

The First Conference on Menthol Cigarettes: Setting the Research Agenda

Executive Summary

Menthol

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
National Institutes of Health • National Cancer Institute
Centers for Disease Control and Prevention

**The First Conference on
Menthol Cigarettes:
Setting the Research Agenda
March 21-22, 2002
Atlanta, GA**

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The First Conference on Menthol Cigarettes: Setting the Research Agenda was held March 21-22, 2002, in Atlanta, Georgia. We are indebted to the vision and material support provided to this conference by the sponsors, the members of the planning committee, and all the attendees at the conference.

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The First Conference on Menthol Cigarettes was convened in Atlanta, Georgia, on March 21 and 22, 2002.† The purpose of the conference was to evaluate the present state of the science concerning the health implications of adding menthol to cigarettes, and to set the priorities for further studies on health effects of menthol cigarettes. The conference sponsors will make the conference proceedings available to a wider audience through a supplemental issue to be published with *Nicotine & Tobacco Research* journal in early 2004. This Executive Summary presents background on use of menthol in cigarettes and summarizes the topics that will be discussed in the supplemental issue.

Special thanks go to Pamela I. Clark, Ph.D., Phillip S. Gardiner, Dr.P.H., Mirjana V. Djordjevic, Ph.D., Scott J. Leischow, Ph.D., and Robert G. Robinson, Dr.P.H., for taking the lead in developing this Executive Summary.

Introduction

Menthol is unique in that it is the only cigarette additive that is actively marketed to consumers. It is the only aspect of cigarette design that is explicitly marketed based on its physiological effects, as an anti-irritant and a cooling agent. It is the only cigarette additive about which consumers make conscious buying choices.

While the tobacco industry has actively investigated menthol as an additive,^{1,2,3,4,5,6} there have been relatively few studies in the public health literature about:

- the emergence of menthol cigarettes;
- the use of menthol cigarettes by some segments of the smoking population;
- the targeted marketing of menthol cigarettes to specific population groups;

- reported reasons for menthol cigarette use;
- the addictive, physiological, and toxicological properties of menthol cigarettes, which are purportedly different from nonmentholated brands;
- the potential of menthol cigarettes to increase exposure to harmful smoke constituents;
- the propensity of menthol cigarettes to aid in the initiation of smoking among adolescents; and
- the impact of mentholated cigarettes on smoking-related disease, disability, and death.

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Investigating the issues related to adding menthol to cigarettes will not only contribute to the knowledge about menthol's role in the initiation and progression of tobacco use, but will also aid in a better understanding of its effect on addiction to cigarettes and the rate of

smoking-related diseases. New research also can lead to development of models to study the health impact of other cigarette additives and cigarette designs, including emerging potential reduced-exposure tobacco products.

The emergence of menthol cigarettes

Menthol cigarettes were conceived as specialty products in the 1920s and 1930s.³ These cigarettes were initially marketed as a luxury product, through radio and magazine ads, and especially targeted to women smokers.⁷ Until the 1960s, the market share of menthol cigarettes never exceeded 5 percent.⁷ However, with the great migration of African Americans from the South to urban centers, peaking during and after World War II, the industry started targeting menthol cigarettes to African Americans. Launched in the early 1940s, the popular African American magazines (e.g., *Ebony*, *Jet*)⁸ offered a unique opportunity for precision marketing. By the 1960s and 1970s, menthol brands

† The conference was supported by the Centers for Disease Control and Prevention; National Cancer Institute; Tobacco-Related Disease Research Program, University of California; American Legacy Foundation; The Robert Wood Johnson Foundation; The Onyx Group; National Association of African Americans for Positive Imagery; and Battelle Centers for Public Health Research and Evaluation.

had become the cigarettes of choice for the majority of African American smokers.^{7,9,10} Whereas only about 25 percent of White smokers use menthol cigarettes, more than 70 percent of African American smokers choose them; other population segments are now adopting menthol use, including young people, Asian and Pacific Islander Americans, and women.¹¹ Today, menthol cigarettes represent about 26 percent of all cigarettes sold in the United States.¹² Newport cigarettes are the leading menthol brand and are second only to Marlboro in overall market share.

