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Menthol: Putting the Pieces Together

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Abstract

Objective—To integrate information on cigarette companies' understanding and use of menthol as summarized in published research based on previously internal tobacco industry documents with results from large population-based surveys of tobacco use and other independent sources.

Data sources—Papers published in this supplement to *Tobacco Control* together with papers identified using PubMed searches.

Results—Tobacco companies shaped consumer perceptions of menthol cigarettes. Menthol is not just a flavoring agent. Cigarette companies use menthol's ability to mask irritation and provide sensory effects to make menthol cigarettes appeal to youth and health-concerned smokers, in part because menthol makes low-tar cigarettes more palatable. Consistent with targeted marketing, youth, women, and African Americans disproportionately smoke menthols. There appear to be complex interactions with addictive effects of nicotine. The ubiquitous addition of menthol by tobacco companies to over 90% of all tobacco products, whether labeled “menthol” or not, demonstrates that menthol is not simply a flavor or brand. Menthol imparts sensory characteristics to cigarettes and has a complex interaction with nicotine that affects smoking behavior whether it is perceived or not, or whether cigarettes containing menthol are marketed as “menthol” or not. Adding menthol increases fine particles in cigarette smoke, which have immediate adverse effects on the risk of heart attack.

Conclusion—Information from industry documents, confirmed by independent scientific literature, consistently demonstrates that menthol increases population harm from smoking by increasing initiation and reducing cessation in some groups. Menthol facilitates and increases smoking, which causes disease and death.

On June 22, 2009, President Barack Obama signed the Family Smoking Prevention and Tobacco Control Act, giving the Food and Drug Administration (FDA) authority to regulate tobacco products.[1] The law instructed the FDA to ban use of candy, fruit, and spice flavors in cigarettes, but not menthol. During the Congressional debate the menthol exemption drew a strong response from seven former Secretaries of Health and Human Services and one Surgeon General who called it discriminatory against African Americans and said that the bill “cav[ed] to the financial interests of tobacco companies … [and sent] the message that African American youngsters are valued less than white youngsters.”[2] Due to the public outcry following the exclusion of menthol from the list of banned additives, Congress amended the bill to require that the FDA to prepare a study of menthol by March 2011. This

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study could be – but does not have to be – the first step toward regulating or eliminating menthol from cigarettes and other tobacco products.

The first menthol cigarette was created in 1925 by Lloyd “Spud” Hughes who, while suffering from a cold, stored menthol crystals along with his tobacco and discovered the next day that he had created a mentholated cigarette.[3] Since then, the tobacco companies have known of menthol's ability to mask the harshness, increase the ease of smoking, and provide a cooling sensation that appeals to many smokers[4, 5] Prior to 1956, sales of menthol cigarettes represented about 3% of the overall cigarette market in the U.S.,[6] reaching 20% in 2006.[7] Menthol is added to over 90% of all tobacco products whether labeled “menthol” or not.[8] (Internationally, tobacco companies confirmed in the 1990s that in Asia, menthol cigarettes are important in attracting beginning smokers and young people due to their preferences for lighter taste.[9]) As the tobacco companies recognized menthol's value for recruiting and retaining smokers, they conducted research to refine their marketing strategies and the cigarettes themselves to improve their appeal.

We know these facts because, as a result of litigation, we have access to over 60 million pages of previously internal tobacco industry documents. Indeed, in 2006, three years before Congress granted the FDA authority to regulate tobacco products, RJ Reynolds anticipated that the FDA would use these documents to understand why and how the industry makes and sells its products:

> An industry has developed around the analysis of Tobacco company documents (typically produced as a part of litigation activities). This activity would likely proceed since it is felt that it has retrospectively demonstrated industry intentions and provides a means to ensure industry activities are kept in check. … The FDA would likely contract with such groups to perform these tasks using documents made available by the Industry.[10]

As RJ Reynolds anticipated, many investigators,[4–6, 9, 11–14] including several supported by the FDA,[8, 15–19] have used the documents to understand why and how the cigarette companies use menthol to sell cigarettes.

