



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



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Cigars

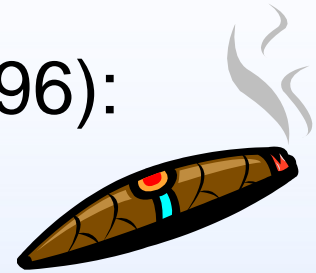


Images from www.trinketsandtrash.org

Cigar Definition

U.S. Department of Treasury (1996):

Cigar



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

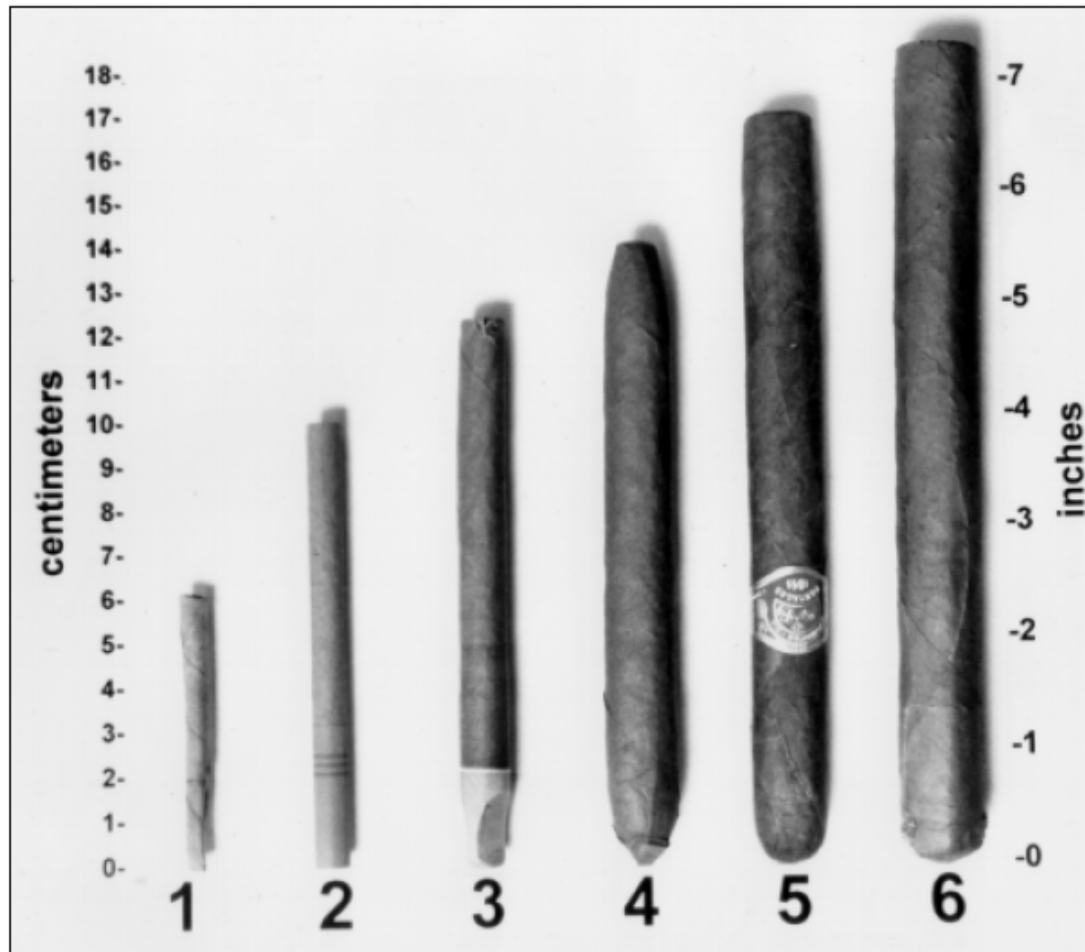
vs.

Cigarette

“Any roll of tobacco wrapped in paper or in any substance not containing tobacco.”

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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.



NCI Monograph 9. Cigars: Health Effects and Trends.



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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



“Spitless Tobacco” – Star Scientific

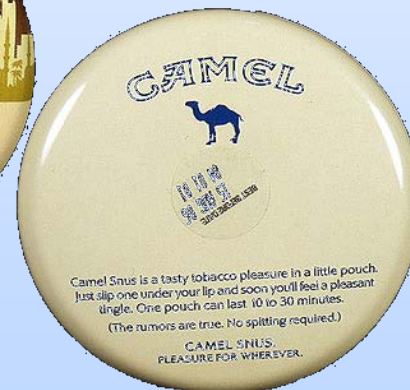


RJ Reynolds's



“Swedish Style” ST

RJReynolds



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Phillip Morris (Altria)



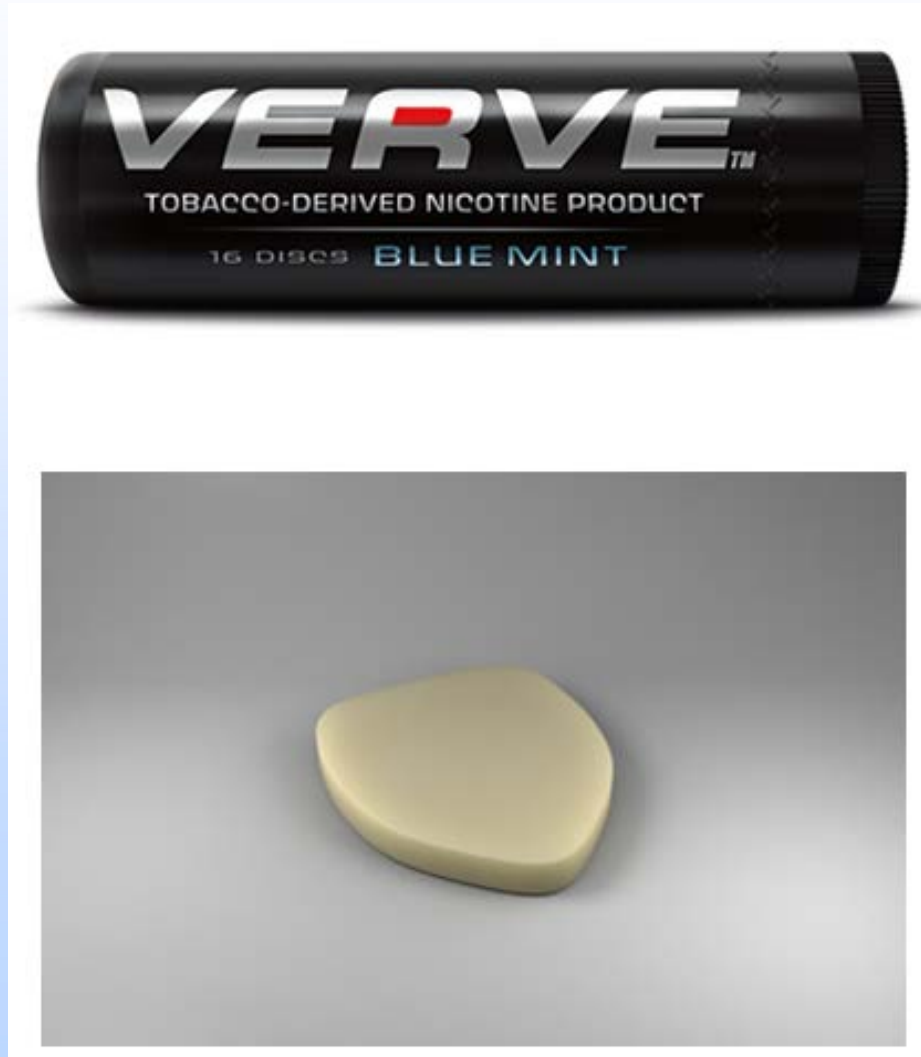
“Fully Dissolvables”