Why it is important to study menthol cigarettes

One urgent question that needs to be answered is whether menthol cigarettes contribute to the health disparities between White and African American smokers. Although African Americans tend to smoke fewer cigarettes per day than do White smokers,^{9,13,14,15,16} incidence and mortality rates of lung cancer and other smoking-related diseases are significantly higher among African Americans. For example, average age-adjusted annual incidence rates for lung cancer in the United States between 1992 and 1998 were 54.7/100,000 for Whites and 71.6/100,000 for African Americans; mortality rates, for the same period, were 48.8 for Whites and 59.1 for African Americans.¹⁷ Historically, the age-adjusted smoking-related lung cancer death rates in the United States among African American males and White males were: in 1950, 15.7 and 21.9, respectively; in 1965, 47.8 and 47.3, respectively; and in 1990, 107.7 and 73.6, respectively. Whether these trends reflect the trends of use of menthol cigarettes by African Americans remains to be determined.¹⁸

Menthol, a chemical compound extracted from the peppermint plant and classified as a mild local anesthetic, was commonly used in veterinary medicine.¹⁹ Colorless and with a mint scent, menthol was

first added to cigarettes in the 1920s and 1930s to mask the harshness of tobacco smoke.³ Fifty-two percent of 174 African Americans interviewed in one study reported that mentholated cigarettes were less harsh on the throat, 48 percent stated that inhalation was easier, and 33 percent felt they could inhale more deeply.²⁰

Since the 1960s, menthol brands have been marketed by the industry as “refreshing” and “cool.”¹⁹ Menthol stimulates cold receptors, with the resulting sensation of coolness perceived not only in the mouth and pharynx, but also in the lungs.^{21,22} Stimulation of laryngeal cold receptors may reduce airway irritation.²³ This sensation of coolness might result in deeper inhalation, but because of the difficulty in precisely measuring the inhalation phase of smoking, this issue has not been adequately studied. Menthol may increase salivary flow thereby enhancing the passage of harmful smoke constituents across mucus membranes.^{24,25}

Menthol has been shown to increase significantly involuntary breath holding.²⁶ Breath holding at peak inspiration could contribute to increased uptake of inhaled tobacco smoke constituents, including nicotine and cancer-causing agents, from the alveoli of the lungs into the bloodstream. There have been conflicting reports on the effect of menthol on smoking topography (e.g., puff volume, puff frequency) that may be due to small samples and variations in study populations.^{15,27} The 1999 Massachusetts Benchmark Study of the 24 most popular U.S. filter cigarette brands and styles (six of them were menthol brands) provided some evidence that the chemical composition of the mainstream smoke of selected menthol cigarettes differs from that of their nonmenthol counterparts.²⁸ The yields of “tar,” nicotine, carbon monoxide, and several carcinogenic compounds (e.g., benzene, 1,3-butadiene, benzo[a]pyrene, NNK), obtained by the Massachusetts machine-smoking method, were 30-70 percent higher in the mainstream smoke of menthol cigarettes than in the smoke of the selected

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nonmentholated brands. There are many cigarette design characteristics (e.g., tobacco blend, resistance to draw, paper porosity, amount of tobacco in the rod, cigarette length, and others) that may contribute to differences in yield that are independent of mentholation. For example, Newport, the most popular menthol brand in the United States, is a “full flavor” cigarette with no filter ventilation holes, while the most popular nonmentholated brand, “full flavor” Marlboro, averages 8 percent ventilation in the hard pack version and 11 percent ventilation in the soft pack.²⁸

Emerging research on behavior, epidemiology, and toxicology of menthol cigarettes

The tobacco industry and some members of the scientific community studied the effects of menthol on human tissue when menthol was first introduced into cigarettes. In 1944, Brown & Williamson commissioned a literature search on the toxic effects of menthol.²⁹ Thus, the industry knew early on that menthol, when tested on animals, had distinct properties that had to be accounted for in the delivery of nicotine to cigarette smokers.