This review compares the conclusions from investigations into tobacco companies' knowledge about menthol with results from large population-based surveys conducted by non-industry investigators. A remarkably consistent picture emerges that shows that consumer perceptions and use of menthol cigarettes is largely consistent with the companies' planning. The information in the documents, however, goes beyond the information obtained from independent population surveys to demonstrate that menthol—even at levels so low that they are not perceived by the smoker—also has important effects on smoking behavior.

The tobacco companies manipulated menthol content and marketing to target initiates and youth

Menthol cigarettes were not introduced to appeal to youth, but by the mid-1970s industry market research began to reveal that they were popular among young smokers because they were perceived as less harsh and easier to smoke.[11, 18] To capitalize on these desirable characteristics, the companies manipulated menthol levels and used targeted marketing to enhance the menthol cigarettes' appeal to this population.[18]

A 1977 Philip Morris study found that the median age for Lorillard Tobacco Company's Newport King smokers was the youngest for all cigarette brands: 24.8 years old compared with 38.0 for all smokers.[6] Newport's success in the young adult market demonstrated that

mentholated cigarettes with relatively low menthol content appealed disproportionately to young people led other companies to develop low menthol cigarettes. By the 1980s all major menthol brands had low menthol varieties to target this market.[11] According to company research in the 1980s, half of Newport smokers were under 25 and young smokers identified Newport as smoother, milder, and less harsh than Brown and Williamson's Kool menthols, which had higher levels of mentholation.[6]

Tobacco companies developed marketing to target young potential menthol smokers. Lorillard's competitors attributed Newport's success to its appeal among younger smokers.[11, 18] By the 1990s Lorillard had built Newport into the most successful menthol brand with its youthful and fun marketing campaign that often depicted people doing childlike, silly activities.[6] Following Newport's success, other menthol brands, including RJ Reynolds' Salem, copied the use of young people in their marketing materials.[18]

Independent research confirms that menthol cigarette use is more common among younger and newer teen smokers.[20–22] The 2004–2008 National Survey on Drug Use and Health (NSDUH) shows the youngest current smokers in the study (age 12 – 17) had the highest past month menthol cigarette use.[22] Even though cigarette use declined between 2004 and 2008, the fraction of smokers 12 – 17 years old reporting past month menthol use increased from 44% to 48%.[23] The NSDUH also showed that smoking menthols was more likely for recent initiates (started smoking within the past year) than for those who started smoking more than a year earlier among those aged 12 – 17 (49% vs. 44%) and 18 – 25 (40% vs. 36%).[23] Studies focused on youth have found smoking menthol cigarettes is significantly associated with indicators of nicotine dependency.[20, 21]

Tobacco companies manipulated menthol content to reinforce smoking behavior and addiction

Industry documents consistently demonstrate that the companies manipulate menthol's ability to mask the harshness, increase the ease of smoking, and provide a cooling sensation to provide particular sensory effects.[5, 12, 13, 16, 17] They use menthol's sensory effects to minimize the immediate negative effects of tobacco smoke (harshness, irritation) and superimpose positive attributes (coolness, smoothness) to make menthol cigarettes easier to inhale.[5, 17] These characteristics depend on the amount of menthol added to cigarettes, with even non-identifiable levels contributing to smoothness and a reduced harshness perceived by smokers.[5] Beginning in the 1970s, tobacco companies investigated the effects of adding different amounts of menthol to cigarettes and manipulated menthol levels to develop different cigarettes for young and experienced menthol smokers.[12]

In the early 1970s tobacco companies discovered that increased menthol levels affected the “impact” or the “grab,” smokers perceive in their throats when inhaling smoke that is essential for the immediate perception of strength and satisfaction.[5, 16] A 1989 Philip Morris study concluded that impact jointly depended on the levels of nicotine and menthol.[16] Furthermore, company research beginning in 1995 found that menthol alone can increase impact, suggesting that menthol reinforces smoking behavior independent of nicotine.[24] Menthol's nicotine-like effects led several companies to conclude that menthol could be used to compensate for the reduced “satisfaction” of low tar/nicotine yield cigarettes to increase their appeal.[5, 16] Research done by Philip Morris in the 1980s even suggested that a menthol-like additive could be used as an analog (substitute) for nicotine.[5, 25] Independent research confirmed different menthol levels in cigarettes depending on company-defined cigarette descriptors (e.g., ultralight or light) or cigarette length (e.g., 100mm or 85mm).[26] These results are consistent with tobacco company research suggesting that menthol is used to offset reduced delivery or impact in low tar/nicotine, “light” cigarettes.

