

Conferences and Reviews

African-American Smokers and Cancers of the Lung and of the Upper Respiratory and Digestive Tracts Is Menthol Part of the Puzzle?

TERRI L. RICHARDSON, MD, *Denver, Colorado*

The prevalence of cigarette smoking is higher among African Americans than among whites. African Americans have higher rates of lung cancer than whites, although they smoke fewer cigarettes. To explore this black-white difference in lung cancer rates, I examine various aspects of tobacco use in African-American smokers, including the age of initiation of smoking, quantity of cigarettes smoked, quit rates, level of nicotine dependence, biochemical differences, and brand preferences, specifically menthol brand cigarettes. I also review briefly the sequelae of patterns of tobacco use, including rates of lung and other tobacco-related cancers. A preference for mentholated cigarettes by African Americans is well documented and is one of the most striking differences between African-American and white smokers. Menthol brand preference has been investigated in an attempt to explain the black-white differences in rates of cancers of the lungs and the upper respiratory and digestive tracts. Also, studies have evaluated smoking behavior both with and without menthol and have explicitly examined the question of whether menthol use helps explain the black-white difference in lung cancer rates. The results of these studies are so far inconclusive with regard to the use of menthol and the risk of lung cancer developing. I provide practical suggestions for clinicians in counseling African-American smokers to quit smoking and to maintain a nonsmoking status.

(Richardson TL. African-American smokers and cancers of the lung and of the upper respiratory and digestive tracts: is menthol part of the puzzle? *West J Med* 1997 Mar; 166:189-194)

Among all US citizens, cigarette smoking remains the single most preventable cause of death and the single most important cause of cancer.¹ African Americans currently have a higher prevalence of tobacco use than whites, and although African Americans smoke fewer cigarettes than whites do, they have higher rates of lung cancer.² This seeming paradox has sparked investigators to search for reasons to explain this disparity. In this article I review smoking characteristics in African Americans and some of the factors that have been examined in an attempt to explain this black-white difference.

African Americans are at higher risk of smoking-related illnesses—including heart disease, stroke, and cancers—than whites. The overall incidence of cancers of various sites, most notably of the upper respiratory and digestive tracts, and the associated mortality are substantially higher among African Americans than among whites.^{3,4} In fact, the cancer incidence over the past five decades has been greater in African Americans of both sexes than in whites.⁵ In 1992 more than 45,000 African Americans died of smoking-related diseases, and 17,000 of these were cancer deaths.^{3,6,7} In addition,

African-American smokers are known to have a 50% higher probability of lung cancer developing and more than a threefold higher rate of cancers of the upper respiratory and digestive tracts than whites.^{4,8}

In the United States, three fourths of cases of oral cancer are related to tobacco and alcohol use. In one study, heavy smoking was found to increase the risk of oral cancer threefold compared with not smoking.⁸ African Americans are generally not heavy smokers, but are more likely to have oral cancer at a younger age and tend to have a worse prognosis than whites.⁸ Furthermore, the incidence of oral and pharyngeal cancer in African-American men from 1977 to 1988 increased by 47%, whereas that for white men declined by 9%.⁹

Cigarette smoking was first linked to lung cancer in 1950, and in 1964 the US Surgeon General reported that smoking was causally associated with lung cancer.¹⁰ The 1982 Surgeon General's report estimated that 91% of lung cancer deaths were attributable to the effect of cigarette smoking.¹¹

Lung cancer mortality for African-American men surpassed that for white men in 1963 and was directly

From the Department of Internal Medicine, University of Colorado Health Sciences Center, and the Eastside Health Center, Denver Health and Hospitals, Denver, Colorado.

Reprint requests to Terri L. Richardson, MD, Eastside Health Center, Denver Health and Hospitals, 501 28th St, Denver, CO 80205.