Tobacco-less Nicotine Product - Altria

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

Virginia test
market

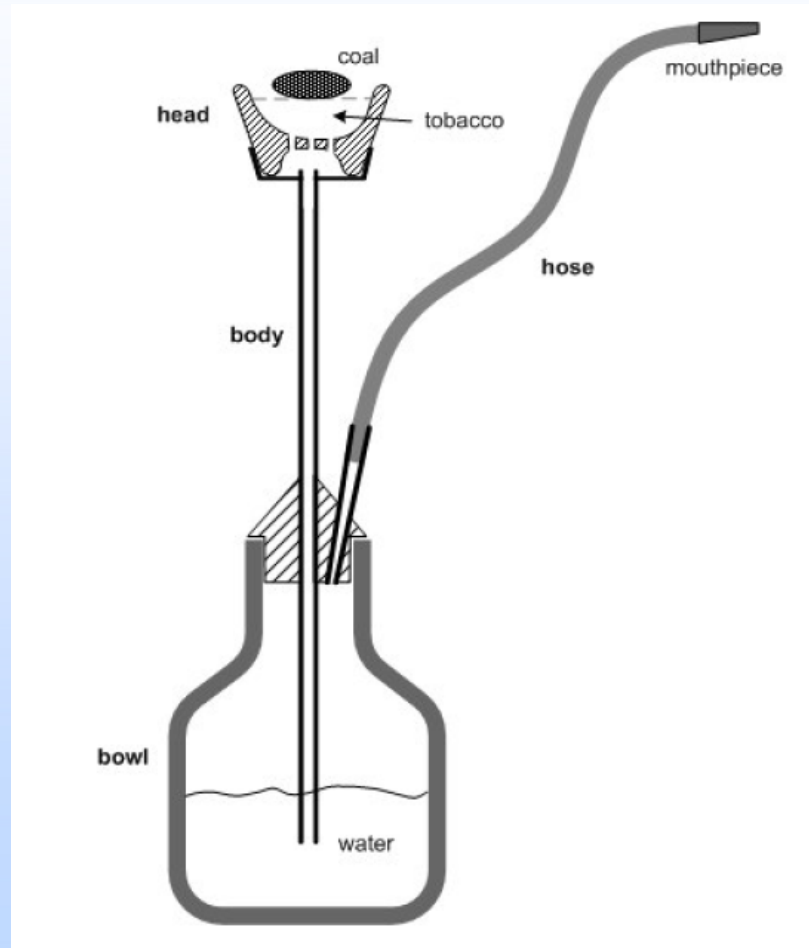


Waterpipe

- 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



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



Hookah tobacco



Charcoal

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Source: Knishkowsky & Amitai. (2005). Pediatrics, 116, e113-e119.



ENDS:

Electronic Nicotine Delivery Systems

aka

“E-cigarettes”



ENDS

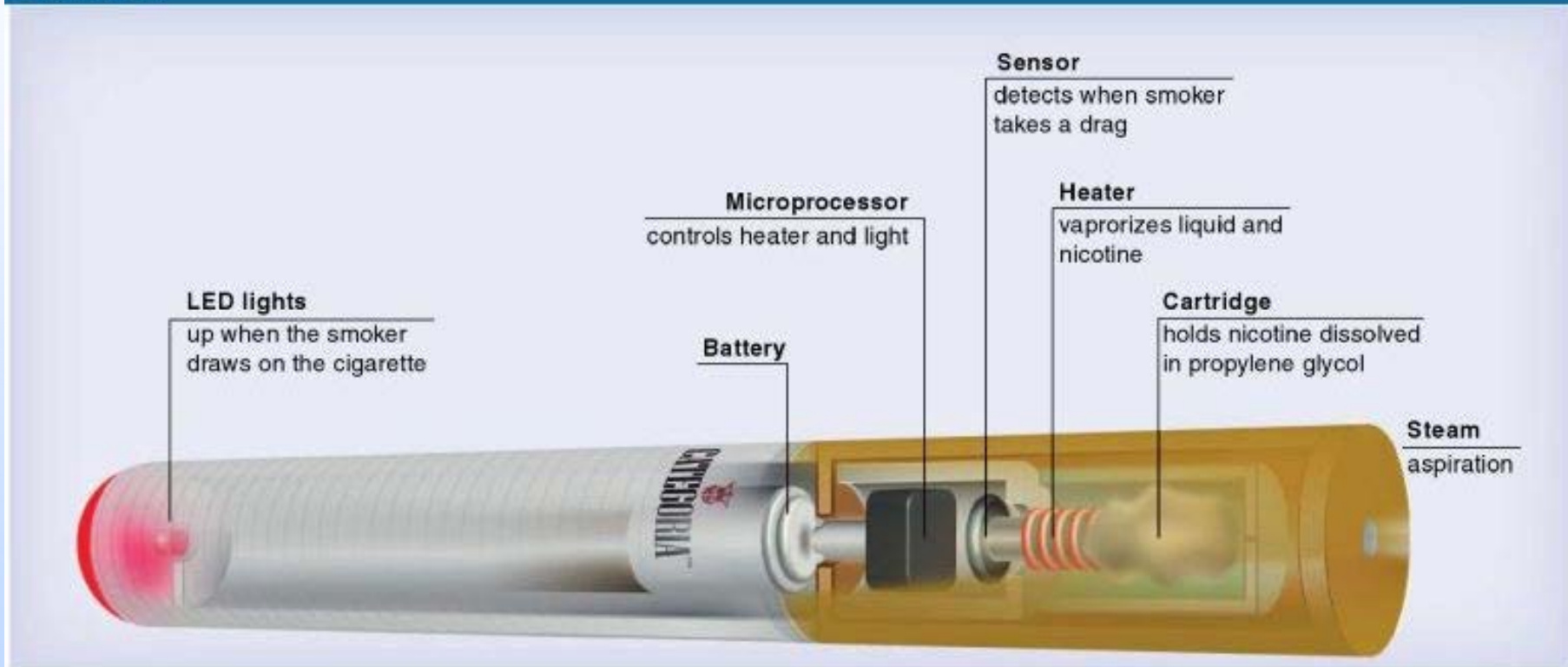
A battery-powered device that provides inhaled doses of vaporized nicotine solution. It is used as an alternative to smoked tobacco products, such as cigarettes, cigars, or pipes.

