

**Up in Smoke:  
Current Trends in Smoking Habits Affecting Oral and Systemic Health**

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**Presenter Disclosures for Betsy Reynolds, RDH, MS**

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**Agenda**

Introduction

Tobacco Trends

- Cigarette
- Smokeless Tobacco
- Hookah
- Little Cigar and Cigarillo

Non-Tobacco Smoking Trends

- Electronic Cigarette ('E-cig')

Role of Dental Professional

**Trends in Tobacco Use**

On average, the life expectancy of a smoker is 10 years less than a nonsmoker

Smoking is responsible for about 1 in 5 deaths annually in the United States

For every person who dies from a smoking-related disease, 20 more people suffer from a smoking-related illness  
More deaths are caused each year by tobacco use than by human immunodeficiency virus (HIV), illegal drug use, alcohol, motor vehicle injuries, suicides, and murders COMBINED

Smoking and tobacco use causes more than 5 million deaths per year worldwide—current trends show that this will increase to more than 8 million deaths annually by 2030

**Bottom Line: Tobacco is the leading cause of preventable death in the world**

**Headliners: Despite Federal Ban, Tobacco Ads Continue to Lure Teen Smokers; Jane Meredith Adams; reporting for Ed Source; posted 5/ 9/2013; accessed 3/21/16 at: <http://edsource.org/2013/despite-federal-ban-tobacco-ads-continue-to-lure-teen-smokers/31682>**

Despite decades of efforts to keep the tobacco industry away from children, tobacco companies are successfully promoting their products to nine out of 10 middle and high school students in the U.S.--Source: Centers for Disease Control

'The tobacco industry has really gone underground. If you don't shop at 7-11 and you aren't online going around on YouTube, you don't see it.'--Pamela Ling, MD, MPH; associate professor of medicine; University of California (San Francisco)

But teenagers do see it, the study found—some 91% of middle school students reported seeing pro-tobacco marketing in a store, a magazine or online, as did 93% of high school students--Source: 2011 National Youth Tobacco Survey conducted by the Centers for Disease Control

Store advertising was most often reported—83% of middle school students and 87% of high school students saying they saw tobacco ads there

Research has established a 'causal relationship' between tobacco advertising and the likelihood a teen would start smoking--Source: 2012 report from U.S. Surgeon General Regina Benjamin

'Of every three young smokers, one will quit and, of the remaining two, one will die from tobacco-related causes. Smoking causes multiple types of malignancies, including cancer of the lung, throat, mouth and stomach, and tobacco use remains the No. 1 cause of preventable death in the U.S.'--U.S. Surgeon General Regina Benjamin  
'Virtually all tobacco advertising is aimed at young people, and the reason is because almost nobody starts smoking beyond age 21 or 22. To reach students, tobacco companies have concentrated advertising and discounts in small stores, particularly those near schools. It's an absolute carnival of tobacco products behind the check-out.'--Dr. Robert Jackler; professor of medicine; Stanford University; lead researcher; Stanford Research into the Impact of Tobacco Advertising

The tobacco industry spends almost \$8.8 billion every year to market their products

In 2012, cigarette and smokeless tobacco marketing expenditures amounted to about \$26 million a day in the United States alone

The bulk of this advertising takes place in retail stores that are frequented by young people—70% of youth visit convenience stores at least once a week

Although other types of tobacco marketing have been restricted, convenience stores, pharmacies, gas stations and other retail outlets remain places where kids are certain to see tobacco advertising—it is no coincidence that 85% of teenagers prefer Marlboro, Camel, and Newport (the three most heavily advertised brands)

Camel Crush cigarette ads were published in the April, May, and June 2013 issues of widely circulated magazines  
"We believe[d] that R.J. Reynolds'... ad campaign does directly or indirectly target youth because the entire ad buy is reaching millions of youth and several of the individual magazines have large youth readerships. The...ad uses bold colors and graphics that highlight the crushable capsule, which could be particularly appealing to young people. R.J. Reynolds has long recognized the potential appeal of such products to youth, noting in one internal document that the ideal youth cigarette should include 'some useful, demonstrable novelty in filter, mouthpiece, package or other aspect of the product system.'"  
--Source: Letter posted on Tobacco Free Kids; supported by the American Heart Association, American Lung Association, American Cancer Society, Legacy, and Campaign for Tobacco-Free Kids; in a complaint to at least two state attorneys that the Camel Crush cigarette ads (published in 24 major magazines) may be openly disregarding the Tobacco Master Settlement Agreement by enticing teenagers  
Camel Crush cigarettes contain a capsule in the filter that releases menthol flavoring into the smoke—according to a 2012 report, the brand is increasingly popular among teenagers who are 12 to 17 years old  
The group claim that a large portion of the readership of these magazines—at least 12.9 million—consists of teenagers between the ages of 12 and 17

Despite the earlier success of anti-smoking campaigns, after 2002, most states did not allocate funds to maintain the proven anti-tobacco efforts shown to deter youth tobacco use

**Headliners: States Spend Far Less Than CDC Recommends on Anti-Smoking Campaigns; Reid Wilson reporting for the Washington Post; 12/10/13; accessed on 3/21/16 at:**

**<https://www.washingtonpost.com/blogs/govbeat/wp/2013/12/10/states-spend-far-less-than-cdc-recommends-on-anti-smoking-campaigns/>**

A report from the Campaign for Tobacco-Free Kids found that states collected \$25 BILLION in revenue from the 1998 tobacco settlement in Fiscal Year 2014—but they spent just \$481 million (< 2%) on prevention and cessation programs

According to the Surgeon General, there could be 3 million fewer young smokers today if success in reducing youth tobacco use that was made between 1997 and 2003 had been sustained--Source: Preventing Tobacco Use Among Youth and Young Adults; accessed on 3/24/2016 at: <http://www.surgeongeneral.gov/library/reports/preventing-youth-tobacco-use/factsheet.html>

More than 450,000 12-to-13-year-olds and around 4.4 million 14-to-17-year-olds have smoked

Tobacco products used by adolescents include cigarettes (both store-bought and hand-rolled), cigars, hookahs, and smokeless tobacco products

**Flavorings** in tobacco products can make them more appealing to youth—in 2014, 73% of high school students and 56% of middle school students who used tobacco products in the past 30 days reported using a flavored tobacco product during that time

According to the FDA:

'On September 22, 2009, [the] FDA banned cigarettes with characterizing fruit, candy, and clove flavors—cigarettes that have special appeal for children. The agency's national effort to enforce this provision of the Tobacco Control Act and to advise parents about the dangers of flavored tobacco products was an important first step for responsible tobacco regulation that will protect the American public.'--Source: U.S. Food and Drug Administration: 'Protecting and Promoting Your Health'; official website; accessed on 3/24/2016 at:

<http://www.fda.gov/AboutFDA/Transparency/Basics/ucm208085.htm>

**Headliners: Flavored Tobacco Product Use Among Middle and High School Students—United States, 2014; Catherine G. Corey, MSPH; Bridget K. Ambrose, PhD; Benjamin J. Apelberg, PhD; and Brian A. King; Morbidity and Mortality Weekly Report; 10/2/2015: 64(38);1066-1070; accessed on 3/24/2016 at:**