ABBREVIATIONS USED IN TEXT

NHIS = National Health Interview Survey
 NNK = 4-(methylnitrosamino)-1-(3-pyridyl)-1-butanone

attributable to a greater increase in smoking rates for African-American men.⁷ Between the 1950s and the 1980s, according to the American Lung Association, lung cancer deaths increased 381% in black men and 440% in black women. The average lung cancer death rate from 1980 to 1987 for African Americans was 2.3 times higher than that for whites. This was the case especially for men aged 35 to 64.¹² The mortality for African-American men with lung cancer is 45% higher than white men.¹²

Smoking Characteristics That Lead to Lung Cancer

When lung cancer rates are examined and the factors reviewed that are usually associated with an increased risk of lung cancer developing, the following factors are noted to increase the risk: the duration of cigarette smoking, the number of cigarettes consumed, and the degree of inhalation.^{15,13,14} The longer the duration of cigarette smoking, the higher the risk. It has been noted that smoking one pack of cigarettes for 40 years is eight times more hazardous than smoking two packs for 20 years.¹ The higher the number of cigarettes smoked, the higher the risk.¹³ The total mortality for cancer averaged two times higher in smokers and three to four times higher in heavy smokers versus nonsmokers.¹³ In addition, a higher volume of smoke inhaled with each puff has been associated with higher cancer risk.¹⁵

Several characteristics of smoking in African Americans would suggest a lower risk for lung cancer rather than the higher rates that have been described. Characteristics of African-American smokers will be outlined, with special emphasis on those factors that would suggest a lower lung cancer risk.

African-American Smoking Behavior

Currently, the prevalence of tobacco use is higher among adult African Americans than whites. Before the 1960s, African Americans smoked less compared with whites, and African-American women did not smoke more than white women until 1970.¹² Although rates of cigarette smoking for all US citizens have declined since 1965 when rates were 51% for white men and 60% for black men, African Americans still have higher rates of cigarette smoking than whites.¹²

Although fewer African Americans than whites quit once they begin smoking cigarettes, studies have shown that they are strongly motivated to quit smoking.¹⁶⁻²⁰ Unfortunately, African Americans are less likely to remain abstinent for a year or more. In 1987 the quit ratio—proportion of persons who have ever quit smoking in relation to those who smoked cigarettes—was 31.5% for African Americans versus 46.5% for whites.¹⁸

Age of Initiating Smoking

When Joycelynn Elders, MD, was US Surgeon General, she stated that “most people who are going to smoke are hooked by the time they are 20 years old.”²¹ In general, this is true. Each day more than 3,000 children begin to use tobacco, mainly in the form of cigarettes.^{22,23} It is known that smoking initiation at a young age increases the risk of heavy smoking later in life.²⁴ African Americans tend to begin smoking later in life than do whites and consistently are not heavy smokers.^{14,20} A study from the *American Journal of Industrial Medicine* reported that African Americans started smoking later than whites for almost every occupational class.¹⁴ Surveys have also shown that over the past decade the prevalence of smoking has declined in African-American adolescents. In 1992 only 4% of black high school seniors smoked compared with 20% of white seniors.²¹

It is well known that smokers of all races have smoking rates that vary by educational level and occupational class, with persons of lower educational levels and blue collar workers generally having higher rates of cigarette smoking. African Americans are concentrated in blue collar occupations. The 1978 to 1980 National Health Interview Survey (NHIS) demonstrated that male African-American blue collar workers had the highest smoking rate at 52.1%.¹⁸ Nevertheless, as previously noted, African-American blue collar workers are considerably less likely than their white counterparts to be heavy smokers.^{14,18}

Quantity of Cigarettes Smoked

Heavy smoking is much less common among African-American than among white smokers. The average adult African-American smoker smokes 65% the number of cigarettes smoked by the average white adult smoker.¹⁴ The 1986 NHIS reported that African-American men were three times less likely to be heavy smokers than were whites.¹² The 1985 NHIS showed that 64% of African-American smokers and 35% of white smokers consumed less than one pack per day.²⁵ In addition, a study by the American Health Foundation found that, on the average, African-American men smoked about seven fewer cigarettes per day than did white men, and African-American women smoked about five fewer cigarettes per day than did white women.²⁶ Moreover, 35% of black men and 50% of black women smoked ten or fewer cigarettes compared with 14% and 26% for white men and white women, respectively.²⁶

Nicotine Dependence Patterns

Despite the findings that African Americans smoke fewer cigarettes per day, they showed high levels of nicotine dependence: a higher percentage of African Americans were “wake-up” smokers (needed to smoke within 10 minutes of awakening).²⁰ In this study, African Americans were 1.6 times more likely than whites to smoke within ten minutes of awakening. In another study, 63% of African-American smokers had their first cigarette within 30 minutes of awakening,¹⁶ again sug-

gesting a high level of addiction.