“Vaping”



ENDS: Basic Structure

Medscape



Source: Expert Rev Resp Med © 2012 Expert Reviews Ltd

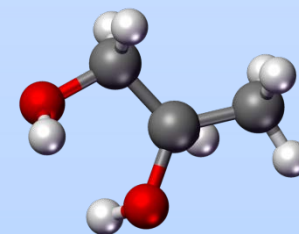




ENDS – Liquid Solution Composition

Substance	Recipe 1	Recipe 2	Recipe 3	Recipe 4	Recipe 5
Propylene glycol	85%	80%	90%	80%	<65%
Nicotine	6%	4%	2%	0.1%	<3%
Glycerol	2%	5%	-	5%	<20%
Tobacco essence	-	4%	4.5%	1%	<5%
Essence	2%	-	1%	1%	<5%
Organic acid	1%	-	-	2%	<1%

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



“E-Juice” or “Smoke Juice”

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

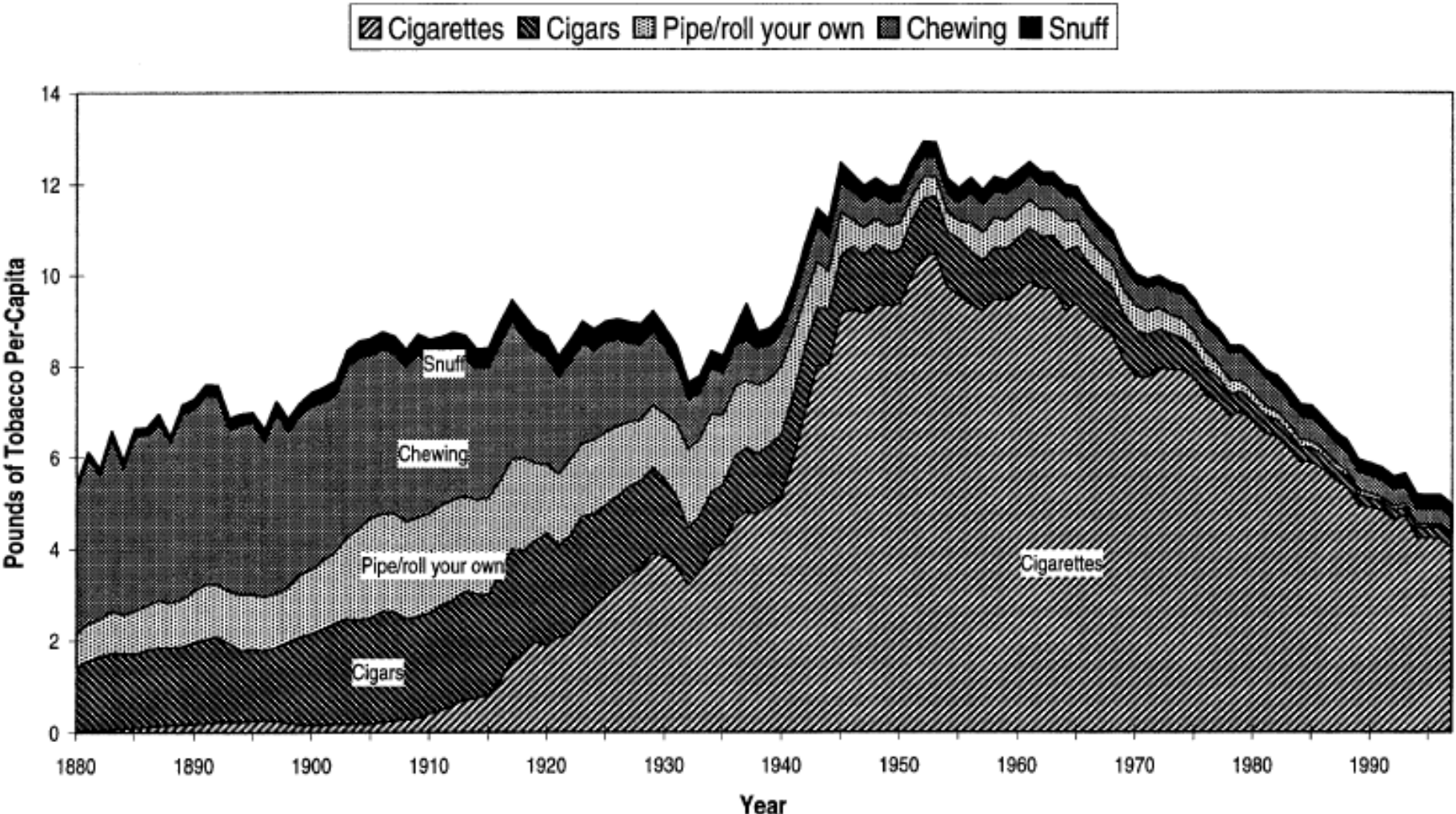




NCTP: Trends & Prevalence

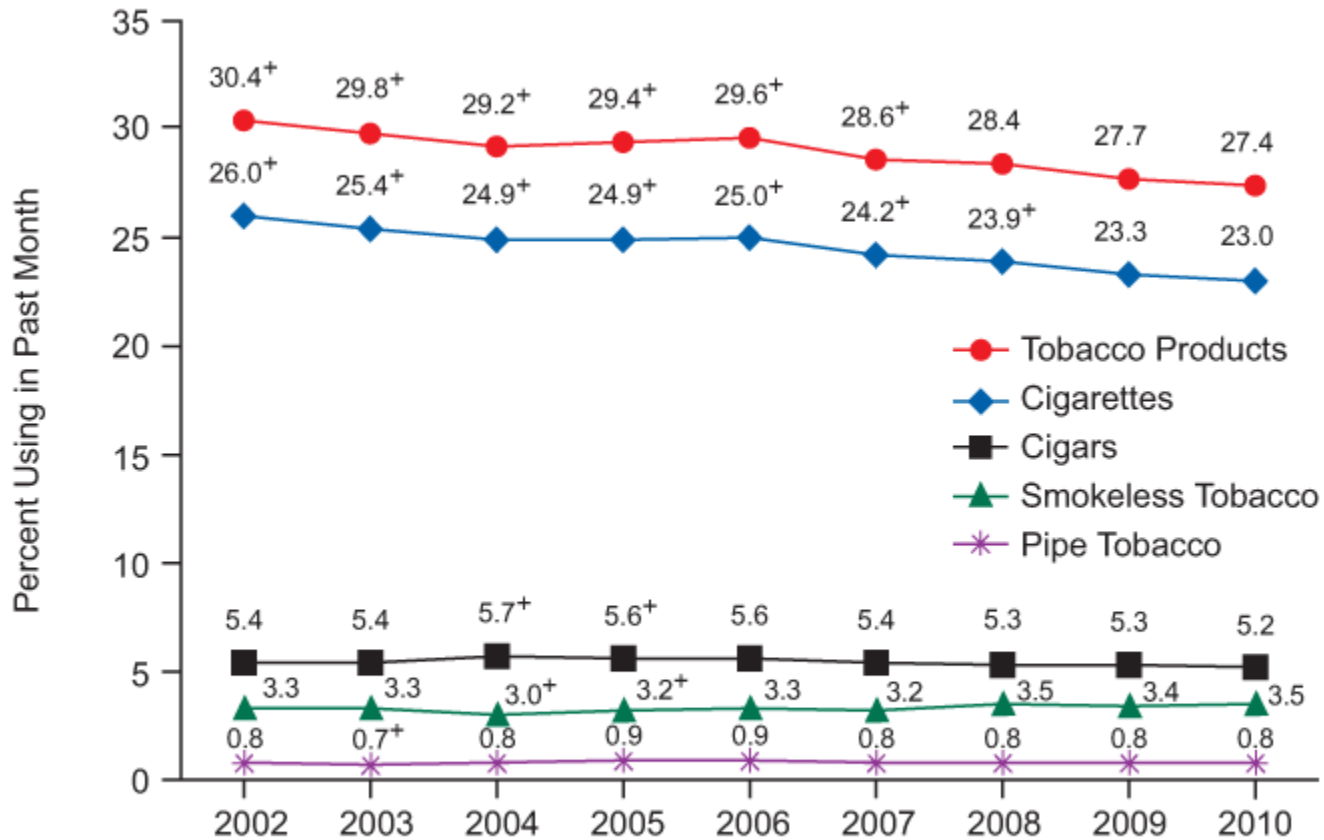


Per-capita consumption of different forms of tobacco in the US 1880-1997



NCI Monograph 9. Cigars: Health Effects and Trends.

Past Month Tobacco Use among Persons Aged 12 or Older



estimate is statistically significant at the .05 level.





Cigar Smoking

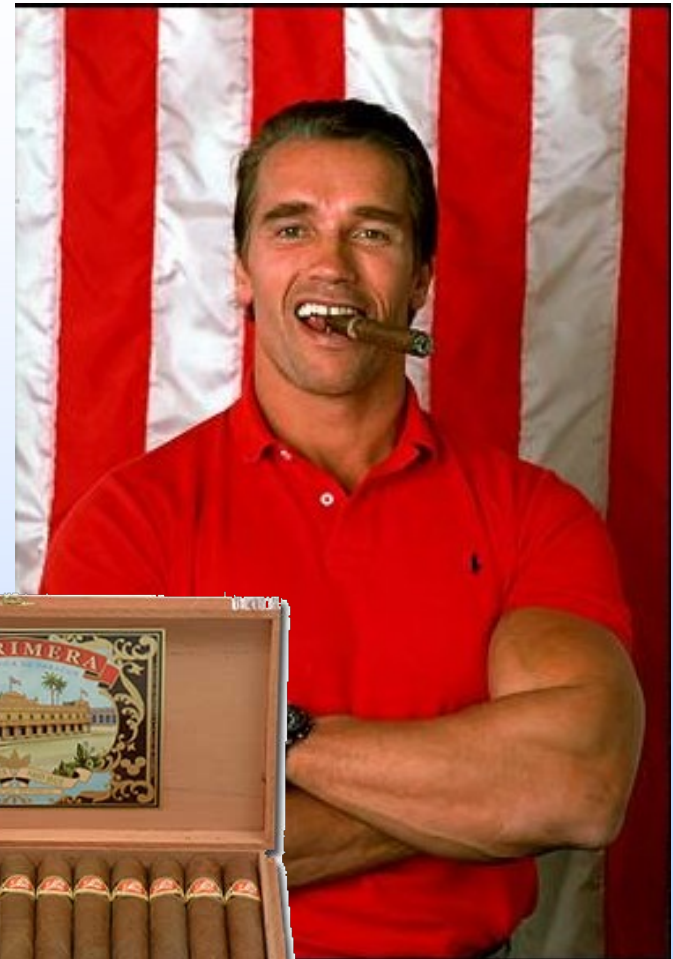
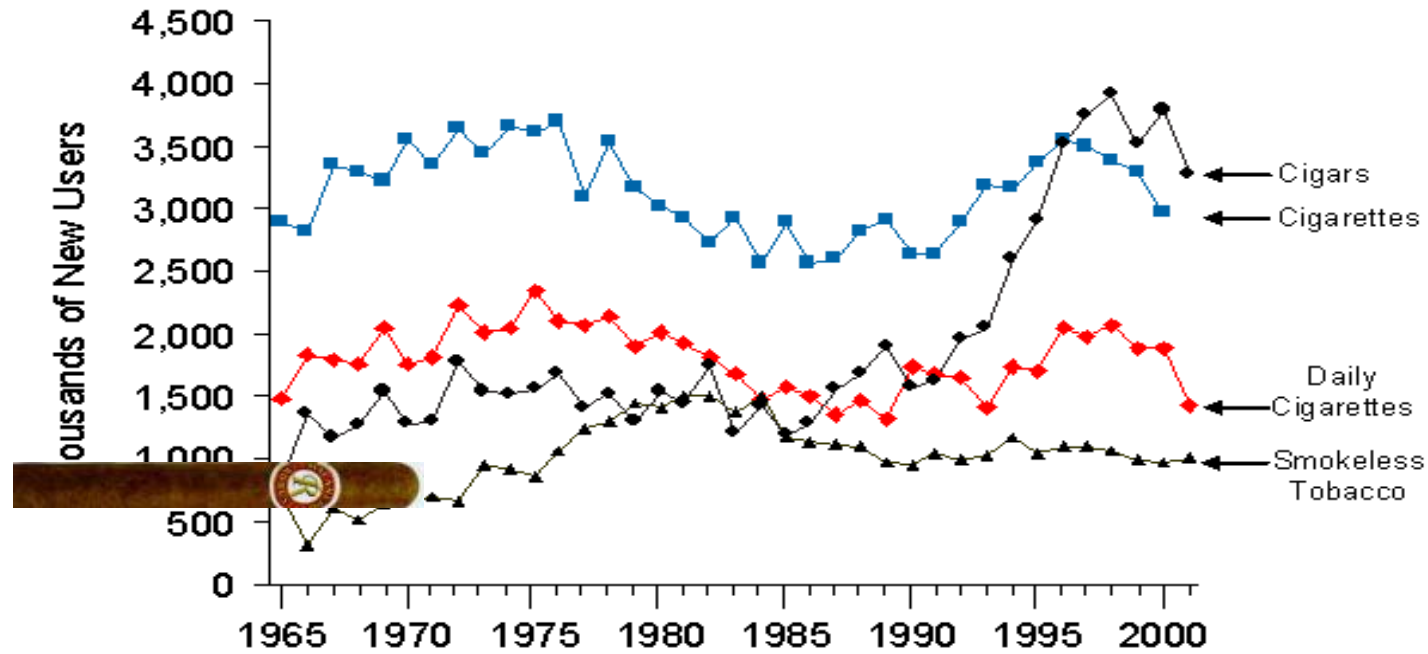