**<http://www.cdc.gov/mmwr/preview/mmwrhtml/mm6438a2.htm>**

Among middle and high school students in 2014, an estimated 1.58 million used a flavored e-cigarette, 1.02 million used flavored hookah tobacco, 910,000 used flavored cigars, 900,000 used menthol cigarettes, 690,000 used flavored smokeless tobacco products, and 120,000 used flavored pipe tobacco in the past 30 days

Among current users of any tobacco product, 70.0% reported using at least one flavored tobacco product in the past 30 days—that corresponded to an estimated 3.26 million middle and high school students

The proportion of current tobacco users who reported flavored product use in the past 30 days was 63.5% for cigars, 63.3% for e-cigarettes, 60.6% for hookah, 58.8% for any smokeless tobacco, 53.6% for menthol cigarettes and 42.3% for tobacco in pipes

'The popularity of flavors across the range of tobacco products suggests that flavoring might have broad appeal to young tobacco users. Therefore, it is important that comprehensive tobacco prevention and control strategies for youths address all forms of flavored tobacco products and not just cigarettes.'--Study authors' comment

## **Cigarette Smoking**

It is no secret that smoking tobacco is harmful:

- Smoking damages nearly every organ of the body and is related to many cancers including lung, mouth, stomach, kidney, bladder, cervical, and others—in fact, cigarette smoking has been linked to about 90% of all cases of lung cancer
- Smoking is also associated with emphysema, chronic bronchitis, and other lung diseases—additionally, smoking aggravates asthma symptoms and it increases the risk of heart disease

**Headliners: Report Adds to Smoking's Disease Tally; Liz Szabo; reporting for USA Today; 1/17/14**

A 2014 study from the surgeon general found that smoking caused even more physical and financial damage than previously estimated—killing 480,000 Americans annually from diseases that include diabetes, colorectal cancer and liver cancer (the report is the first to link these diseases CAUSALLY with smoking)

**Further 'causal links' reported:**

- Erectile dysfunction
- Rheumatoid arthritis
- Macular degeneration (a major cause of age-related blindness)
- Inflammation
- Impairment of immune function
- Increases death from tuberculosis
- Birth defects (cleft lip/palate)
- Ectopic pregnancy

'Amazingly, smoking is even worse than we knew. Even after 50 years, we're still finding new ways that smoking maims and kills people.'--Thomas Frieden; director; Centers for Disease Control and Prevention

The report raised the annual death toll from smoking by about 37,000 additional lives lost and estimated that tobacco has killed 20 million Americans since the first surgeon general's report on smoking was released in 1964

Nearly 2.5 million of those premature deaths were in non-smokers exposed to second-hand smoke

An additional 100,000 infants who died from sudden infant death syndrome ('SIDS') or complications from prematurity and low birth weight attributable to maternal smoking were added to the list of casualties

**Powerful incentive:** Every day, more than 1,200 Americans die from smoking—each of these people is replaced by two new smokers under the age of 26

Smoking typically precedes other substance abuse, including smoking marijuana and using hard drugs—adolescent smokers tend to engage in other unhealthy behaviors, such as fighting, binge drinking, and having multiple sexual partners--Source: U.S. Department of Health and Human Services. (2012). Preventing tobacco use among youth and young adults: 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. Retrieved on February 12, 2016, from <http://www.surgeongeneral.gov/library/reports/preventing-youth-tobacco-use/full-report.pdf>.

Although tobacco use by U.S. adolescents has declined substantially in the last 40 years, in 2014, almost one in 15 high school seniors was a daily smoker and almost one in seven had smoked at least once in the previous month

Although we may not know all of the factors playing a role in the past decline, the 1990s were years when funds from tobacco companies (the result of a legal settlement between the tobacco companies and the federal government) supported a number of local, state, and national anti-tobacco campaigns

In addition, during this time, new restrictions on tobacco advertising were instituted, smoke-free laws and policies were widely implemented, and additional taxes were placed on cigarettes (inhibiting demand)

**Let's take a closer look at the Master Settlement Agreement of 1998:**

As the largest class-action settlement in U. S. history, the ruling gives immunity from litigation to tobacco manufacturers in exchange for 'not targeting youth smokers and restricting advertising practices'--Source: <http://www.lung.org/about-us/blog/2016/02/who-benefit-tobacco-settlement.html>

The companies must also make annual payments to states in perpetuity to help 'offset some of the tobacco-related health care costs'

This court settlement between 46 states and the District of Columbia and the major tobacco companies forced them to end some of their more egregious marketing practices and provided for annual payments to the states for some of the medical costs of caring for the 16 million Americans who have smoking-caused illnesses—the settlement was huge: \$206 billion over the first 25 years and the payments continue indefinitely into the future The vast majority of states have failed to use the funds for their intended purpose:

- Some have used them to fill budget holes or pay off debts
- A couple of states have used the monies to benefit the tobacco industry

For instance, South Carolina gave 15% of settlement funds to tobacco farmers affected by the drop in prices for their crop; North Carolina used 75% of its settlement funds for tobacco production

This misuse of tobacco settlement funds continues to this day

According to the 'State of Tobacco Control 2016' report, 40 states and the District of Columbia got a failing grade for spending less than 50% of what the CDC recommends should be spent on tobacco prevention programs in its Best Practices

In total, states are spending close to \$470 million on tobacco prevention and cessation programs in the 2015-2016 fiscal year—however, this is less than 2 cents of every dollar or close to \$26 billion total that states receive from tobacco settlement payments and tobacco taxes each and every year

**Reality Check:** Almost from the day the agreement was signed, the tobacco industry has challenged a portion of the annual payments—to date, over \$11 BILLION has been funneled into a 'disputed payments account' and the industry sets aside an additional \$800 MILLION every in disputed payments that need to be arbitrated

It is unclear if this is an intentional strategy to wear states down but several states have chosen to settle their disputes and give up a portion of their due compensation in exchange for receiving the remainder without a fight 'For the manufacturers, that was a win. [In the 2003 arbitration alone], they saved hundreds of millions of dollars.'--Source: Brett DeLange; office of the Idaho Attorney General; as reported in the Idaho Statesman; 4/10/2016

Tobacco use is started and established primarily during adolescence—nearly 9 out of 10 adult cigarette smokers first tried smoking by age 18, and 99% first tried smoking by age 26

Each day in the United States, more than 3,800 youth aged 18 years or younger smoke their first cigarette—and an additional 2,100 youth and young adults become daily cigarette smokers

If smoking continues at the current rate among youth in this country, 5.6 million of today's Americans younger than 18 will die early from a smoking-related illness—that is about 1 of every 13 Americans aged 17 years or younger alive today

The Surgeon General estimates that if all the evidence-based youth anti-tobacco strategies were implemented, smoking among high school students would decline by more than 50% by 2020

Cigarette smoke contains more than 7,000 chemicals—70 of which are known to cause cancer

**Headliners: CDC: American Cigarettes Contain More Carcinogens; Los Angeles AP Wire Service; as reported in the Idaho Statesman; appearing 6/2/10**