Although the industry had an early interest in the use and effects of menthol added to cigarettes, the public health community was not conducting extensive menthol-related research. Studies of the effects of smoking menthol cigarettes are now emerging. In 1989, the first epidemiological study of health effects of smoking menthol cigarettes was published,³⁰ and there have since been several others.^{14,31,32,33,34,35} To date, epidemiological studies of the relationship between smoking menthol cigarettes and cancer risk have shown mixed results, and have been limited by problems such as too few subjects exclusively smoking menthol cigarettes for too short a time. Little is known about the brand- and style-switching habits

of smokers, so classifying subjects as exclusively menthol or nonmenthol smokers for a long enough time period is difficult. For instance, it is not known if the “worried well” may switch to menthol cigarettes because they perceive them to be less harmful or if subjects with a persistent cough may switch to a mentholated brand for its local anesthetic and cooling properties. Both aspects may cause a misclassification bias of unknown magnitude in epidemiological studies. Also, the increased “dose” delivered with menthol cigarettes may be no more than the equivalent of a few cigarettes a day among heavy smokers, or even a single extra cigarette among lighter smokers (which African American smokers generally are). Thus, parsing out the additional harm associated with smoking menthol cigarettes might require very large sample

sizes or the exclusive use of menthol cigarettes for long periods. No studies have been reported on the effect of menthol cigarettes on noncancer health outcomes, such as nicotine addiction, cardiovascular disease, chronic obstructive pulmonary disease, and birth outcome.

The comparative studies of the uptake of smoke constituents, including nicotine and carcinogens, among smokers of menthol and nonmenthol cigarettes, as determined by measuring the levels of biological markers, are now emerging.^{15,36,37,38} One study

reported that the levels of urinary 1-hydroxypyrene (a marker of polycyclic aromatic hydrocarbon [PAH] exposure) per cigarette smoked by male menthol smokers were about 2.7-fold higher than the levels measured among nonmenthol cigarette smokers based on equimolar benzo(a)pyrene dosage delivered in the mainstream smoke. The latter observation suggested that menthol may enhance the uptake of PAH from mainstream smoke and alter metabolism, or that racial differences in the metabolic activation of carcinogens are factors in uptake and metabolism of PAH.³⁷ The absence of a crossover component, in which subjects are tested while smoking both menthol and nonmenthol styles, has been a significant limitation in the

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interpretation of some studies. Thus, it is not known if the results were attributable to interaction between individual differences in smoking (such as inhalation or breath-holding patterns), addiction and disease susceptibility, and the preference for menthol cigarettes, rather than menthol smoking *per se*. This is an important distinction given that cigarette smoking is a highly ritualistic activity developed, in part, to maintain a physiologically needed level of blood nicotine. Crossover designs will help separate individual idiosyncratic smoking patterns from those attributable to smoking menthol cigarettes. Direct measures of body burdens of carcinogens are required to better understand the relative harm of menthol and nonmenthol cigarettes. These studies are beginning to emerge.¹⁵

Studies of the epidemiology and toxicology of menthol cigarettes and behavioral issues involved in their use are beginning to receive appropriate attention. Significant gaps in knowledge persist, however. The First Conference on Menthol Cigarettes was convened to summarize what we know, what we suspect, and to state the research priorities. The following section provides a brief description of the proceedings from the conference.

Conference Proceedings

Proceedings of The First Conference on Menthol Cigarettes: Setting the Research Agenda will be published in a peer-reviewed supplemental issue to the journal *Nicotine & Tobacco Research* in early 2004, and also will be available via the National Cancer Institute's Web site at <http://dccps.nci.nih.gov/TCRB/> (accessed August 27, 2003). The supplemental issue will cover the current state of knowledge on marketing, history, social factors, pharmacology, epidemiology, and toxicology of menthol cigarette use. Following is a brief description of the contents of the papers summarizing this conference.

The African Americanization of Menthol Cigarette Use in the United States

Phillip S. Gardiner, Dr.P.H.