Menthol Brand Preference

Studies have repeatedly shown that although African Americans smoke fewer cigarettes per day, they tend to smoke cigarettes that are higher in tar and nicotine. In a 1986 study, 78% of African Americans chose cigarettes with tar levels of greater than 15 mg.¹² It is thought that tar contains the carcinogens causing lung cancer.¹ Menthol cigarettes tend to be higher than nonmenthol cigarettes in tar and nicotine. It has been well documented in surveys and research studies that African Americans frequently prefer menthol cigarettes. This menthol brand preference is not related to educational level or occupational class.²⁰ About 75% to 90% of African Americans report a preference for menthol compared with 23% to 25% of whites.^{12,18,25,27-30} Even among teenagers, African-American smokers prefer menthol. In 1993 the Centers for Disease Control and Prevention reported that 70% of African-American teens chose Newport and 12% chose Kool, both of which are menthol brands.³¹ The top brands preferred by adult African Americans as reported in another survey were menthol brands. Of the various menthol brands, those of Newport, Kool, or Salem accounted for 54% of brands preferred by African Americans.²⁷

Menthol cigarettes were introduced in the 1930s but did not exceed 3% of the total market until 1949. By 1963 the market share was 16%, and by 1976 it was 28%.⁴¹² Sales to African Americans accounted for the vast majority of this increase. Advertising for menthol cigarettes began appearing in *Ebony*, an African American-oriented magazine, in the 1960s. It is plausible that the preference for specific menthol brands of African-American smokers is shaped by targeted advertising campaigns by the tobacco industry, which advertises these brands in culturally specific magazines and on billboards in predominantly African-American neighborhoods.³²

Biochemical Differences

In addition to the differences in brand preference, several studies have noted a difference in biochemical characteristics of African-American smokers. Cotinine is a major metabolite of nicotine and currently is considered the best indicator of tobacco smoke exposure. Several studies report higher cotinine levels in African Americans.^{28,33-35} In one study, African Americans had higher cotinine levels in each category of self-reported cigarettes smoked per day.²⁸ This held true for African Americans who smoked either mentholated or regular cigarettes. The investigators found median cotinine levels 30% higher in African Americans than in whites. Cotinine levels also have been noted to be higher in African-American nonsmokers with exposure to environmental tobacco smoke.^{34,35}

4-(Methylnitrosamino)-1-(3-pyridyl)-1-butanone (NNK), a tobacco-specific nitrosamine, has been the subject of intense interest lately. It and other tobacco-

specific nitrosamines are derived from nicotine and in studies of animals have been found to be extremely potent carcinogens leading to the development of lung adenomas and carcinomas when administered orally, topically, subcutaneously, or intraperitoneally.^{13,36} The results of a recent study by the American Health Foundation found a substantially poorer capacity of African Americans than whites to detoxify NNK (B. Baker: "Women, Blacks Harmed More by Cigarettes," *Internal Medicine News and Cardiology News*, 1994 May, p 18). The foundation also noted that black smokers are more metabolically prone to the development of cancer than whites.

To summarize, African-American smokers tend to start smoking later in life, smoke fewer cigarettes per day, tend to be more nicotine-dependent, and prefer mentholated brands. It is this last characteristic that has recently been investigated to help explain black-white differences in the rates of lung cancer and cancers of various other sites, mainly of the upper respiratory and digestive tracts. The menthol brand is the one striking difference that could possibly complete the puzzle of why blacks smoke fewer cigarettes but have higher cancer rates.

Role of Menthol

Briefly, menthol is a naturally occurring alcohol, but most of the menthol currently in use is synthetic. Menthol has been used in a number of commercial products such as toothpaste, mouthwash, foods, and cigarettes.³⁷ Menthol is not directly carcinogenic and is rated "generally regarded as safe" by the Food and Drug Administration.^{38,39} Its possible carcinogenicity has been evaluated in the pulmonary tumor A/He mouse test with negative results.⁴⁰ In several studies of mice and rats, there has been no histologic evidence for the toxicity or carcinogenicity of menthol. On the other hand, menthol combustion does produce compounds such as 3,4-benzopyrenes that are known carcinogens.^{15,29} Menthol does not give rise to any measurable amounts of 3,4-benzopyrenes when mentholated cigarettes are smoked, however.^{15,41}

Menthol has been shown to stimulate thermally sensitive fibers of the lingual nerve, producing a sensation of coolness.^{30,32} This property has been exploited in some brands of cigarettes to counteract the perceived burning sensation from tobacco smoke.