A 2010 study conducted by the Centers for Disease Control and Prevention determined that cigarettes produced in the United States contain much higher levels of tobacco-specific cancer-causing nitrosamines

'People smoking the U.S. brand cigarettes [we tested] received a level of this carcinogen in their mouth and lungs that was three times higher compared to smokers in Canada and Australia.'--Dr. James Pirkle; CDC

Apparently, American cigarettes are typically made from 'American blend' tobacco—a unique blend that concentrates tobacco-specific nitrosamines (TSNA) (recognized as a group of potent carcinogens)

The most popular Canadian, Australian and British brands (in comparison) are made from 'bright' tobacco which is lighter in color due to a different curing process

The CDC hoped that this information would help guide how American cigarettes were made in the future—thanks to a 2009 bill that allows the Food and Drug Administration to not only regulate the content of American-made tobacco products but also empowers the agency to release information to the public about harmful constituents in tobacco and tobacco smoke

At the time the CDC research was published, Dr. Pirkel observed: 'This is important information, I'm confident the FDA will pay a lot of attention to it.'

**Here's why:** Modification of tobacco curing methods and other changes in cigarette manufacturing techniques could substantially reduce the levels of tobacco-specific nitrosamines (TSNA)

NNK and NNN (long-recognized as powerful carcinogens in laboratory animals) have been evaluated as 'carcinogenic to humans' by the International Agency for Research on Cancer—NNK and NNN are present in the tobacco of virtually all marketed cigarettes with the highest levels seen in U.S. products

Many researchers called for the immediate regulation of the carcinogenic tobacco-specific nitrosamines 4-(methylnitrosamino)-1-(3-pyridyl)-1-butanone (NNK) and N'-nitrosonornicotine (NNN) in cigarette tobacco as a logical path to cancer prevention

The NNK metabolite NNAL (itself a strong carcinogen) is present in the urine of smokers and nonsmokers exposed to secondhand smoke

It is well established that factors such as choice of tobacco blend, agricultural conditions, and processing methods influence levels of NNK and NNN in cigarette tobacco and cigarette smoke—controlling these factors would produce cigarettes with 100 ppb or less each of NNK and NNN in tobacco resulting in an approximate 15- to 20-fold reduction of these carcinogens in the mainstream smoke of popular cigarettes sold in the United States--Cancer Prev Res; 7(7); 639–47; accepted for publication 4/30/2014

**Headliners: It Is Time to Regulate Carcinogenic Tobacco-Specific Nitrosamines in Cigarette Tobacco; Stephen S. Hecht; results appearing in Carcinogenesis; 12/1/14; 35:2798-2806**

According to the researchers, no indication that any meaningful attempt was made to reduce or at least control TSNA levels in the new varieties of the popular brands Marlboro and Camel introduced over the last decade was made

**Women** become more easily addicted to nicotine and they metabolize the chemical 60-120 times more rapidly than men—making smoking cessation more difficult for females

In 2016, it was estimated that overall maternal smoking rates at any time during pregnancy was 8.4%—with 20.6% of women quitting during the third trimester--Source: National Vital Statistics Reports; 65:1; 2/10/16; 'Smoking Prevalence and Cessation Before and During Pregnancy: Data From the Birth Certificate, 2014; by Sally C. Curtin, M.A., and T.J. Mathews, M.S., Division of Vital Statistics; accessed 3/23/16 at:

[http://www.cdc.gov/nchs/data/nvsr/nvsr65/nvsr65\\_01.pdf](http://www.cdc.gov/nchs/data/nvsr/nvsr65/nvsr65_01.pdf)

Currently, almost six out of 10 teenage mothers are continuing to smoke during pregnancy

Besides making it harder for a woman to get pregnant, smoking during pregnancy causes many health problems including PTLB deliveries, certain birth defects, and infant death

**The CDC Stats:** (accessed on 1/28/14 at:

<http://www.cdc.gov/Reproductivehealth/TobaccoUsePregnancy/index.htm>)

- Women who smoke during pregnancy are more likely than other women to have a miscarriage
- Smoking can cause problems with the placenta—the source of the baby's food and oxygen during pregnancy
- Babies born to women who smoke are more likely to have cleft lip or cleft palate

**Headliners: Nicotine Patches Don't Help Pregnant Smokers, Study Finds; Rachael Rettner, MyHealthNewsDaily Staff Writer; 2/29/12; accessed on 10/1/13 at: <http://www.livescience.com/36176-nicotine-patch-pregnancy-quit-smoking.html>**

In this ground-breaking investigation (the largest of its kind to address the issue of patch use and smoking cessation during pregnancy), researchers found that pregnant women who used nicotine patches as a smoking cessation aid were just as likely to continue smoking until their delivery date as women who used a placebo

**Headliners: Study Casts Doubt on Nicotine Replacement; As reported by Benedict Carey for New York Times; appearing in the Idaho Statesman; 1/10/12**

A multi-year investigation followed nearly 2,000 smokers, recent quitters, and young adults to see whether nicotine replacement affected their odds of kicking the habit over time—the results found that it did not (even if the smoker received counseling in addition to nicotine replacement)

'We were hoping for a very different story. I ran a treatment program for years, and we invested some \$6 million in treatment services.'--Dr. Gregory N. Connolly; study co-author and director of the Harvard Center for Global Tobacco Control

Nicotine replacement products came under fire in 2002 when researchers from the University of California (San Diego) reported that they appeared to offer not benefit

A government-appointed panel that included nicotine replacement as part of federal guidelines for treatment also came under fire several years ago—panel members had received payments from the products' manufacturers

**Headliners: More Than One Way to Quit Tobacco; Meghan Rosen; reporting for Science News; 3/5/2016**

For people trying to stop smoking, the how might not really matter—six months after quitting, only about one in four people still abstained from smoking

Those results held true regardless of the study participants used a nicotine patch, twice daily varenicline (Chantix™) or a combo nicotine lozenge and patch to quit--T.B. Baker et al. Effects of nicotine patch vs varenicline vs combination nicotine replacement therapy on smoking cessation at 26 weeks. JAMA. Vol. 315, January 26, 2016, p. 371.