Figure 6.4 Annual Numbers of New Users of Tobacco: 1965–2001

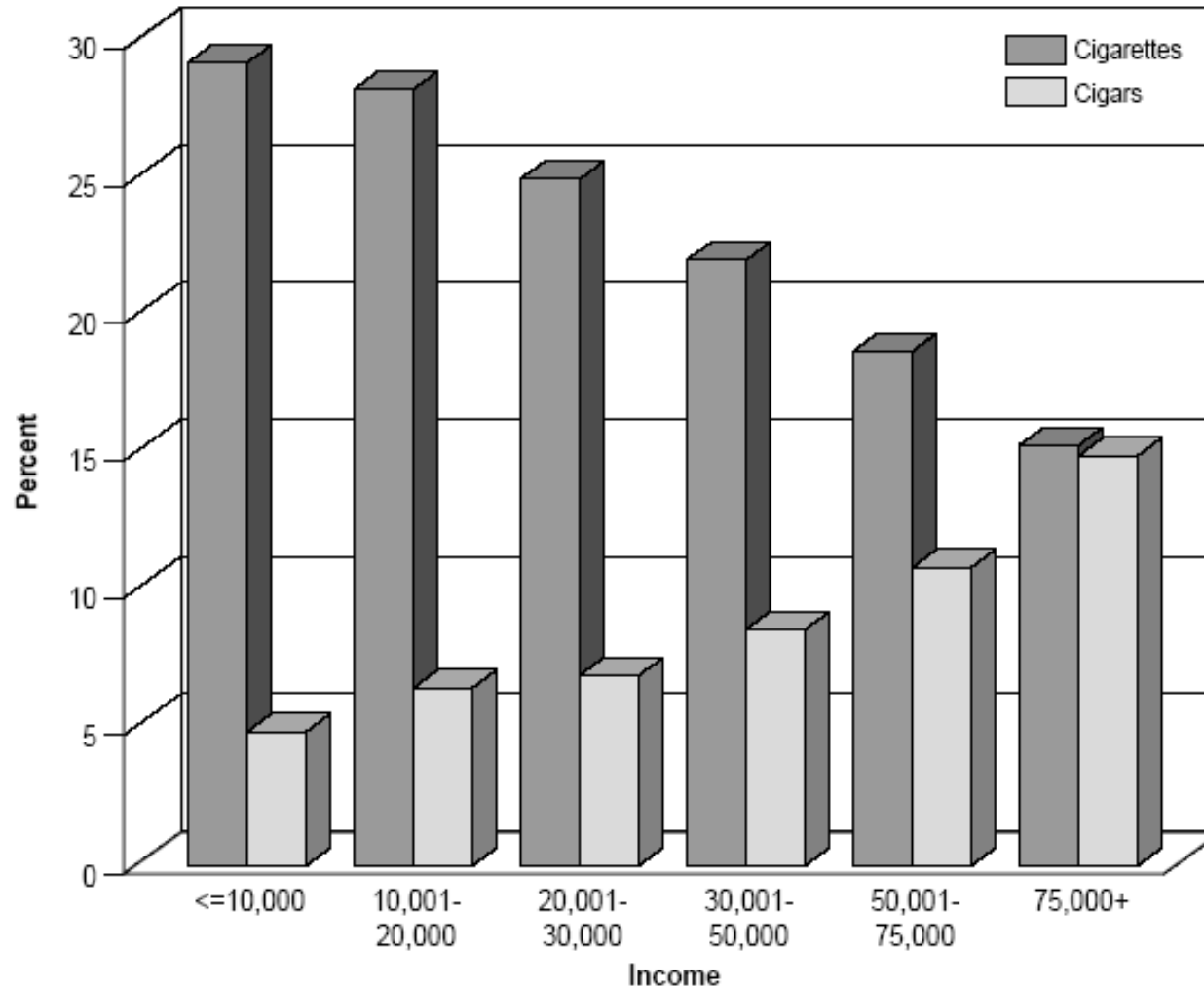


< 18 years of age group constituted an increasingly greater proportion of the number of new cigar smokers:

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SAMHSA, Office of Applied Studies, National Survey on Drug Use and Health, 2002.
The Monitoring the Future Study, University of Michigan, 2001 and 2002.