Today, more than 70 percent of African American smokers prefer menthol cigarettes as compared to 30 percent of White smokers. This unique social phenomenon was occasioned principally by the tobacco industry's masterful manipulation of the burgeoning African American, urban, segregated, consumer market in the 1960s. Through the use of television and other advertising media, coupled with culturally tailored images and messages, the tobacco industry "African Americanized" menthol cigarettes. The tobacco industry successfully positioned mentholated products, especially Kool, as young, hip, new, and healthy. During the time that menthol cigarettes gained a large market share in the African American community, the tobacco industry donated funds to African American organizations hoping to blunt the attack on its products.

Many of the findings in this article are drawn from the tobacco industry documents disclosed following the Master Settlement Agreement in 1998. This article examines some key social factors that, when considered together, led to disproportionate use of mentholated cigarettes by African Americans as compared to other Americans. Unfortunately, the long-term impact of the tobacco industry's practice in this community may be responsible, in part, for the disproportionately high tobacco-related disease and mortality among African Americans generally and African American males particularly.

Numerous outstanding questions remain, including:

- Did the tobacco industry know of any additional adverse health effects that may result from adding menthol to cigarettes?

Studies of the epidemiology and toxicology of menthol cigarettes and behavioral issues involved in their use are beginning to receive appropriate attention. Significant gaps in knowledge persist, however. The First Conference on Menthol Cigarettes was convened to summarize what we know, what we suspect, and to state the research priorities.

- Why did the industry select African Americans for targeting of menthol cigarettes?
- Why has the use of mentholated cigarettes reached a plateau of about 25 percent of the U.S. market?
- Why is it that people living in the Philippines, Cameroon, and Hong Kong have high rates of menthol cigarette use?

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smokers (those whose initial attraction is generally to brands with lower levels of menthol). Since individual brand preferences tend to be locked in fairly early in life, the menthol brand that can capture teenagers and young adults invariably becomes the next market leader. Brands with more menthol taste watched sales fall and market share shrink as their customer base aged.

The Marketing of Menthol Cigarettes in the United States: Populations, Messages, and Channels

Charyn D. Sutton, B.A., and Robert G. Robinson, Dr.P.H.

Much of what is currently known about menthol cigarettes concerns African Americans, a population that is characterized by a preference for menthol cigarette brands. Yet other ethnic minority groups, as well as women and youth, have received their share of unwanted attention from the manufacturers and marketers of menthol cigarette brands.

There was a five-fold increase in menthol sales from the 1950s through the 1980s. Three freestanding menthol brands—Kool, Salem, and Newport—accounted for nearly two-thirds of all menthol cigarette market share in the United States during that period and since. Four distinct advertising messages have been central in the marketing of mentholated cigarettes as an entire “coolness” category and as specific brands: health, freshness, ethnic awareness (focusing on African Americans), and youthful fun, bordering on silliness. These messages have been promoted through targeted media to reach particular population segments.

The messages used to market menthol cigarettes also have interacted with a product focus that demonstrates a relationship between the level of menthol in cigarettes and the effectiveness in retaining current smokers (those who tend to prefer more menthol in their cigarette brands), as well as recruiting new

Many questions remain unanswered in understanding the role of marketing in recruiting new smokers for mentholated tobacco products and in retaining existing smokers by making it more difficult to quit.

- Are other population segments being steered toward menthol cigarettes using marketing approaches based on gender, race/ethnicity, age, sexual orientation, cultural background, state, or other demographics in ways that are similar to what has occurred with African Americans?
- Is there any relationship between the marketing and subsequent use of mentholated tobacco products by population subgroups and tobacco-related health consequences?
- Are there lessons to be learned from the marketing of menthol cigarettes that can be used to improve the public health and medical communities’ marketing of smoking cessation and tobacco use prevention?

For too long, the public health community has given only a cursory glance to the mentholated tobacco category, the ways by which it has been marketed to vulnerable and at-risk populations, and the characteristics of the affected racial, ethnic, gender, and other groups. The availability of internal industry documents and of new data from surveys that now ask about menthol brand smoking provide us with an opportunity to find answers to many of our questions. Learning more about the messages and media that are used to promote mentholated cigarette brands to target markets such as women, African Americans, and multicultural youth can be an invaluable aid in helping to decrease the uptake of menthol cigarette brands

and in creating improved prevention and cessation strategies for at-risk communities and populations.