**Headliners: California Approves Raising Smoking Age; Appearing in the Idaho Statesman; 3/11/2016**

On 3/10/2016, California state lawmakers voted to raise the legal smoking age from 18 to 21—approving a measure that would join the nation's most populous state with Hawai'i as two states who are putting legal tobacco out to the reach of most teenagers

Dozens of cities—including New York and San Francisco—have already passed their own, similar laws

Quit Strategies

The U.S. Preventive Services Task Force recommends that primary care clinicians provide interventions, including education or brief counseling, to prevent initiation of tobacco use among school-aged children and adolescents (ages 10-17)

**quitSTART App**

quitSTART is a free app (available for download on iTunes and Android) made for adolescents and teens who want to quit smoking (adults can use it, too)

This app is designed to take the information the potential quitter provides about their smoking history and gives them tailored tips, inspiration, and challenges to help them become smoke-free and live a healthier life

With the quitSTART app, a teen can:

- Get ready to quit with tips and information for becoming smoke-free
- Monitor their progress and earn badges for smoke-free milestones and other achievements

- Get back on track if they slip and smoke
- Manage cravings and bad moods in healthy ways
- Distract themselves from cravings with games and challenges
- Store helpful tips, inspirations, and challenges in their Quit Kit
- Share your progress and favorite tips through social media

quitSTART is a product of Smokefree Teen—a smoking cessation resource for teens created by the Tobacco Control Research Branch at the National Cancer Institute in collaboration with the U.S. Food and Drug Administration and input from tobacco control professionals, smoking cessation experts, and ex-smokers

### **Good News!**

Cigarette smoking among teens in grades 12, 10 and 8 continued a decadeslong decline in 2016—reaching the lowest levels recorded since annual tracking began 42 years ago--As reported by Jared Wadley; University of Michigan 'Michigan News'; posted 12/13/2016; accessed 2/27/2017 at: <http://ns.umich.edu/new/releases/24386-vaping-hookah-use-by-us-teens-declines-for-first-time>

From 2015 to 2016, the percentage of youth who smoked in the past 30 days fell from 11.4% to 10.5% among 12th-grade students, from 6.3% to 4.9% among 10th-grade students, and from 3.6% to 2.6% among 8th-grade students—the one-year declines in 10th and 8th grade were statistically significant

One important cause of these declines in current smoking is that many fewer young people today have ever started to smoke—in 1996, 49% of 8th-graders said they had tried cigarettes; by 2016 only 10% percent said they had done so (a drop of almost 80% in smoking initiation over the past two decades!)

'Since the peak year in 1997, the proportion of students currently smoking [in 2016]...dropped by more than three quarters—an extremely important development for the health and longevity of this generation of Americans.

While the improvements in the smoking numbers for just this one year are important, of course, the longer term declines are much more so. Since teen smoking reached a peak around 1996-1997, the levels of past 30-day smoking have fallen by nearly 80% among 8th- and 10th-graders, and by more than 70% among 12th-graders.

Further, the proportional declines in daily smoking are even larger.'--Source: Lloyd Johnston; principal investigator; Monitoring the Future Project

Investigators point to concerted efforts to reduce youth smoking as having a positive effect—increased taxes on tobacco products, restrictions on advertising and promotion, limiting where smoking is permitted, broad based anti-smoking ad campaigns, educational programs in schools, removal of added flavoring to cigarettes (except menthol), quit smoking programs and products becoming more available, and increases in the price of cigarettes charged by manufacturers played important roles

### **Smokeless Tobacco**

Use of smokeless tobacco products among adolescents is less common than cigarette smoking—however, adolescents increased their use of smokeless tobacco between 2008 and 2010

8.4% of 12th graders used smokeless tobacco in the past 30 days in 2014—while user rates are not as high as during the mid-1990s, recent rates are still higher than levels seen during most of the 2000s

For smokeless tobacco use, the highest rates of initiation are in the 7th through 11th grades and users are predominately male

Chewing tobacco, snuff, snus, and dissolvable tobacco in the shape of sticks, pellets, and strips are all types of tobacco products that are not smoked but used in other ways

### **Chewing Tobacco**

Chewing tobacco comes in 3 forms:

- Loose leaves
- Twists or rolls
- Plugs

A piece (plug, wad, or chew) of tobacco is placed 'between the cheek and gum'—users chew on it for several hours and spit out the tobacco juices and saliva as they build up

## **Snuff and Snus**

Snuff and snus are ground tobacco products

Dry snuff is a powdered form sold in cans—it can be placed in the mouth or sniffed up the nose

### **Snus**

A 'wet' snuff, snus tobacco contains 50% water and 30% tobacco—with high levels of salt, moist oral snuff produces less saliva than dipping or chewing and the saliva byproduct is meant to be swallowed

The finished tobacco product is chilled below room temperature to keep its contents fresh

Moist snuff and snus are sold in cans or sachets (pouches that look like tea bags)—the tobacco product is then placed between the cheek or lip and gingiva

While snuff has been around since before Columbus sailed the ocean blue, snus has been primarily used in Sweden where it was developed several hundred years ago

In the 2000's, Swedish Match broke into the U.S. marketplace with the introduction of General brand Swedish snus—the top-selling snus in the world and the flagship brand for Swedish Match

As of 2012, General was widely available in convenience and tobacco stores across the country—and the product comes in a variety of flavors

Snus in the U.S. is generating sales of roughly \$9 million for Swedish Match—4 million cans of snus a year at approximately \$1.50 to \$2 per can

In response, Swedish Match is pumping about 8% of its trading profit into growing its U.S. business

Statistics from research firm Euromonitor suggested that the U.S. will be snus' biggest growth area—between 2013 and 2017 the group forecasted retail volume to grow by 19.7% in the U.S., 11.1% Sweden and 15.5% in the rest of the world

The European Union banned the sale of snus in 1992, partly out of concern that it would be marketed to young people—a policy that almost derailed Sweden's membership bid, until a waiver was granted

There are no such restrictions in the United States

Recognizing a successful product when they saw it, Philip Morris USA and R. J. Reynolds Tobacco began developing snus under their most famous names—Marlboro and Camel

The U.S. tobacco giants got into the snus business in response to both declining cigarette sales and consumer demand—with more public bans on puffing, they said 'smokers need socially acceptable alternatives'

### **Some things to keep in mind:**

- Snus contains nitrosamines—the same cancer-causing chemicals in cigarettes but at lower levels
- In a study of 280,000 Swedish construction workers, published in the British medical journal Lancet, snus was found to be a risk factor for pancreatic cancer
- Snus also contains plenty of nicotine

## **Hookah Use**

Hookahs (water pipes) are popular among some adolescents and are typically used in groups and sometimes in hookah cafés—when used in groups, the hookah mouthpiece is passed around from person to person

Hookah use began centuries ago in ancient Persia and India—today, hookah cafés are gaining in popularity around the world, including Britain, France, Russia, the Middle East, and the United States

In 2014, it was estimated that there were 1.6 million youth hookah users in the U.S.—Source: René A. Arrazola, MPH et al; Tobacco Use Among Middle and High School Students—United States, 2011–2014; Morbidity and Mortality Weekly Report (MMWR); 4/17/2015; accessed online 3/25/2016 at: <http://www.cdc.gov/mmwr/preview/mmwrhtml/mm6414a3.htm>

Increased interest in hookah use has been primarily observed among youth and college students

The CDC's National Youth Tobacco Survey found that from 2013 to 2014, hookah smoking roughly doubled for middle and high school students in the United States—hookah use among high school students rose from 5.2% (770,000) to 9.4% (1.3 million) and for middle school students from 1.1% (120,000) to 2.5% (280,000) over this period

Among adolescents and young adults, hookah use is highest among those ages 19-20 and is less common in suburban and rural areas



Adolescents of higher socioeconomic status appear to be at particularly high risk for hookah use in the United States—the authors stated that ‘prevention efforts must target this group as prevalence continues to increase’-- Source: Palamar JJ et al: Hookah Use Among US High School Seniors; Pediatrics (2014); 134:1-8