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



NCI Monograph 9. Cigars: Health Effects and Trends.

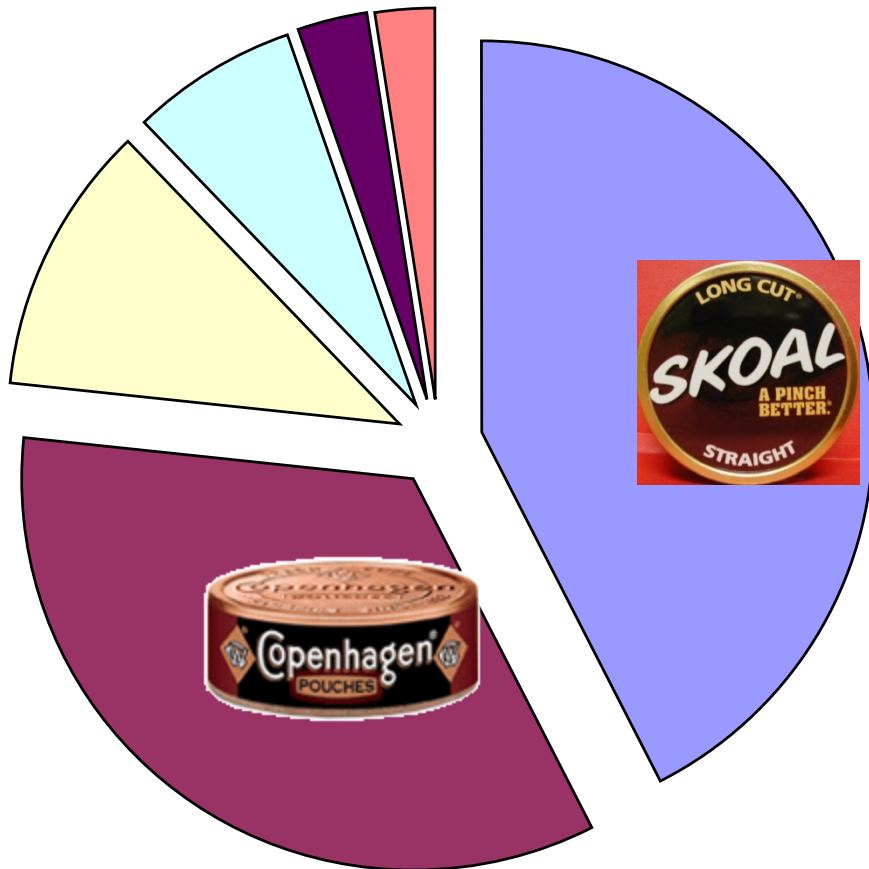
SAMSHA

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



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

Preferred Snus Products



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



National Survey on Drug Use and Health

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”



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Ward KD, et al. *Nicotine Tob Res.* 2007 Dec;9(12):1339-46.

Primack BA, et al. *Nicotine Tob Res.* 2012 May 28.



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



New blu Smart Pack

Available Now at:



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.

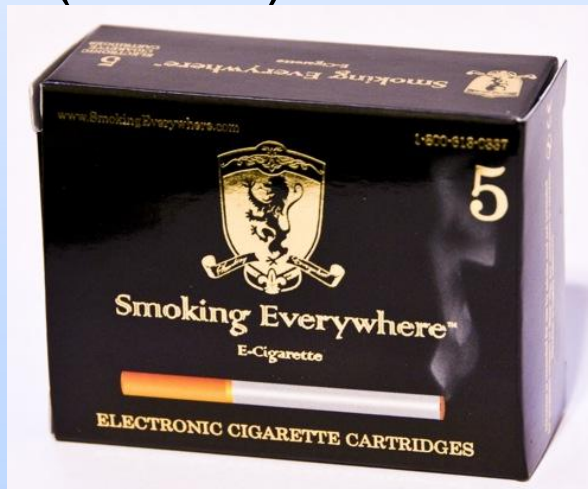


SURGEON GENERAL'S WARNING: Quitting Smoking Now Greatly Reduces Serious Risks to Your Health.

Box Kings, 16 mg. "tar", 1.2 mg. nicotine av. per cigarette by FTC method. Actual deliveries will vary based on how you hold and smoke your cigarette. For more product information, visit our website at www.brownandwilliamson.com



- 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





- 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



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

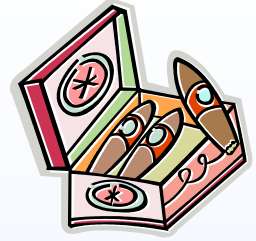


Deaths from	'Sustainers'		
	Never smoked	Pipe only	Cigarettes only
Men (n=16 932 aged 20–49 years)			
All causes	1.00	1.99 (1.73 to 2.27)	2.44 (2.27 to 2.62)
Ischaemic heart disease	1.00	3.07 (2.35 to 4.00)	3.17 (2.69 to 3.73)
Stroke	1.00	1.54 (0.84 to 2.82)	2.30 (1.71 to 3.11)
Cardiovascular disease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