Physiological, Psychological, Social, and Cultural Influences on the Use of Menthol Cigarettes Among African Americans and Hispanics

Felipe Gonzalez Castro, Ph.D., M.S.W.

Evidence from various sources has revealed an unexplained association between racial/ethnic background as African American or Hispanic and the use of menthol cigarettes. It has been postulated that marketing practices have identified and exploited existing health-related cultural beliefs and practices within the African American and Hispanic communities to encourage the use of menthol cigarettes. Ethnic-cultural associations of menthol with wellness and recovery from illness may have been used to promote the belief that menthol cigarettes are less toxic than nonmentholated cigarettes.

Results from the available research shows that beliefs regarding the soothing-cooling and health-enhancing effects of menthol are prevalent among African Americans and Hispanics, especially within lower-income sectors of these communities. Epidemiological studies confirm the higher rates of menthol cigarette use among African Americans and Hispanics, relative to non-Hispanic Whites. An unresolved question is:

- To what extent are the higher prevalence rates of mentholated cigarettes preference/use among specific ethnic groups influenced by social, cultural, or genetic/physiological factors? It is likely that several of these factors operate in combination to exert a synergistic effect on the occurrence of these higher prevalence rates.

Epidemiology of Menthol Cigarette Use

Gary A. Giovino, Ph.D., M.S.; Stephen Sidney, M.D., M.P.H.; Joseph C. Gfroerer, M.S.; Patrick M. O'Malley, Ph.D.; Jane E. Allen, M.A.; Patricia A. Richter, Ph.D.; and K. Michael Cummings, Ph.D., M.P.H.

Previously published work documented common use of menthol cigarettes among African-American smokers, both adolescents and adults. The literature was summarized on menthol and cancer, FTC reports on menthol brands, international market share data on menthol market share, and national survey data on use patterns among smokers.

The epidemiological literature to date does not indicate that menthol cigarettes confer a risk for cancer above that from nonmentholated brands. Rather, menthol cigarettes appear to be as hazardous as nonmenthol brands. About one-fourth of all cigarettes sold in the United States are mentholated. There is substantial international variability in menthol market share, with the Philippines highest at 60 percent.

Among smokers in all racial/ethnic groups, African Americans had the highest prevalence of menthol cigarette use. Among adolescent smokers, Asian and Pacific Islander Americans also had high menthol use rates. Among those less than 26 years old, smokers of "full flavor" cigarettes were more likely to smoke menthol brands than were smokers of "light" or "ultra-light" cigarettes. Menthol smoking was more common in the Northeast than in the West. The only sex difference observed was in Whites aged 26

years and older, where women were more likely than men to smoke mentholated cigarettes.

- There are significant knowledge gaps, including
- the need for more and better studies on menthol and cancer of various sites, and the effect of menthol cigarettes on cardiovascular diseases;

Results from the available research shows that beliefs regarding the soothing-cooling and health-enhancing effects of menthol are prevalent among African Americans and Hispanics, especially within lower-income sectors of these communities.

- the role of health beliefs on menthol use is not known, nor is the effect of such beliefs on brand selection;
- the reasons for the large international variation in menthol use are not known (e.g., high rates in the Philippines, generally lower rates in African countries than in African Americans);
- further monitoring and study of use of “cross-brands” such as Marlboro Menthol and Newport nonmenthol are needed;
- the association between use of menthol cigarettes and illicit drugs needs to be investigated; and
- the best way to measure menthol use in large national surveys must be explored.

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Menthol Pharmacology and Its Potential Impact on Cigarette Smoking Behavior

Karen Ahijevych, Ph.D., and Bridgette E. Garrett, Ph.D.