Other small studies of young adults have found high prevalence of hookah use among college students in the United States—showing past-year use ranging from 22% to 40%

Hookahs vary in size, shape, and style—a typical modern hookah has a head (with holes in the bottom), a metal body, a water bowl, and a flexible hose with a mouthpiece

According to a study published in the 2012 issue of CDC's Preventing Chronic Disease ('PCD'), many hookah smokers believe that smoking a hookah carries less risk of tobacco-related disease than cigarette smoking More than 1,500 young people (aged 15-23) were surveyed during 2010-2011—the vast majority of respondents (1,048) had never smoked cigarettes at the time of the initial survey but 71% of the never-smokers had used water pipes to smoke tobacco

Those hookah users were two to three times more likely to have begun smoking at the time of the two-year follow-up than those young adults who had not used the alternative tobacco products--Results appearing in JAMA Pediatrics

Research has shown that similar peak plasma nicotine levels, greater blood carbon monoxide levels, and much greater inhaled smoke volume were observed from exposure to hookah smoke compared to cigarette smoke The amount of smoke inhaled during a typical hookah session is about 90,000 ml—compared with 500–600 ml inhaled smoke when smoking a cigarette

Also, due to the method of smoking—including frequency of puffing, depth of inhalation, and length of the smoking session—hookah smokers may absorb higher concentrations of the same toxins found in cigarette smoke

**Studies demonstrated that hookah use is associated with many potentially dangerous chemicals and health effects:** Source: Society of Toxicology: Potential health risks of hookah smoking are being overlooked by users, concerning toxicologists. ScienceDaily. 2/2/2015. Accessed on 3/25/15 at:

[www.sciencedaily.com/releases/2015/02/150202105325.htm](http://www.sciencedaily.com/releases/2015/02/150202105325.htm)

- Hookah use generates carcinogens (such as **benzene, carbon monoxide**, and metals) and has been linked to lung cancer and loss of lung function

**Headliners: Hookah Smokers Are Inhaling Benzene; Nada Kassem; lead investigator; associate director; Center for Behavioral Epidemiology and Community Health; San Diego State University; study results appearing in Cancer Epidemiology, Biomarkers and Prevention; as reported by Shereen Lehman; Reuters Life; posted 11/25/2014; accessed on 3/25/2016 at: <http://www.reuters.com/article/us-hookah-smoke-benzene-idUSKCN0J921620141125>**

KEY: The tobacco in hookahs is exposed to high heat from burning charcoal to generate the smoke—benzene is present in BOTH tobacco smoke and the burnt charcoal emissions

Researchers had 105 hookah smokers and 103 non-smokers spend an average of three hours at either a hookah lounge or a house party where hookah was smoked and then measured benzene exposure—they used urine levels of a byproduct of benzene known as S-phenylmercapturic acid ('SPMA') to measure exposure

In hookah smokers (one in five of whom smoked a water pipe daily), benzene uptake quadrupled after they smoked hookah tobacco in hookah lounges, and doubled after they smoked hookah tobacco in private homes In non-smokers, the uptake of benzene did not change after events in private homes but increased 2.6 times after attending a social event in a hookah lounge

'Hookah smoking involves tobacco which is simply hazardous to the health of those who smoke it, and those who socialize or live with them. In addition to inhaling toxicants and carcinogens found in the hookah tobacco smoke, hookah smokers, and non-smokers who socialize with them, also inhale large quantities of charcoal combustion-generated toxic and carcinogenic emissions.'--Kassem

'Both the laboratory and the naturalistic studies are consistent with one another, that water pipe tobacco smoke contains many toxicants, including nicotine that causes dependence, tobacco-specific nitrosamines that cause cancer, carbon monoxide that causes cardiovascular disease, and now benzene that causes leukemia, and water pipe tobacco smokers have these same toxicants in their bodies after they smoke tobacco in a water pipe. There is an oft-repeated myth that water pipe use in this country is only occasional and thus somehow not harmful. In fact, inhaling toxic smoke involves substantial health risk, and there are many individuals in this country who inhale

toxic water pipe smoke every day.’--Thomas Eissenberg; researcher; Virginia Commonwealth University (Richmond); in a comment to Reuters about the research

Benzene exposure is a known risk factor for leukemia—since there are no safe levels of benzene exposure, interventions to prevent or reduce hookah smoking or regulate the tobacco products are needed

### **Carbon Monoxide Risk**

The charcoal used to heat tobacco in the hookah increases health risks by producing smoke that contains metals, cancer-causing chemicals, and high levels of carbon monoxide

**Headliners: Woman Suffers Carbon Monoxide Poisoning After Smoking Hookah; As reported by Amy Corderoy; Health Editor; Sydney Morning Herald; 5/4/2015; accessed on 3/24/2016 at:**

**<http://www.smh.com.au/national/health/woman-suffers-carbon-monoxide-poisoning-after-smoking-hookah-20150501-1mxypv.html#ixzz43phNQYod>**

A 20-year-old woman developed carbon monoxide poisoning after smoking a hookah waterpipe—which prompted leading doctors to warn that smoking the traditional pipes could be dangerous

Experts say the ‘light-headed’, relaxed feeling associated with smoking the hookah may actually be the result of severe oxygen deprivation in the brain

Carbon monoxide is especially dangerous because when it enters the body it attaches itself to hemoglobin—which would otherwise be used to carry oxygen to the body

Some sweetened and flavored non-tobacco products are sold for use in hookahs—labels and ads for these products often claim that users can enjoy the same taste without the harmful effects of tobacco

Studies of ‘herbal’ shisha show that smoke from both tobacco and non-tobacco preparations contain carbon monoxide and other toxic agents known to increase the risks for smoking-related cancers, heart disease, and lung disease

### **Good News!**

The University of Michigan's Monitoring the Future study found hookah use among U.S. 12th-grade students declined in 2016—the first significant drop since the survey began tracking hookah use in 2010--As reported by Jared Wadley; University of Michigan ‘Michigan News’; posted 12/13/2016; accessed 2/27/2017 at:

<http://ns.umich.edu/new/releases/24386-vaping-hookah-use-by-us-teens-declines-for-first-time>

From 2015 to 2016, use of a hookah in the past 12 months fell by more than one-third—from 20% to 13% among 12th-grade students (the survey tracks use only among 12th-grade students)

### **Tips for the Dental Team:**

The WHO's Study Group on Tobacco Product Regulation (TobReg) urges consideration of the following public health initiatives to reduce hookah smoking and associated disease:

- Education of health professionals, regulators, and the public at large is urgently needed about the risks of hookah smoking (including high potential levels of second-hand exposure)
- Waterpipes should be included in comprehensive tobacco control efforts (including prevention strategies and cessation interventions)

### **Little Cigars and Cigarillos**

In 2013, an estimated 12.4 million people in the United States aged 12 years or older (or 5.2%) were current cigar smokers

The three major types of cigars sold in the United States are large cigars, cigarillos\*\*\*, and little cigars\*\*\*

Cigarillos are tobacco products that are between a cigarette and a cigar both in terms of size and weight of tobacco—the outer wrapping consists of brown, dried tobacco leaves or brown paper

Little cigars are the same size and shape as cigarettes, often include a filter, and are packaged in a similar way—but they are taxed differently than cigarettes and are therefore less costly

Historically, cigar smoking in the United States has been a behavior of older men, but the industry's increased marketing of these products to targeted groups in the 1990s broadened user appeal

Marketing that promotes cigars as symbols of a luxury and successful lifestyle has likely contributed to the increased acceptability of cigar smoking

**Cigar marketing strategies include:**

- Endorsements by celebrities
- Development of cigar-friendly magazines (e.g., Cigar Aficionado)
- Images of highly visible women smoking cigars
- Product placement in movies

**Another troubling marketing trend:** The use of **flavorings** in some cigar brands and the fact that they are commonly sold as a single stick has raised concerns that these products may be especially appealing to youth. The CDC reported that little cigars have become more popular in recent years—sales increased 240% from 1997 to 2007.