Independent research confirms the companies' understanding that menthol's particular anesthetic and sensory characteristics mask the immediate negative health effects of smoking[4] and its potential interaction with nicotine.[24] Independent research reported that menthol has analgesic, antitussive, antibacterial, antiallergic, and soothing effects on the respiratory tract as well as serving as an expectorate[4] and reinforced the effects of nicotine.[27] An independent study of smokers' descriptions of early experiences with cigarettes found differences in African Americans' and Whites' early smoking experiences, with African Americans, who disproportionately started smoking with menthols, reporting more positive and pleasurable experiences as opposed to reporting dizziness or difficulty inhaling.[28] This work, combined with studies on the taste and rewarding effects of smoking menthols, suggest that menthol reinforced smoking, possibly leading to increased nicotine dependence.[27]

Independent research confirms the complex interaction between menthol and nicotine that the cigarette companies studied. Menthol smokers do not have significantly different Fagerström Test for Nicotine Dependence (FTND) scores than non-menthol smokers.[27, 29, 30] Nevertheless, studies have consistently found shorter time-to-first-cigarette in menthol smokers,[20, 27, 29–32] indicating higher levels of addiction. However, menthol smokers also consistently report smoking fewer cigarettes per day.[31, 33] These two findings may help explain the FTND results because the FTND depends on both time-to-first cigarette and number of cigarettes per day. These consistent but seemingly contradictory results suggest that there is a complex interaction between menthol and nicotine in terms of the cigarettes' addictive properties.

Tobacco company marketing associates menthol cigarettes with medicinal properties and implied health messages

Early menthol cigarette brands (Spud, Kool) were introduced as a remedy for throat irritation, cough, allergies, or heavy smoking.[6, 8] After menthol cigarettes were introduced in the 1920s tobacco companies' menthol cigarette advertising emphasized health benefits[8] and connected them with medicinal remedies that commonly contain menthol, such as chest rubs and throat lozenges.[6, 8] Until the 1950s most menthol cigarettes were only smoked occasionally by smokers.[6] This pattern was consistent with explicit health messages that presented menthol cigarettes as a healthier alternative to non-menthols to be used when smokers felt they temporarily needed a less harsh cigarette to relieve symptoms.[6] A 1951 case report in the *Journal of the American Medical Association* reflected this widely accepted health messaging by referring to menthol cigarettes as ”medicated cigarettes,” which the reporting physician observed that patients used for their “anesthetic and cooling effect … for rhinitis, pharyngitis, laryngitis, and bronchitis.”[34]

The public became more worried about the dangers of cigarette smoke in 1952 when *Reader's Digest* printed an article entitled “Cancer by the Carton.”[35] By the mid-1950s the cigarette companies had stopped making explicit health claims in their advertising because they believed that such messaging reminded people of the association between smoking and cancer.[6] During the 1980s, however, the companies continued to appreciate the continuing benefits of the association between menthol cigarettes and health established before the mid-1950s.[8]

After the public became more aware of, and concerned about smoking's health dangers menthol cigarette marketing shifted to more subtle health reassurance messages emphasizing the positive experience of smoking menthols.[6, 8] By describing menthol cigarettes as “clean,” “fresh,” “refreshing,” and “cool,” tobacco marketing put the focus on the taste of menthols as a positive feature while still suggesting health benefits to reassure smokers.[8] In

the 1970s, British American Tobacco and its U.S. subsidiary Brown and Williamson, described marketing goals for brand promotion to “convince smokers … that Kent menthol is the menthol that offers refreshing menthol smoking satisfaction and health reassurance”[36] and to position the Kool menthol brand into the “health reassurance segment.”[15, 37] After this shift to reassurance rather than explicit health claims, tobacco companies continued to recognize the importance of retaining a connection between menthol and health in the general public. For example, Brown and Williamson developed a 1979 – 1985 prime marketing objective for Kool menthol cigarettes to provide reassurance with the message that Kool cigarettes are “safe” through the launch of a “low-tar” or “mild” product.[8, 37]