Given the properties of menthol, several studies have examined smoking behavior in relation to mentholated cigarettes.^{15,38,39,42} In these studies, investigators postulated that because of the local anesthetic, cooling effects of these cigarettes, smokers would increase the inhaled volume of smoke and smoke retention time in the lung, with a resultant increase in retained components of smoke.³² The studies failed to show this, however. Several studies on menthol cigarette smoking behavior supported the following findings^{15,38,39}:

- Mentholated cigarette smoking is not associated with taking more puffs. In fact, subjects took fewer puffs of these cigarettes.

- Despite decreased aggregate smoke exposure in mentholated cigarettes, there is no attendant decrease in the correlates of nicotine exposure (such as heart rate).

- There appears to be an increased carbon monoxide boost, which is the difference between before- and after-smoke carbon monoxide levels with mentholated cigarettes. Menthol has been shown to influence the absorption of carbon monoxide.³⁸

Furthermore, it has been reported that African-American regular smokers took notably fewer puffs for both types of cigarettes than did white regular smokers.³⁸

Studies of Menthol Cigarette Smoking

So is menthol part of the puzzle? Two studies evaluating this issue in regards to esophageal cancer concluded that the mentholation of cigarettes is not contributory.^{4,9} Between 1950 and 1980, menthol cigarette sales dramatically increased, as did the rate of esophageal cancer, in African Americans.⁴ Given the seeming relationship between menthol sales and esophageal cancer mortality, Kabat and Hebert did a case-control study to evaluate the risk of esophageal cancer. This was the first of its kind and spanned 15 years, from 1969 to 1984. This study involved 20 hospitals in nine US cities. The cases of esophageal cancer were obtained from the American Health Foundation's ongoing tobacco study, and the matched controls were current cigarette smokers with non-tobacco-associated disease. In this study, they analyzed existing data and found no menthol effect—men with ten years or more of menthol smoking had a relative risk of 0.70, and women had a relative risk of 1.53. Based on study limitations, however, the authors thought it was premature to discount the hypothesis that menthol cigarette smoking is causally linked to esophageal cancer.

Despite its long duration and the involvement of a large number of cooperating hospitals, the study was relatively small, and only 5% of male subjects and 11% of female subjects smoked exclusively mentholated cigarettes for ten years or more. One of the other limitations was that the subjects were from teaching hospitals, which contributed to a nonrepresentative sample of African Americans in terms of other important behavioral risk factors. African-American subjects in the study had higher educational levels and lower menthol cigarette usage (10% of African-American men and 32% of African-American women) than African Americans in general. The study also did not have details on the timing, exact type of alcohol consumed, and various nutritional factors. In addition, it did not unambiguously classify brands according to mentholation, since 49% of brands had both menthol and regular subtypes.

A subsequent study evaluated subjects enrolled in the earlier study between 1985 and 1990.⁹ This time period was chosen because there was better detail regarding the classification of mentholated cigarettes compared with the pre-1985 years. Other enhancements in this study included details on the depth of inhalation, filter status, and further classification of oropharyngeal cancer site.

In this study, the use of mentholated cigarettes showed odds ratios for oropharyngeal cancers of less than 1.0, or indistinguishable from 1, in both men and women. In men, however, smoking mentholated cigarettes showed a modest positive association with cancer of the pharynx. This study also had limitations in that there were few exclusive menthol users. The frequency of ever using menthol was low: 26% in men and 34% in women. The mean duration of ever using menthol was relatively short. Furthermore, the small number of African Americans did not permit a separate analysis. The question of whether this was a representative sample was again raised. Given the limitations of these studies, the issue of menthol cigarette smoking and its correlation with oropharyngeal cancer has not been resolved.

Relationship of Menthol With Cancer

The possibility of the mentholation of cigarettes as a contributor to human cancer remains intriguing, and investigators have been perplexed by the paradox of African Americans smoking fewer, mainly menthol cigarettes, yet having higher rates of lung cancer. Only two studies to date have directly addressed this issue.