Flavored brands made up almost 80% of the market share.

Adolescent use of flavored little cigars was tracked in 2011 for the first time—researchers found that about four in 10 smokers in middle school and high school say they use flavored little cigars--Source: National Youth Tobacco Survey

In 2014, among middle and high school students who used cigars in the past 30 days, 63.5% reported using a flavored cigar during that time.

'This data is disturbing. Flavored little cigars are basically a deception. They're marketed like cigarettes, they look like cigarettes, but they're not taxed or regulated like cigarettes. And they're increasing the number of kids who smoke.'--Tom Frieden, director of the U.S. Centers for Disease Control and Prevention

'We find that more than 87% of adolescents who used cigarillos in the past 30 days used flavored cigarillos. This result suggests that flavoring is a major draw of cigarillos among youth. It also suggests the possibility that if cigarillos had no flavoring, then fewer youth would use them.'--Richard Miech, PhD; senior investigator; 2015 the Monitoring the Future project

**Dangers of Cigar Use:**

According to the National Institutes of Health, a cigar emits up to 90 times a cigarette's level of nitrosamines.

The NIH also reported that smoking one or two cigars a day **DOUBLES** the risk of cancer of the lips, tongue, mouth, throat, or esophagus—if you smoke more than two of them daily, the risk rises dramatically.

A study of nearly 18,000 men published in the New England Journal of Medicine found that cigars raised the risk of coronary heart disease by 30% and the risk of emphysema rose 45%.

'The average cigarette has approximately 8 milligrams of nicotine in it; the average cigar can range anywhere from 100 to 200 milligrams of nicotine.'--Source: Mignonne Guy; Mayo Clinic researcher and public health advocate

**Headliners: Nicotine May Damage Arteries; Tina Hesman Saey; reporting for Science News; 1/25/14**

Nicotine in tobacco and non-tobacco products has been understood to be primarily an 'addiction' chemical with little systemic effect—however, that notion is being increasingly questioned.

According to a recent study, smoking cigarettes may cause damage that can lead to atherosclerosis--Chi-Ming Hai; Brown University (Providence, RI); results presented at the American Society for Cell Biology's Annual Meeting; 12/15/13

Vascular smooth muscle cells make up the outer arterial walls and are integral in controlling blood flow and pressure.

Inflammation and certain chemicals can stimulate arterial smooth muscle cells to morph into miniature drills that burrow through connective tissue and allow muscle cells to tunnel into blood vessels.

Once inside the vessel, the cells and other debris clump into artery-clogging plaques—nicotine appears to be one chemical that assists in turning normal muscle cells into invaders.

The research team reported that when exposed to nicotine, smooth muscle cells already riled up by inflammation formed ring-like structures that started the 'invasion'.

'This report raises a red flag about newer tobacco products. Cigars and hookah tobacco are smoked tobacco—addictive and deadly. We need effective action to protect our kids from addiction to nicotine.'--Source: Tom Frieden, M.D., M.P.H.; CDC Director

**One more nicotine tidbit:** Smokers typically inhale about 1 milligram (mg) of nicotine in a single cigarette.

## E-cigs

### E-Cig Components:

- Rechargeable lithium battery
  - Some can be charged with a USB cord connector to the computer
- A cartridge containing nicotine, flavoring and/or chemicals like glycerin or polyethylene glycol
  - CAUTION: Not all ingredients are listed because e-cigs are not regulated!
- A microchip activates the battery when the e-cigarette is puffed—causing the atomizer to create heat which in turn vaporizes the liquids in the sponge to create vapor
- Atomizer

### History

First patented by a gentleman named Herbert A. Gilbert in 1963, the first e-cigarette was described as a non-tobacco cigarette wherein a nicotine solution was heated up to produce steam—this was the first recorded instance of the idea of e-cigarettes but the product was never manufactured

Fast-forward to 1979, when Dr. Norman Jacobson invented an early form of the e-cigarette—called the Favor cigarette—which was designed to give users a way to inhale nicotine without the smoke

Incidentally, Dr. Jacobson was also one of the pioneers of the word ‘vaping’

In 2014, the word ‘vape’ made it into the Oxford Dictionary and was named the word of the year—if anything, that proves that vaping is now a worldwide phenomenon

The decades that followed demonstrated that the world was not impressed with e-cig technology—largely because from the 1960s to 1990s, cigarettes were the norm

Cigarette smoking was allowed everywhere and no one really complained—even though harmful side effects were known, the tobacco industry had succeeded in marketing smoking as ‘cool’

When the 2000s came, alternative healthy lifestyles began permeating the collective consciousness of the masses—people started to seeking a healthier way to live

### Enter Hon Lik

In 2003, a Chinese pharmacist named Hon Lik reworked the earlier version of the e-cig and the following year, the Ruyan (which means ‘like smoke’) company—where Hon Lik was employed—invested in the idea and began manufacturing the very first modern e-cigarettes

The Cig-a-Like vape pens from Ruyan were an instant hit in the Chinese market and quickly spread to neighboring countries—in 2006, this new trend reached the shores of Europe, and the U.S. started vaping in 2007

As more and more people began vaping, more and more concerns were raised concerning safety issues, marketing to children and health concerns

**Headliners: E-cigarettes Proving to Be a Danger to Teens; Janet Raloff; reporting for Science News; 6/30/2015; appearing in magazine issue: Vol. 188 No. 1, 7/11/2015, p. 18; accessed online 3/25/2016 at:**

**<https://www.sciencenews.org/article/e-cigarettes-proving-be-danger-teens>**

E-cigarettes became a fashionable new electronic toy—with vape flavorings like bubble gum, Dr Pepper and cotton candy, teens have been taking the bait

In 2014, e-cigarettes surpassed cigarettes as the most commonly used tobacco product by middle school and high school students

In 2014, only 14.2% of 12th graders surveyed viewed regular e-cigarette use as harmful

Teens’ fascination with this nicotine-dispensing smoking alternative worried physicians and toxicologists—data from a growing number of studies indicated that electronic cigarettes were far from harmless

An electronic cigarette can contain as much or more nicotine as a regular cigarette—the amount of nicotine an electronic cigarette delivers depends on the content of the liquid-nicotine cartridge installed in it