Tobacco company research in the 1960s and 1970s consistently found that smokers perceive menthol cigarettes as healthier, safer, milder, and less harmful.[8, 38] This effect seems to have faded with time. Independent research using the 2009 HealthStyles survey[39] and the 2005 New Jersey Adult Tobacco Survey[40] showed few menthol smokers or respondents overall (smokers and non-smokers) believed that menthol cigarettes were less harmful than non-menthol cigarettes. Both studies also show younger respondents are more likely than older ones to report that menthol cigarettes are more harmful/risky.[39, 40] This age effect also appeared in a 2010 study using focus group and survey data to assess attitudes and beliefs about menthol cigarettes among African Americans: beliefs that menthol cigarettes have medicinal effects and are less harmful were most likely to be held by older smokers.[41] These results may reflect the fact that older smokers were more likely to have been exposed to earlier industry advertisements promoting menthol's health “benefits.”

The tobacco companies targeted vulnerable groups for menthol cigarette promotions

In addition to youth, the cigarette companies targeted women and African Americans for menthol cigarettes.[6, 8] Independent research in the open literature confirms that smokers in these populations are more likely to smoke menthol cigarettes than others.[6, 7, 42]

Women

Women were the first group targeted by tobacco companies for menthol use. By the 1950s most menthol smokers were women.[6] After R.J. Reynolds introduced Salem menthols in 1956, tobacco companies noted that female smokers liked the new filters, longer cigarettes and menthol flavor.[6] Menthol cigarette advertising at the time used images of romance, beauty, nature, relaxation and female desirability to appeal to women.[6] Tobacco companies disproportionately advertised menthols in women's magazines and on daytime television. For example, Brown and Williamson's 1969 Kool campaign to promote its extra-long menthol cigarettes was named “Lady Be Kool” based on knowledge that female menthol smokers preferred extra-long cigarettes.[6] Beginning in the 1980s and early 1990s, companies expanded targeted marketing of menthols to women in Japan, Korea, and Singapore where menthol sales subsequently rose rapidly and brands have attracted high proportions of young women.[8, 9]

Confirming conclusions from tobacco industry documents, independent research demonstrates higher proportions of women continue to smoke menthol than non-menthol cigarettes. The higher prevalence of menthol smoking among women is confirmed by nationally representative surveys. According to the 2004–2008 National Survey on Drug Use and Health (NSDUH), over 52% of menthol smokers are female compared with 43% for non-menthol.[22, 23] The 2003 and 2006–07 Tobacco Use Supplements to the Current Population Survey (TUS-CPS) show higher prevalence of menthol smoking among women aged 18+ with 55% of menthol smokers being female compared with 44% for non-menthol.[7]

The 2005 National Health Interview Survey and Cancer Control Supplement show that women are significantly more likely to be menthol smokers (25% for Whites, 78% for Blacks, and 36% for Hispanics) than men (15% for Whites, 70% for Blacks, and 17% for Hispanics) after adjusting for age, income, and education.[42] This pattern appears internationally. For example, survey data from Japan show that by 2000 48% of female high school smokers smoked menthols compared with 18% of males.[9]

African Americans

Before the 1960s, African Americans smoked menthol and non-menthol cigarettes at rates similar to the general population, and like the general population, most smoked non-menthol brands.[6] In the following decades, tobacco companies competed for menthol market share and targeted inner cities predominantly composed of African American residents with menthol cigarette marketing during the late 1970s to 1990s.[43] The 2003 and 2006–07 TUS-CPS indicated that 74% of adult African American smokers smoked menthol cigarettes compared with 21% of non-Hispanic Whites.[7] This dramatic change in the proportion of African American menthol smokers coincided with cigarette company target marketing of menthol cigarettes to African Americans beginning in the 1960s.[44]

