to help smokers stop smoking

• Legal status in the US– regulated as tobacco
  • FDA yet to reveal regulations
Health Impact of NCTP
Adjusted relative risk* (95% CI) of death
Sustainer = No switching

<table>
<thead>
<tr>
<th>Deaths from</th>
<th>'Sustainers'</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Never smoked</td>
<td>Pipe only</td>
<td>Cigarettes only</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Men (n=16,932 aged 20–49 years)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>All causes</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>Ischaemic heart disease</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>Stroke</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>Cardiovascular disease</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>Lung cancer</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>Other smoking related 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>
</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.
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-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>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cancer, Mouth and Gum</td>
<td>11.2 (4.1-30.7)</td>
<td>A</td>
</tr>
<tr>
<td>Gum &amp; Buccal Mucosa</td>
<td>4.2 (2.6-6.7)</td>
<td>B</td>
</tr>
<tr>
<td>Larynx</td>
<td>7.3 (2.9-18.3)</td>
<td>A</td>
</tr>
<tr>
<td>Salivary gland</td>
<td>5.3 (1.2-23.4)</td>
<td>A</td>
</tr>
<tr>
<td>Kidney</td>
<td>4.0 (1.2-12.9)</td>
<td>C</td>
</tr>
<tr>
<td>Pancreatic</td>
<td>3.6 (1.0-12.8)</td>
<td>D</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 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\(^C\)

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

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
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&lt;sup&gt;a&lt;/sup&gt;, µg/g dry weight</th>
<th>Alkaloids, mg/g dry weight</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>NNN&lt;sup&gt;a&lt;/sup&gt;</td>
<td>NNK&lt;sup&gt;a&lt;/sup&gt;</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>
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<tr>
<td>Camel Snus</td>
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<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>
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<tr>
<td>Skoal Dry</td>
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</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>
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<tr>
<td>Mean for new products</td>
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</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></td>
<td></td>
</tr>
</tbody>
</table>

Note. <sup>a</sup>Abbreviations: TSNAs, tobacco-specific N-nitrosamines; NNN, N'-nitrosonornicotine; NNK, 4-(methylnitrosamino)-1-(3-pyridyl)-1-butanone; NAT, N'-nitrosoanatabine; NAB, N'-nitrosoanabasine. <sup>b</sup>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)

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
Bupropion SR: Dosing

150 mg daily for 3-4 days then
150 mg twice a day for 3-4 days THEN
STOP CHEWING

3 to 12 months – No taper needed
Snuff Substitutes

- Smokey Mountain®
- Golden Eagle®
- Oregon Mint®
- KIK IT®
- Jerky®
- Bacc-Off®
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 $\geq$ 30 min
    - $\leq$ 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
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

Facilitator Guide

MAYO CLINIC
NICOTINE DEPENDENCE CENTER
Your brain and nicotine: The physical challenge of quitting

You use chew for many reasons. One main reason is because smokeless 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 groups
☐ Plan activities or projects
☐ Dispose of all tobacco (check my gym bag, glove compartment and other storage areas)
☐ Make an appointment to see my dentist
☐ Make an appointment to see my doctor
☐ Buy the medications recommended
☐ Other:

Nicotine from chewing tobacco is absorbed by your bloodstream much like alcohol. Nicotine from swallowed tobacco is absorbed much like the nicotine comes through your lips before entering your bloodstream. Your heart pumps nicotine to your brain and the rest of your body.

You may find it helpful to write check mark next to days that you chew:

List ways that you can think about to keep yourself from chewing:

1. 
2. 
3. 
4. 
5. 
6. 
7. 
8. 
9. 
10. 

Chew checks: Simple ways to check your progress.

List ways that you can think about to keep yourself from chewing:

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7. 
8. 
9. 
10. 

Chew checks: Simple ways to check your progress.
**Blood nicotine levels of chewing tobacco vs. nicotine**

- **Bupropion**
  - Available doses: 150 mg
  - Comments:

- **Varenicline**
  - Available doses: 0.5 mg, 1 mg
  - Comments:

---

Nictotine 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 (from gums) is absorbed much more slowly and often results in a flare-up of 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
Goals & Objectives

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