In the first study by Kabat and Hebert published in 1991, they concluded that the use of mentholated cigarettes does not explain black-white differences in lung cancer incidence rates or time trends in rates.⁵ This case-controlled study involved eight hospitals in four major US cities. Each case of a tobacco-related cancer was matched with that of an inpatient with condition(s) thought not to be associated with smoking. Only current smokers were included. Only 2% of the men and 5% of the women had used mentholated cigarettes exclusively. About a quarter of male and female subjects had ever smoked both mentholated and nonmentholated brands, and about 75% of subjects never used menthol. Of the male and female subjects, 13.6% and 12.5%, respectively, were African American. The study showed that the duration of smoking and cigarettes smoked per day had a statistically significant association with lung cancer, as has been previously noted. But the study failed to detect a significantly increased risk of lung cancer among users of menthol cigarettes, with odds ratios for lung cancer of 1.14 for those smoking menthol cigarettes 1 to 14 years and 0.98 for those smoking menthol 15 or more years. Although this was a high-quality study, some investigators think that it may be premature to conclude from this study that smoking menthol cigarettes does not increase the risk of lung cancer for smokers because only 3% of this study's cases and controls smoked menthol cigarettes exclusively.¹⁵

In a more recent study published in 1995, it was concluded that there is an increased risk of lung cancer associated with menthol cigarette use in male smokers.⁴³ The authors report a statistically significant 45% increase in the incidence of lung cancer with mentholated cigarette use relative to nonmentholated cigarette use in men who were long-term smokers. This was a prospective study of members of a northern California Kaiser Permanente

involving 11,761 members who were current smokers and had smoked at least 20 years. There were 318 incident lung cases. The relative risk of lung cancer associated with mentholated cigarette use was 1.45 in men and 0.75 in women. In addition, the duration of mentholated cigarette use was directly related to the presence of lung cancer in men but not in women. The relative risk of lung cancer for men was 1.10, 1.32, and 1.59 for smoking mentholated cigarettes 1 to 9, 10 to 19, and 20 years or more, respectively.

After assessing both studies, we have to conclude that the verdict is not completely in on whether menthol helps explain the black-white lung cancer difference. Thus, it is still a puzzle why African Americans begin smoking later and smoke fewer cigarettes per day than whites but have higher lung cancer rates. More studies are needed on menthol cigarette smoking, as well as NNK, cotinine, and other genetic or dietary factors that might contribute to this difference. At this time, clinicians need to emphasize the primary prevention of tobacco abuse, including restricting the exposure of minors to tobacco products and enhanced smoking cessation measures that are culturally specific.

Practical Suggestions for Counseling African-American Patients to Quit Smoking

Most smokers who quit generally quit on their own. But even minimal counseling by health professionals can reinforce repeated efforts to quit and enhance maintenance. African Americans tend to smoke mentholated, high-tar and -nicotine cigarettes and tend to be more addicted at lower levels of cigarette consumption. Nevertheless, they have a high desire to quit, so it is important to discuss smoking cessation at every visit.

When counseling African-American smokers, it is important for clinicians to emphasize the following^{7,16,17,19,20,30,44}:

- African Americans are not immune to the ill effects of smoking and actually may have an increased risk for certain smoking-related conditions.
- Low-rate smoking patterns are not safe—as some African-American smokers erroneously assume—and do not decrease the serious health risks of cigarette smoking.
- Menthol cigarettes have a higher tar and nicotine content than nonmentholated.
- Mentholation may pose additional health risks, despite the fact that menthol cigarettes may seem mild and taste good.
- The tobacco industry's strategies and economic incentives for targeting the advertising of high-nicotine mentholated brands to African Americans should be pointed out.
- It is difficult to stop smoking when other people around the person smoke.
- Emphasize reasons not to smoke, such as the adverse effects of passive smoking on the health of family members.

- Discuss practical ways of avoiding excessive weight gain after quitting smoking.

Given that many African-American smokers consume high-nicotine menthol cigarettes, clinicians can prepare the smokers for quitting with nicotine-fading and brand-switching techniques. Clinicians should also enhance African-American patients' exposure to existing programs and materials. Educational materials should be geared to the educational level and literacy skills of the patients. Smoking cessation materials should highlight the increased prevalence of smoking-related disease in African Americans. In general, the materials should be tailored to African-American smokers' culture with text, imagery, and models reflecting circumstances similar to those of the patients. This is exactly what tobacco companies have done to sell their poisonous products. Many African American-oriented materials are available. "Pathways to Freedom," developed by Foxchase, is available through the Centers for Disease Control and Prevention, Atlanta, Georgia (1-888-CDC-3228). The American Lung Association has developed an African American-oriented quit-smoking aid, "Quit For Life." This is a supplement to the association's "Freedom From Smoking for You and Your Family" and features African-American models, lower literacy levels, and tip sheets (1-800-LUNG-USA).