Tobacco companies used a variety of marketing methods to reach the African American market to increase sales[8, 14, 43, 44] including concentrating menthol cigarette advertisements in popular African American magazines and television programs.[8, 44] Tobacco companies found that African Americans were more likely than Whites to trust advertising and promotional campaigns targeted at them.[44] Company research found that in the 1960s and 1970s African Americans were more likely to believe health messaging related to menthol[4, 44] and respond favorably to menthol marketing efforts to associate menthol cigarettes with African American culture.[6, 44] Tobacco companies reinforced conventional advertising campaigns in several ways. Tobacco companies formed organizational and philanthropic relationships with Black community groups and civil rights organizations,[45] developed tailored brands in the 1990s such as R.J. Reynolds' *Uptown* and an independent Boston firm's *X*[44, 46]) and targeted Black urban neighborhoods by distributing free menthol cigarettes using mobile vans in the 1980s and early 1990s as well as using retailer incentive programs.[14, 43]

The independent literature confirms that these targeted marketing and public relations efforts were successful. The 2004–2008 National Survey on Drug Use and Health (NSDUH) indicated that 83% of African Americans aged 12 or older reported smoking menthol cigarettes in the past month compared with 24% of Whites.[23]

Independent research on the receptivity of African Americans to tobacco industry health messaging on menthol has tended to find that African Americans are more likely to associate menthol cigarettes with reduced health risk, although research is mixed. Focus group and survey data collected in 2006 among African Americans in Los Angeles, CA, show that African American menthol smokers had significantly higher measures of positive attitudes and beliefs regarding the medicinal effects and reduced harm of menthol cigarettes than non-menthol smokers by 10% and 9% respectively.[41] Another study using data from the 2009 HealthStyles survey of US households found that African Americans are significantly more likely to believe that menthol cigarettes have health benefits compared to Whites (OR=3.2, 95% CI=1.8–5.7).[39] Similar findings have been published using interview data from African American smokers in Atlanta, GA, during 2005 showing that participants believed that smoking menthols leads to less negative health effects than smoking non-menthols.[47] In contrast, one study using the 2005 New Jersey Adult Tobacco Survey found that African Americans overall were no more likely than other groups to believe that

menthols are less risky than non-menthols and that current African American smokers were more likely to believe that menthols are more risky.[40]

Tobacco companies manipulated menthol content and marketing to decrease desire to quit and inhibit cessation

The tobacco documents show that the companies used and manipulated sensory characteristics of menthol cigarettes and health messaging in advertising to reassure smokers that menthol cigarettes were safer than non-menthols to assuage smokers' health concerns[6, 8, 15] and likely contributed to decreased motivation of some smokers to quit.[12, 15] Tobacco company research also identified declining social acceptability of smoking, particularly smokers' concern about how their secondhand smoke is perceived by and affects nonsmokers,[48, 49] as one motivation for quitting that could be addressed by menthol's masking of tobacco odor.[15]

Health concerns have been repeatedly shown to be the primary reason that smokers quit, so masking irritation and immediate negative health effects of smoking potentially prevents cessation by providing a false sense of well-being and obscuring the health effects of smoking.[4, 15] The health messaging that tobacco companies used to associate menthol cigarettes with medicinal properties,[6, 8], manipulation of the soothing/cooling sensory effects of menthol that make them easier to inhale[5, 17] and easier for new and young smokers to smoke[11, 18] all likely contributed to the perception among some smokers that menthol cigarettes are healthier than non-menthol cigarettes and that menthols are a partial solution to the negative health effects of smoking.[12, 15]

After the attention to the health effects of smoking that began in the 1950s, tobacco companies increased efforts to manufacture and market low-tar and low-nicotine cigarette brands.[15] In the 1970s, company research showed that menthol cigarettes were considered by some to be a more flavorful, and yet mild, alternative to new non-menthol low-tar cigarettes,[12] and the companies attributed the coincident growth of menthol brands like R.J. Reynolds' Salem and Lorillard's Newport to this perception.[15] Tobacco company studies found that many menthol smokers switched from non-menthols after smoking menthols when experiencing a cold when the harshness of non-menthol cigarettes was too irritating to their throats.[8, 12, 15] Tobacco company research on brand switching in the 1970s found that menthol cigarettes experienced a 13% gain in market share due to switching to menthol brands from high filtration brands, compared with 8% for high filtration brands due to switching from menthol brands, showing that more smokers were switching to menthols than from them.[15] Company focus group studies found that some menthol smokers had switched to menthols as an alternative to quitting, leading some company researchers in the 1960s through the 1980s to conclude that because menthol cigarettes were perceived as having less irritation and increased safety, they could be positioned as an alternative to quitting.[8, 15] In 1979, a report for Philip Morris supported this conclusion by finding that fewer menthol smokers report wanting to quit (39%) than non-menthol smokers (43%).[8]