‘What I can say definitively is that nicotine is harmful to the developing teenage brain. No teenager, no young person, should be using any tobacco or nicotine-containing products.’--Source: Mitch Zeller; director; Center for Tobacco Products; U.S. Food and Drug Administration (Silver Spring, MD)

**Headliners: The Dangers of Vaping; Teresa Shipley Feldhausen; reporting for Science News; 7/11/2015; accessed on 3/25/2016 at: <https://www.sciencenews.org/article/e-cigarettes-proving-be-danger-teens>**

The prefrontal cortex—the area of the brain responsible for emotions and impulse control—does not finish developing until age 25 or so

It is an area especially vulnerable to nicotine addiction

Nicotine can reach the brain within seven seconds of inhaling—the drug then acts like a key, unlocking special receptor molecules that cause nerve cells in the prefrontal cortex and other parts of the brain to release neurotransmitters (such as dopamine and serotonin) into the synapse

Users get a feel-good high—but, after repeated exposure to nicotine, fundamental changes in the brain can interfere with the body's ability to release natural pleasure-giving chemicals on its own

Teen brains will then create more receptors to handle the flood of nicotine—as the number of receptors increases, teens need more nicotine to get the same high

That makes nicotine users seek hit after hit—in teens, behavioral consequences (including impaired attention and bouts of depression and anxiety) can emerge

Exposing the developing adolescent brain to nicotine 'could lead to a high risk of lifelong addiction'--Source: Garry Sigman; Chief, Adolescent Medicine; Loyola University (Chicago) School of Medicine

Certain other chemicals added to cigarettes to make them easier to smoke are found in e-cigs as well—researchers at the Harvard School of Public Health sifted through a mountain of tobacco company documents released to the public in the 1990s as part of a legal settlement to identify cigarette additives that might also be found in e-cigs

'What we found is that [the tobacco industry] added ingredients [to cigarettes]—particularly **pyrazines**—that appear to have contributed to the 'smooth' flavor, reducing the harshness of certain cigarettes. Pyrazines are also being added to e-cigarette fluids.'--Hillel Alpert et al; lead investigator; A study of pyrazines in cigarettes and how additives might be used to enhance tobacco addiction; Tobacco Control (online); 6/10/2015; accessed on 3/25/2016 at: <http://tobaccocontrol.bmj.com/content/early/2015/05/03/tobaccocontrol-2014-051943.abstract>

Such chemicals may mask the body's natural aversion to irritating aspects of vapors, making them easier to inhale and comfortably take in nicotine—likely fostering addiction in the process

In September 2014, a study published in The New England Journal of Medicine stated that, "...like conventional cigarettes, electronic cigarettes may function as a 'gateway drug' that can prime the brain to be more receptive to harder drugs."

**Headliners: Teen E-Cig Users More Likely to Smoke Tobacco; Adam Leventhal, PhD, et al; lead investigator; University of Southern California (Los Angeles); Association of Electronic Cigarette Use With Initiation of Combustible Tobacco Product Smoking in Early Adolescence; study results appearing in JAMA. 2015; 314(7):700-707; as reported by Meghan Rosen; Science News; 8/18/2015; appearing in issue: 188:6; 9/19/2015; p. 14; accessed 3/25/2016 at: <https://www.sciencenews.org/article/teen-e-cig-users-more-likely-smoke-tobacco>**

Leventhal and colleagues asked 2,530 nonsmoking ninth-graders from 10 Los Angeles public high schools about their background, family history and habits—of those students, 222 had used e-cigarettes

The team repeated the survey after six months and again after a year

Compared with the adolescents who did not use e-cigarettes at the beginning of ninth grade, those who did were about three times as likely to start smoking tobacco products during the year

'The idea that e-cigarettes steer teens away from tobacco just does not fit. We actually found the opposite.'--Leventhal

The study is the first to draw a link between e-cigarette use and later experimentation with tobacco

Among high school seniors, 22.2% reported inhaling nicotine, 6.1% reported inhaling marijuana or hash oil, and 6.3% indicated that they did not know what they inhaled

### **Good News!**

The University of Michigan's Monitoring the Future study found that the percentage of U.S. teens who vape declined in 2016—the first significant reversal of a rapid rise in adolescent vaping--As reported by Jared Wadley; University of Michigan 'Michigan News'; posted 12/13/2016; accessed 2/27/2017 at:

<http://ns.umich.edu/new/releases/24386-vaping-hookah-use-by-us-teens-declines-for-first-time>

From 2015 to 2016, the percentage of adolescents who vaped in the last 30 days declined from 16% to 13% percent among 12th-grade students, from 14% to 11% among 10th-grade students, and from 8% to 6% among 8th-grade students—each of these declines was statistically significant

'Whether adolescent vaping has peaked or only paused is something we will be able to determine in the coming years. In the past, we have seen new drugs follow a pattern in which use increases at a fast pace during a honeymoon period and then reverses course and declines as knowledge of the substance's drawbacks became known...Hookah use and vaping are two alternative cigarette products that rank among the most commonly used among U.S. youth. The decline in their use is important so that any reduction in cigarette smoking among U.S. teens is a real reduction in nicotine consumption, and not just a change from one form of nicotine use to another.'--Richard Miech; a senior investigator; Monitoring the Future Project

**Headliners: Health Risks of E-Cigarettes Emerge; Janet Raloff; reporting for Science News; 6/3/2014; appearing in magazine issue: Vol. 185 No. 13, 6/28/2014, p. 9; accessed on 3/25/2016 at:**

**<https://www.sciencenews.org/article/health-risks-e-cigarettes-emerge>**

In this 6/28/2014 issue of Science News, data was presented by a variety of experts on the health risks of e-cigarettes—and the news was alarming

A study team at UCSF poured over emerging data on what e-cig vapers are inhaling and found greater risk than scientists had thought—apparently, e-cigarettes deliver high levels of nanoparticles which can trigger inflammation and have been linked to asthma, stroke, heart disease, and diabetes--Source: Stanton Glantz, PhD; lead researcher; director of the Center for Tobacco Control Research and Education at the University of California (San Francisco); in a 5/13/2014 review appearing in Circulation

The median diameter of vaping particles falls around 200 to 300 nanometers and the mass of particles in the vapors is about 3 milligrams per cubic meter of air—about 100 times as high as the Environmental Protection Agency's 24-hour exposure limit for levels of fine air particles

Researchers' analyses predicted that some 40% of these inhaled particles would deposit in the lungs' smallest, deepest airways--Jonathan Thornburg et al; RTI International; Research Triangle Park, N.C.