Given the high level of stress in the African-American community as a whole, clinicians should also emphasize preventing relapse through active stress-reducing and coping strategies, including focused problem solving and social support.^{16,17} It is important to emphasize the role of family, friends, and church, and not just individuals, in helping African Americans to quit smoking and to become lifelong nonsmokers.

REFERENCES

1. Austoker J, Sanders D, Fowler G. Smoking and cancer: smoking cessation. *BMJ Br Med J* 1994; 308:1478-1482
2. Botvin GJ, Baker E, Botvin EM, Dusenbury L, Cardwell J, Diaz T. Factors promoting cigarette smoking among black youth: a causal modeling approach. *Addict Behav* 1993; 18(4):397-405
3. Morain C. Kiss of death. *Am Med News* 1993 Nov 15, pp 17-24
4. Hebert JR, Kabat GC. Menthol cigarette smoking and oesophageal cancer. *Int J Epidemiol* 1989 Mar; 18(1):37-44
5. Kabat GC, Hebert JR. Use of mentholated cigarettes and lung cancer risk. *Cancer Res* 1991; 51:6510-6513
6. Boring CC, Squires TS, Heath CW. Cancer statistics for African Americans. *Ca-Cancer J Clin* 1992; 42(1):7-17
7. Satcher D, Robinson RG. The CDC and the NMA partnership to control tobacco in the African-American community. *J Natl Med Assoc* 1994; 86(7):493-496
8. Day GL, Blot WJ, Austin DF, Bernstein L, Greenberg RS, Preston-Martin S, et al. Racial differences in risk of oral and pharyngeal cancer: alcohol, tobacco, and other determinants. *J Natl Cancer Inst* 1993; 85(6):465-473
9. Kabat GC, Hebert JR. Use of mentholated cigarettes and oropharyngeal cancer. *Epidemiology* 1994; 5:183-188
10. Brownson RC, Jackson-Thompson J, Wilkerson JC, Davis JR, Owens NW, Fisher EB Jr. Demographic and socioeconomic differences in beliefs about the health effects of smoking. *Am J Public Health* 1992; 82(1):99-103
11. Chyou PH, Nomura AMY, Stemmermann GN. A prospective study of the attributable risk of cancer due to cigarette smoking. *Am J Public Health* 1992; 82(1):37-40