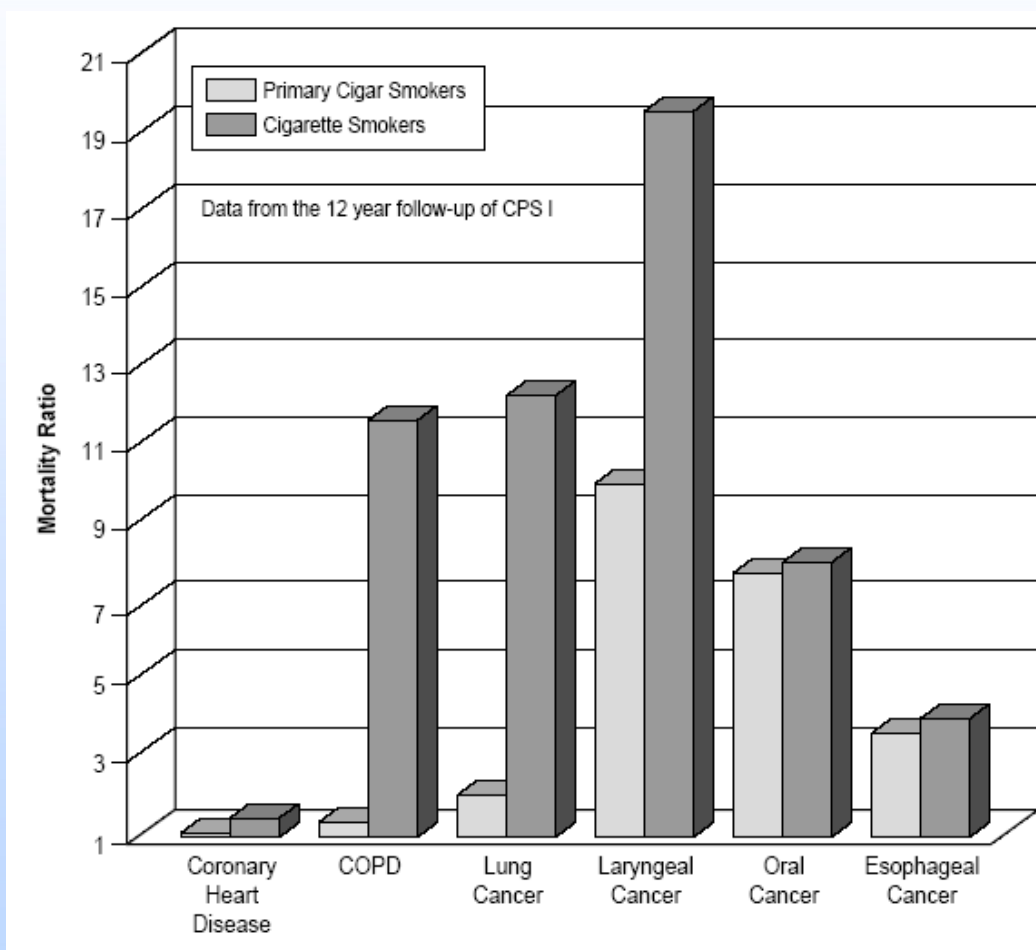
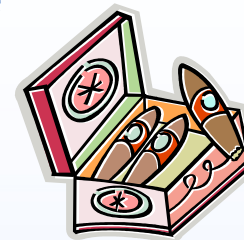
Tverdal et al. Tob Control 2011;20 123-130

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



Mortality Ratios for Cigar & Cigarette Smokers vs. Never Smokers

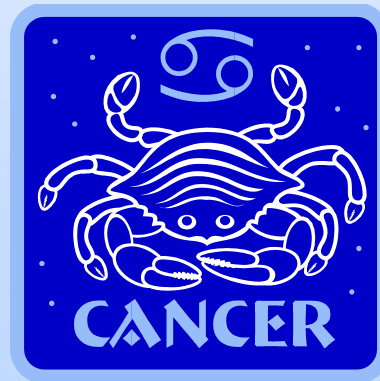


ST – Health Consequences

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

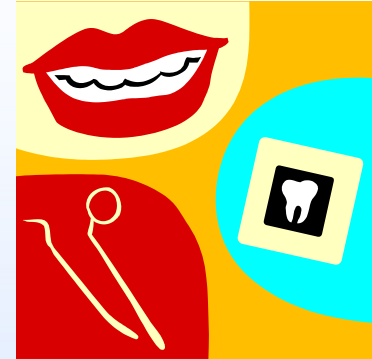
Smokeless tobacco

“Known to be a human carcinogen”



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

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Google: “who tobreg water pipe”



MAYO
CLINIC

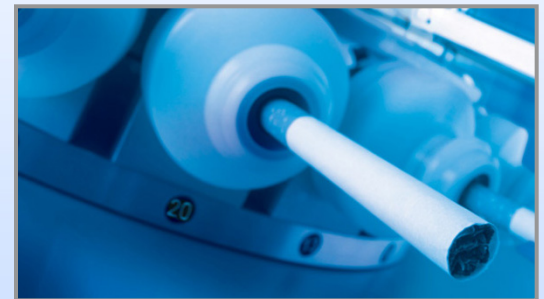


Pharmacology



NCTP Bioavailability of Nicotine (aka “Smoke Yields”)

<u>Type</u>	<u>Nicotine (mg)</u>
Cigarette (filter)	1.1
Pipe	5.2
Smokeless tobacco	
Chewing tobacco	4.5
Moist snuff	3.6
Cigars	
Little cigars, Swishers	3.8
Premium, Macanudo	13.3
4 mg nicotine gum	1.9



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.

Product	TSNAs ^a , µg/g dry weight					Alkaloids, mg/g dry weight					
						Nicotine					
	NNN ^a	NNK ^a	NAT ^a	NAB ^a	Total	pH	Total	Free	Nornicotine	Anatabine	Anabasine
<i>New products</i>											
Taboka											
Original	1.05	0.077	0.370	ND ^b	1.50	6.64	21.1	0.844	1.04	3.78	0.149
Green	0.948	0.092	0.292	0.002	1.33	6.85	19.9	1.26	1.02	4.03	0.197
Marlboro Snus											
Rich	1.27	0.259	0.455	ND	1.98	6.83	17.8	1.08	0.438	2.60	0.111
Mild	1.52	0.229	0.234	ND	1.98	6.47	12.8	0.350	0.484	1.82	0.072
Spice	1.56	0.257	0.246	ND	2.06	6.85	17.9	1.13	0.411	2.17	0.097
Mint	3.28	0.215	0.221	ND	3.72	6.58	20.0	0.701	0.454	1.97	0.063
Camel Snus											
Original	1.15	0.270	0.297	0.012	1.73	7.46	28.2	6.09	0.353	1.39	0.164
Spice	1.27	0.157	0.305	0.015	1.75	7.75	25.4	9.16	0.314	1.09	0.183
Frost	1.20	0.267	0.204	0.009	1.68	7.59	23.7	6.40	0.313	0.741	0.103
Skoal Dry											
Regular	3.57	0.360	0.478	ND	4.41	7.23	11.3	1.57	0.345	1.41	0.117
Cinnamon	5.30	0.313	0.572	0.002	6.19	6.85	11.9	0.751	0.324	1.02	0.130
Menthol	2.53	0.279	0.203	ND	3.01	7.18	11.9	1.51	0.386	1.37	0.127
<i>Mean for new products</i>	2.05	0.231	0.323	0.008	2.61		18.5	2.57	0.490	1.95	0.126
<i>Traditional products</i>											
General Snus	1.66	0.464	0.969	0.008	3.10	7.95	16.7	7.69	0.223	0.367	0.072
Copenhagen Snuff	5.12	1.40	1.12	0.152	7.79	7.45	23.0	4.88	0.248	1.43	0.150
Copenhagen Long Cut	3.76	1.10	1.35	0.062	6.27	7.53	26.7	7.14	0.157	0.770	0.037
Skoal Long Cut	4.66	1.64	1.59	0.074	7.96	7.51	25.6	6.03	0.233	1.02	0.049
Kodiak Wintergreen	6.86	1.41	3.58	0.179	12.0	8.23	19.6	12.1	0.164	0.438	0.055
<i>Mean for traditional products</i>	4.41	1.20	1.72	0.095	7.42		22.3	7.57	0.205	0.805	0.073