In the 1990s, tobacco companies also found that smokers were facing increased concern about secondhand smoke[48, 49] and that menthol cigarettes reduced the perception of offensive tobacco odor associated with smokers, thereby making smokers feel that smoking menthol cigarettes was more socially acceptable than non-menthol cigarettes both inside[15] and outside[9] the U.S. This finding inspired a 1990 R.J. Reynolds marketing strategy for its menthol brand Horizon that explicitly advertised an “improved lingering aroma.”[15, 50] Like other efforts to develop socially acceptable cigarettes,[48] this idea was ultimately abandoned because it called attention to the negative perception of smoke odor.[15] In addition, because menthol masks some of the characteristics of smoking, menthol cigarettes may be associated

with the denial of personal identification as a "smoker,"[12] which would mitigate conflict related to the social unacceptability of smoking.

There are conflicting findings in the open literature on the effects of menthol on cessation and relapse likely due to the use of different outcomes, measures, and types of studies, with more evidence indicating lower quit rates and higher relapse rates among menthol smokers.[27, 51] A study of current smokers using the 2003 and 2006–07 TUS-CPS to assess cessation of menthol smoking found no significant relationship between menthol and non-menthol cigarettes and quit attempts in the past year or length of smoking abstinence.[31] However, other studies using the same 2003 and 2006–07 TUS-CPS showed that those who used to regularly smoke menthol cigarettes compared with non-menthol were less likely to quit.[51, 52] One[52], found that menthol smokers were less likely to have quit for at least six months across racial groups (African Americans OR=.23; Asian American/Pacific Islander OR=.22; Hispanic OR=.49; Native American OR=.49; Non-Hispanic White OR=.28). Another[51], similarly found that menthol smokers are significantly less likely to have successfully quit than non-menthol smokers in the past year and in the past five years (adjusted OR=.97 and OR=.94 respectfully). These different results may be due to the fact that the first study[31] was of current daily current smokers while the second[52] and third[51] were of former smokers (smoked at least 100 cigarettes but did not smoke at the time of survey). Limiting the sample to current daily smokers may obscure differences in cessation success because it excludes smokers who were able to become non-daily users in attempts to quit. Without more specific information about successful quitting and smoking patterns among menthol smokers and non-menthol smokers it is difficult to assess this possibility. However, tobacco company studies identified a possible relationship between menthol cigarettes and social smoking, suggesting that social smoking among menthol users was associated with someone who is not a "real smoker" or who is trying to give up smoking.[12]

Research on menthol and cessation has consistently found that the association between menthol cigarette smoking and difficulty quitting is stronger among racial/ethnic minority groups, younger smokers, and in studies done after 1999.[53] The 2005 National Health Interview Study Cancer Control Supplement shows significant interaction effects between being African American and menthol use (interaction term adjusted OR=.72) in predicting population quit ratio (the total number of former smokers divided by the total number of individuals who had reported smoking in their lifetime).[54] This result indicates that being African American and smoking menthol makes someone less likely to quit than just the additive effects of being African American and smoking menthols. The 2003 and 2006–07 TUS-CPS also showed that among African Americans (adjusted OR=1.62) and Hispanics (adjusted OR= 1.21) smoking menthol cigarettes was significantly associated with seriously considering quitting and a positive estimation of successfully quitting (African American OR=1.87 and Hispanic OR=1.34)[52]

However, former menthol smokers in both groups were significantly less likely to have successfully quit compared with non-menthol smokers for at least 6 months (African American OR=.23 and Hispanic OR=.48), suggesting that for African Americans and Hispanics menthol cigarettes may increase smokers' perception of the ease of quitting while, at the same time, undermining their success rates.[52]

The cigarette companies avoided conducting research on the disease-inducing effects of menthol, but did find adverse effects on the amount of fine particles in the smoke of mentholated cigarettes