12. Robinson RG, Pertschuk M, Sutton C. Tobacco prevention and control: targeting the African American community. Cheltenham (Pa): Kaiser Foundation; 1991
13. Carbone D. Smoking and cancer. *Am J Med* 1992; 93(suppl 1A):1-135
14. Sterling TD, Weinkam JJ. Comparison of smoking-related risk factors among black and white males. *Am J Ind Med* 1989; 15:319-333
15. McCarthy WJ, Caskey NH, Jarvik ME, Gross TM, Rosenblatt MR, Carpenter C. Menthol vs nonmenthol cigarettes: effects on smoking behavior. *Am J Public Health* 1995; 85(1):67-72
16. Orleans CT, Schoenbach VJ, Salmon MA, Strecher VJ, Kalsbeek W, Quade D, et al. A survey of smoking and quitting patterns among black Americans. *Am J Public Health* 1989; 79(2):176-181
17. Stotts RC, Glynn TJ, Baquet CK. Smoking cessation among blacks. *J Health Care Poor Underserved* 1991; 2(2):307-319
18. Centers for Disease Control and Prevention. African Americans and smoking, at a glance. Surgeon General's report. Dept of Health and Human Services; 1995
19. Vander Martin R, Cummings SR, Coates TJ. Ethnicity and smoking: differences in white, black, hispanic, and Asian medical patients who smoke. *Am J Prev Med* 1990; 6(4):194-199
20. Royce JM, Hymowitz N, Corbett K, Hartwell TD, Orlandi MA. Smoking cessation factors among African Americans and whites. COMMIT Research Group. *Am J Public Health* 1993; 83(2):220-226
21. Centers for Disease Control and Prevention: Preventing tobacco use among young people. A report of the Surgeon General. Dept of Health and Human Services; 1994 [Superintendent of Documents, US Government Printing Office, Washington, DC, 20402, S/N 017-001-00491-0]
22. Epps RP, Manley MW. Prevention of tobacco use during childhood and adolescence. *Cancer* 1993; 72:1002-1004
23. Pierce JP, Fiore MC, Novotny TE, Hatziafreu EJ, Davis RM. Trends in cigarette smoking in the United States: projections to the year 2000. *JAMA* 1989; 261(1):61-65
24. Taioli E, Wynder EL. Effect of age at which smoking begins on frequency of smoking in adulthood. *N Engl J Med* 1991; 325(13):968-969
25. Coultas DB, Gong H Jr, Grad R, Handler A, McCurdy SA, Player R, et al. Respiratory diseases in minorities of the United States. *Am J Respir Crit Care Med* 1994; 149(3 Pt 2):S93-S131 [erratum published in *Am J Respir Crit Care Med* 1994; 150(1):290]
26. Harris RE, Zang EA, Anderson JI, Wynder EL. Race and sex differences in lung cancer risk associated with cigarette smoking. *Int J Epidemiol* 1993; 22(4):592-599
27. Center for Disease Control. Cigarette brand use among adult smokers—United States, 1986. *MMWR Morb Mortal Wkly Rep* 1990; 39(38):665-673
28. Racial differences in serum cotinine levels among smokers in the coronary artery risk development in (young) adults study. *Am J Public Health* 1990; 80(9):1053-1056
29. Sidney S, Tekawa I, Friedman GD. Mentholated cigarette use among multiphasic examinees: 1979-1986. *Am J Public Health* 1989; 79(10):1415-1416
30. Ahijevych K, Wewers ME. Factors associated with nicotine dependence among African-American women cigarette smokers. *Res Nurs Health* 1993; 16:283-292
31. Centers for Disease Control and Prevention. Changes in the cigarette brand preferences of adolescent smokers—United States, 1989-1993. *MMWR* 1994; 43(32):577-581
32. Cummings KM, Giovino G, Mendicino AJ. Cigarette advertising and black-white differences in brand preference. *Public Health Rep* 1987; 102(6):698-701
33. English PB, Eskenazi B, Christianson RE. Black-white differences in serum cotinine levels among pregnant women and subsequent effects on infant birthweight. *Am J Public Health* 1994; 84(9):1439-1443
34. Wagenknecht LE, Haley NJ, Jacob DR. Wagenknecht and colleagues respond [correspondence]. *Am J Public Health* 1992; 82(8):1173
35. Wagenknecht LE, Manolio TA, Sidney S, Burke GL, Haley NJ. Environmental tobacco smoke exposure as determined by cotinine in black and white young adults: the CARDIA study. *Environ Res* 1993; 63(1):39-46
36. Hecht SS, Carmella SG, Murphy SE, Akerkar S, Brunnemann KD, Hoffmann D. A tobacco-specific lung carcinogen in the urine of men exposed to cigarette smoke. *N Engl J Med* 1993; 329(21):1543-1546
37. Lundy RF Jr, Contreras RJ. Neural responses of thermal-sensitive lingual fibers to brief menthol stimulation. *Brain Res* 1994; 641(2):208-216
38. Jarvik ME, Tashkin DP, Caskey NH, McCarthy WJ, Rosenblatt MR. Mentholated cigarettes decrease puff volume of smoke and increase carbon monoxide absorption. *Physiol Behav* 1994; 56(3):563-570
39. Miller GE, Jarvik ME, Caskey NH, Segerstrom SC, Rosenblatt MR, McCarthy WJ. Cigarette mentholation increase smokers' exhaled carbon monoxide levels. *Exp Clin Psychopharmacol* 1994; 2(2):154-160
40. Yamaguchi T, Caldwell J, Farmer PB. Metabolic fate of [3H]-1-menthol in the rat. *Drug Metab Dispos* 1994; 22(4):616-624
41. Wynder EL, Hoffman D. Smoking and lung cancer: scientific challenges and opportunities. *Cancer Res* 1994; 54:5284-5295
42. Caskey NH, Jarvik ME, McCarthy WJ, Rosenblatt MR, Gross TM, Carpenter CL. Rapid smoking of menthol and nonmenthol cigarettes by black and white smokers. *Pharmacol Biochem Behav* 1993; 46(2):259-263
43. Sidney S, Tekawa IS, Friedman GD, Sadler MC, Tashkin DP. Mentholated cigarette use and lung cancer. *Arch Intern Med* 1995; 155(7):727-732
44. Orleans CT, Strecher VJ, Schoenbach VJ, Salmon MA, Blachman C. Smoking cessation initiatives for black Americans: recommendations for research and intervention. *Health Educ Res* 1989; 4(1):13-25