Note. ^aAbbreviations: TSNAs, tobacco-specific N-nitrosamines; NNN, N'-nitrosoanabasine; NNK, 4-(methylnitrosamino)-1-(3-pyridyl)-1-butanone; NAT, N'-nitrosoanatabine; NAB, N'-nitrosoanabasine. ^bND, 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)
 - Increased pH of product = higher free nicotine
- Acetic acid (additive)
 - Increases salivation – enhances absorption



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Richter P, et al. Nicotine Tob Res. 2003 Dec;5(6):885-9.



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)



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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

	Peak serum nicotine concentrations (ng/mL)	Cans or pouches per week	Patch dose
Low	0-10	< 2	14 mg/d
Intermediate	11-20	2-3	21mg/d
High	> 20	> 3	42 mg/d

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Ebbert. JSAT. 2004

Bupropion SR: Dosing

150 mg daily for 3-4 days

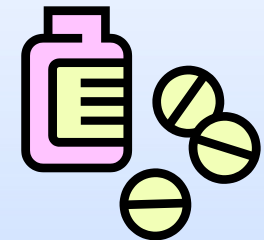
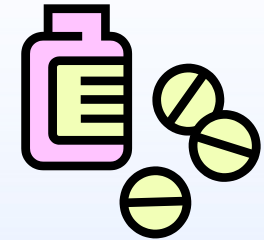
then

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



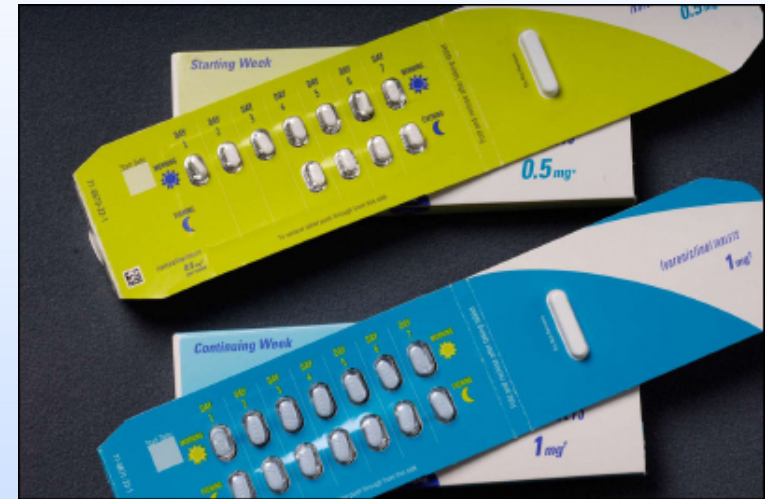
Nicotine Gum

- Monotherapy
 - 2 mg
 - First dip \geq 30 min
 - \leq 2 cans/week
 - 4 mg
 - First dip $<$ 30 min
 - $>$ 2 cans/week
- “Chew and Park”
- Combination with nicotine patch may be optimal



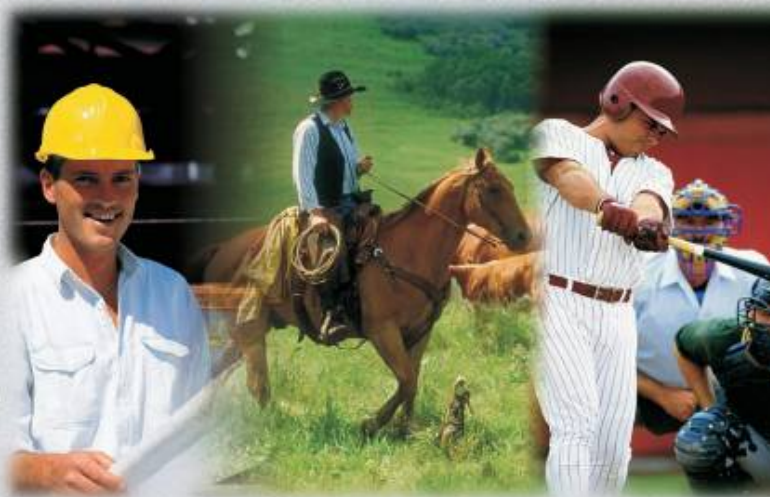
Varenicline (Chantix™) for Snus Users

- 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



Facilitator Guide

Your Path to Smokeless Tobacco Freedom



MAYO CLINIC
NICOTINE DEPENDENCE CENTER



Bupropion
Available doses:
150 mg

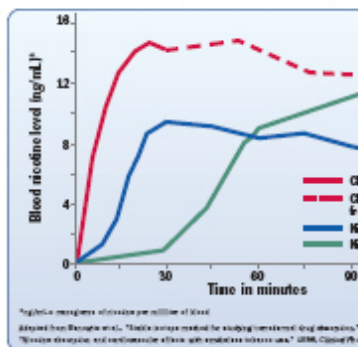
Comments:



Varenicline
Available doses:
0.5 mg
1 mg

Comments:

Blood nicotine levels of chewing tobacco vs. nicotine gum



Nicotine in chewing tobacco is absorbed very rapidly and peaks within 30 minutes of placement. Even after the chew is removed, nicotine is absorbed through the mouth and small intestine. In comparison, the nicotine absorbed through the mouth (from gum) is absorbed much more slowly and often reaches its peak 90 minutes after placement.



Normal inside cheek

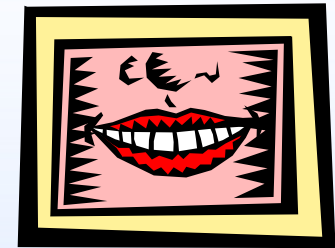


Snuff dipper pouch (where chew is placed)



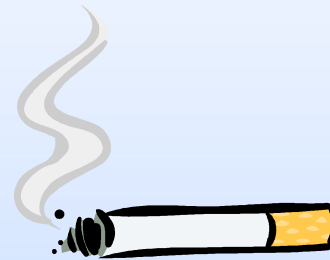
Recommended ST Treatment Approach

- 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