According to the researchers, the levels 'really raise concerns about heart disease and other chronic conditions where inflammation is involved'

The FDA reviewed data from 18 studies on e-cigarettes' vapors and found that most contain at least traces of the solvents in which nicotine and flavorings had been dissolved

Known as 'lung irritants', the solvents can transform into something even more worrisome: carbonyls

As a chemical group, carbonyls include known carcinogens such as formaldehyde and suspected carcinogens such as acetaldehyde

Because early versions of e-cigarettes did not deliver the same powerful hit of nicotine that burning tobacco does, engineers developed second-generation technology that allowed users to increase an e-cigarette's voltage (which increased temperature) and allowed more nicotine to be atomized per puff

But the higher temperatures can trigger a thermal breakdown of the solvents—producing carbonyls like formaldehyde

**Bottom Line: If users of second-generation e-cigarettes maximize the power on their devices while using vaping liquids containing a solvent mix of glycerin and propylene glycol, formaldehyde is produced**

**Headliners: E-Cigarettes Can Churn Out High Levels Of Formaldehyde; Rob Stein; reporting for NPR News; updated 1/22/2015; published 1/21/2015; accessed on 3/21/2016 at: <http://www.npr.org/sections/health-shots/2015/01/21/378663944/e-cigarettes-can-churn-out-high-levels-of-formaldehyde>**

Researchers reported that high concentration of formaldehyde is found in vapor produced by electronic cigarettes and described their findings in a letter published in the New England Journal of Medicine

In a unique study design, investigators simulated vaping by drawing the vapor— the aerosol—into a syringe and then conducted a detailed chemical analysis of the vapor

When they analyzed the vapor, the researchers found something unexpected when the devices were dialed up to their highest settings—masked formaldehyde in the liquid droplet particles in the aerosol

Masked formaldehyde exists in a slightly different form than regular formaldehyde—and could increase the likelihood it would get deposited in the lung

'We found this form of formaldehyde at significantly higher concentrations than even regular cigarettes [contain] —between five[fold] and fifteen-fold higher concentration of formaldehyde than in cigarettes.'--Peyton

'I think this is just one more piece of evidence amid a number of pieces of evidence that e-cigarettes are not absolutely safe.'--David Peyton; study investigator; chemistry professor; Portland State University

The e-cigarette industry immediately dismissed the findings—saying the measurements were made under unrealistic conditions of high vape setting only

"They clearly did not talk to [people who use e-cigarettes] to understand this. They think, 'Oh well. If we hit the button for so many seconds and that produces formaldehyde, then we have a new public health crisis to report.' But that's not the right way to think about it. If you hold the button on an e-cigarette for 100 seconds, you could potentially produce 100 times more formaldehyde than you would ever get from a cigarette. But no human vaper would ever vape at that condition, because within one second their lungs would be incredibly uncomfortable."--Gregory Conley of the American Vaping Association

'As I walk around town and look at people using these electronic cigarette devices it's not difficult to tell what sort of setting they're using. You can see how much of the aerosol they're blowing out. It's not small amounts. It's pretty clear to me that at least some of the users are using the high levels.'--Peyton

Additionally, e-cigarette vapors appear to make microbes harder to kill—when exposed to e-cigarette vapors in vitro, MRSA proved harder to kill because the nicotine-rich vapor exposure apparently allowed the antibiotic-resistant organism to produce a thicker, protective biofilm coating

The research demonstrated that when mice breathed in air containing MRSA that had been exposed to e-cigarette vapors, the mice getting vapor-exposed MRSA had three times as many bacteria growing in their lungs as did mice that got unexposed bacteria--Laura Crotty Alexander, MD; lead investigator; pulmonary and critical care physician and scientist; VA San Diego Healthcare System; research presented at American Thoracic Society meeting (San Diego)

**Headliners: E-Cigarettes are Bad for Your Pet's Health; News Channel 3 (Kalamazoo, MI); posted 3/22/2016 at: <http://wwmt.com/news/local/veterinarian-e-cigs-are-bad-for-your-pets-health>**

According to reports from the pet poison hotline, the number of pets poisoned by e-cigarettes has jumped 400% since 2013 cats and dogs are getting sick by ingesting the liquid or inhaling the vapor

Veterinarians say it is not just e-cigarettes that pet owners need to watch out for, but traditional tobacco products are dangerous for pets—any time there is smoke in the air, animals become more susceptible because their lungs are smaller

Veterinarians report that up to 25% percent of treated pets suffer from some type of smoking illness

### **Child Safety Issues**

It is important to store all nicotine products out of reach of children—nicotine is a poison that is especially toxic in liquid form

Liquid nicotine, or E-juice, refills pose a particular risk to children

Ingesting as little as one-third of an ounce of E-juice—less than the amount of liquid in a coffee creamer—may be fatal for children

Currently, there are no requirements for child safety caps or safety information when selling E-cigarette refills—because refills come in bright colors, appealing flavors, and scents, children will be more likely to put the liquid in their mouths

Products come in bright colors, flavors and scents—just a few drops of E-juice absorbed by the skin or swallowed can send a child to the emergency room

In addition to nicotine and solvents, vapors also contain chemical flavorings and food preservatives from the vaping liquid

Although most of these additives received a 'GRAS' or 'generally recognized as safe' designation by FDA, the designation is based on tests of the compounds when they are ingested—not inhaled

Even the Flavor Extracts Manufacturers Association argues that it would be 'false and misleading' to claim that food-grade flavorings are inherently safe to vape

**Headliners: White House Pulled FDA Restrictions on E-Cigarette Flavors; Reuters; 6/1/2016; as reported by NBC News; accessed on 8/2/2016 at: <http://www.nbcnews.com/health/health-news/white-house-pulled-fda-restrictions-e-cigarette-flavors-n583841>**

On 5/5/2016, the FDA released a final rule extending its tobacco authority to include e-cigarettes, pipe tobacco, cigars and hookah use—the rule, which became effective in early August 2016, mandates companies must seek marketing authorization for any tobacco product introduced after 2/15/2007

Additionally, the rule gives manufacturers a grace period of up to two years to submit marketing applications—during which time they can continue to sell their products

E-cig companies can also sell their wares for an additional year while the FDA completes its review

The missing piece: As submitted by the FDA to the White House Office of Management and Budget (OMB), the proposed rule included ‘a grace period for flavored products of only 90 days after the rule became effective’

However, the OMB deleted language in the tobacco regulation rule that would have removed flavored e-cigarettes from the market until they had been authorized by the Food and Drug Administration

The FDA provided pages of data and scientific studies in support of its proposed ‘e-cig flavoring plan’ to the OMB—and noted ‘a dramatic rise in youth and young adult use of typically flavored tobacco products, like e-cigarettes and waterpipe tobacco, and continued youth and young adult use of cigars’

In its originally submitted rule, the FDA acknowledged that numerous flavored products would come off the market within 180 days of the rule's publication ‘...and that this will significantly impact the availability of flavored tobacco products at least in the short term...but ‘the move was important because tobacco products with characterizing flavors, including menthol but excluding tobacco flavor, were attractive to young people’

‘The FDA made an overwhelming scientific case to the White House Office of Management and Budget (OMB). For reasons that are not articulated, those people substituted their own judgment.’--Matthew Myers; president; Campaign for Tobacco-Free Kids

‘We are deeply troubled that these important safeguards were stripped in this way when FDA repeatedly demonstrated that the science shows flavored products appeal to youth and young adults.’--Harold Wimmer; president; American Lung Association

### **Case Report**

Courtesy of Dr. Nate Johnson (Spokane, Washington)

**THANK YOU!**