There is a considerable body of research that has examined the effects of menthol as a nontobacco additive. However, the effects of menthol in cigarette smoke are more complex since it is administered to the user in a matrix of more than 4,000 other substances. Therefore, isolation of the unique contributions of menthol to cigarette smoking behavior is more difficult. Menthol properties include “cooling” and local anesthesia, as well as effects on drug absorption, bronchodilation and respiration changes, electrophysiology, and modified metabolism. Subjective effects of smoothness and less harshness have been identified as an impact of menthol on cigarette-smoking behavior, and there have been inconclusive findings regarding carbon monoxide exposure and smoking topography parameters. Gaps in the research literature and the questions that future research needs to answer include:

- What is the role of menthol in tobacco reinforcement and addiction?

- In the absence of nicotine, is menthol reinforcing?
- Are menthol’s pharmacological and physiological effects mediated by a menthol-specific receptor or some other central nervous system-mediated action?

- What are the influences of menthol and menthol metabolism related to metabolic activation and detoxification of carcinogens of tobacco smoking?
- Are there differences in cigarette smoking in relation to the interaction of ethnicity, gender, and menthol cigarette preference?

Answers to these questions will help to elucidate the function of menthol in cigarettes and its impact on smoking behavior.

Application, Use, and Effects of Menthol in Cigarettes: A Survey of Tobacco Industry Documents

Geoffrey Ferris Wayne, M.A., and Gregory N. Connolly, D.M.D, M.P.H.

Internal tobacco industry documents provide a valuable insight into industry knowledge of menthol’s function and effects. In this chapter, the internal industry research describing the role of menthol in cigarette product design, including menthol application and smoke delivery, physiological and respiratory effects, and toxicological effects is reviewed. Industry documents confirm the importance of menthol in shaping smoker perception. Of particular importance is menthol’s ability to reduce the harshness of cigarette smoke, facilitating smoke intake, and to substitute for nicotine “impact” perception in lower nicotine-yield cigarettes. Other issues addressed in internal studies include anesthetic and “cooling” effects, altered respiratory perception, and increased respiratory irritation and biological effects. Based on studying tobacco industry documents, it is clear that the unique characteristics of menthol cigarettes must be considered in future research, cessation treatment, and enactment of tobacco product regulations. The glimpse into the industry’s research provides only a starting point in

evaluating the effects and function of menthol in cigarettes. Industry-funded studies should be replicated and the results should be subjected to rigorous peer-review, which is missing from most of the industry research.

Further studies are needed to understand:

- the effects of menthol on the central nervous system and brain;
- the interaction of menthol with perception of nicotine delivery, including differences in regular versus low-yield cigarettes; and
- long-term studies to assess the biological effects of chronic exposure to menthol inhalation.

Menthol Cigarettes: Research Needs and Challenges

**Jack E. Henningfield, Ph.D., and
Mirjana V. Djordjevic, Ph.D.**

The First Conference on Menthol Cigarettes: Setting the Research Agenda provided a forum for discussion of the origins, uses, and consequences of adding menthol to cigarettes. A major purpose of the conference was to identify knowledge gaps in this area and to set

an agenda for research that would lay the foundation for improving public health by reducing tobacco-caused disease. The conference planning process made evident the many potential ways that addition of menthol to cigarettes may have contributed to tobacco-attributable morbidity, disability, and mortality. Thus, scientists representing this diversity were invited to present papers and participate in discussions in order to evaluate thoroughly the state of knowledge and the needs for research. The papers featured in the upcoming supplemental issue of the *Nicotine & Tobacco Research* journal provide the basis for drawing general conclusions about the potential role of menthol in cigarettes and disease, and these conclusions have implications

for public health interventions. Equally important, the papers identify major gaps in knowledge that stand as barriers to tobacco disease control. Addressing the research needs and challenges implied by these knowledge gaps could contribute significantly to improved public health.

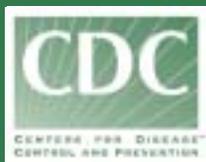
This paper summarizes research needs and challenges that were discussed at the conference, as well as several others that emerged as the presenters prepared their papers for publication in this volume.

Based on studying tobacco industry documents, it is clear that the unique characteristics of menthol cigarettes must be considered in future research, cessation treatment, and enactment of tobacco product regulations.

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