Studies of tobacco industry documents did not locate much company research on the direct toxic effects of menthol.[19] Instead, the companies concentrated on monitoring the (limited) independent research in this area and used it in internal and external briefing papers to argue that there were no direct adverse health effects of menthol.[19] We only located two epidemiological studies of the association of smoking menthol cigarettes with disease, one on atherosclerosis and pulmonary function[55] and one on oesophageal cancer,[56] both of which reported no difference between smokers of menthol and non-menthol cigarettes. (The study of oesophageal cancer[56] was from an individual with funding from the tobacco industry.[57])

These limited findings do not mean, however, that adding menthol to cigarettes does not have any direct negative health effects. Research conducted by the cigarette companies,[19] some of which was published in the open literature,[58–61] consistently demonstrated that adding menthol to cigarettes increased the amount of fine particles in the smoke by 10–20%. Even at the low levels found in outdoor air pollution or secondhand smoke, which are much lower levels than delivered in active smoking, these fine particles have a direct adverse effect on cardiovascular morbidity and mortality and can trigger an acute cardiac event.[62–66]

Conclusion

The results of both internal tobacco company research and studies done in the independent scientific literature are remarkably consistent in showing that menthol influences much more than the taste of cigarette smoke. In addition to its candy-like appeal, menthol's sensory effects and ability to mask irritation make menthol cigarettes appealing as a likely starter product. Likely in part due to these sensory characteristics and targeted marketing, youth disproportionately smoke menthols. Menthol marketing has also been targeted to groups (youth, women and African Americans) that have disproportionate percentages of menthol smokers. Menthol's sensory qualities may also make low-tar cigarettes more palatable and make it easier for inexperienced smokers to progress into increased exposure and, thus, reinforce dependence on nicotine.

Menthol's use for promoting cigarette use goes beyond its use as a flavoring, highlighted by the point that tobacco companies knew as early as 1972 that menthol enhances the perception of smoothness even at unidentifiable levels and in non-menthol cigarettes. The ubiquitous addition of menthol by tobacco companies to over 90% of all tobacco products, whether labeled “menthol” or not, demonstrates that menthol is not simply a flavor or brand. Menthol imparts sensory characteristics to cigarettes and has a complex interaction with nicotine that affects smoking behavior whether it is perceived or not, or whether cigarettes containing menthol are marketed as “menthol” or not.

The consistency between industry marketing efforts and population use patterns of menthol cigarettes contradicts the conclusions in a 2010 review by a tobacco company scientist that research examining menthol's effects on smoking behavior “is not possible from survey data” because of “social, demographic and peer influence mediators and confounders.”[67]

Menthol facilitates and increases smoking, which causes disease and death. 7In developing regulations for tobacco products, the law directs the FDA to consider “(I) the risks and benefits to the population as a whole, … (II) the increased or decreased likelihood that existing users of tobacco products will stop using such products; and (III) the increased or

decreased likelihood that those who do not use tobacco products will start using such products.[1] The information in the industry documents, confirmed in the independent scientific literature, consistently demonstrates that menthol increases the population harm due to smoking because it increases initiation and reduces cessation in some groups. There also appear to be complex interactions with the addictive effects of nicotine. In addition, there is evidence suggesting that adding menthol increases harm by increasing fine particles in cigarette smoke, which have immediate adverse effects on the risk of a heart attack. Based on this large and consistent body of evidence, public health demands that the FDA and similar agencies outside the US ban all use of menthol, in not only cigarettes but also similar products such as cigars, cigarillos and menthol sprays which are used with roll-your-own tobacco products, regardless of whether the menthol is used as a characterizing flavor or present at levels below sensory detection. These agencies should also recognize that menthol is used in smokeless products and likely has similar interactions with nicotine and ban such use until presented with compelling evidence that including menthol in these products is not producing similar harm as it does in smoked tobacco products.

WHAT THIS PAPER ADDS

Tobacco companies have manipulated marketing and the content of menthol cigarettes to increase smoking and discourage cessation.

Tobacco companies' knowledge and use of menthol in cigarettes is supported by findings in the open literature. Cigarette companies use the fact that menthol makes cigarettes easier to smoke to encourage initiation, reinforce addiction, and complicate cessation. In addition, tobacco companies' marketing efforts associate menthol with health and targets vulnerable groups such as youth, women, and African Americans.

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