

The Convergence of Lung Cancer Rates between Blacks and Whites under the Age of 40, United States

Ahmedin Jemal, Melissa M. Center, and Elizabeth Ward

Surveillance and Health Policy Research, American Cancer Society, Atlanta, Georgia

Abstract

Lung cancer rates in the United States have been consistently higher in blacks than in whites at all ages in men and at younger ages in women. However, since the 1970s, smoking initiation decreased more rapidly among blacks than whites. We examined trends in lung cancer rates for white and black young adults (ages 20-39) from 1992 to 2006 using joinpoint models and black-to-white rate ratios by sex. Lung cancer death rates in 20- to 39-year-olds significantly decreased in all groups but was much steeper for blacks than for whites. From

1992 to 1994 and 2004 to 2006, the black-to-white mortality rate ratio (95% confidence interval) decreased from 2.16 (1.90-2.44) to 1.28 (1.05-1.55) for men and from 1.47 (1.25-1.71) to 0.97 (0.78-1.19) for women. A similar convergence was observed in the lung cancer incidence rates. These findings suggest that if current smoking trends in the young continue, racial differences in overall lung cancer rates in men will be eliminated in the next 40 to 50 years. (Cancer Epidemiol Biomarkers Prev 2009;18(12):3349-52)

Introduction

Lung cancer incidence and death rates in the United States have been consistently higher in black than white men at all ages and in black than white women at younger ages (1, 2). Factors that may contribute to these differences include racial differences in smoking behaviors (1), susceptibility to tobacco carcinogens (3, 4), occupational exposures (5), stage at diagnosis (6),¹ and treatment (7, 8). Compared with whites, blacks have higher smoking prevalence, especially in men (9), predominantly smoke menthol cigarettes (10, 11), show higher blood cotinine levels (12, 13), and quit smoking less successfully (12, 14-16). However, recent reports documented the elimination of black-white differences in smoking prevalence in young adults (9) due in large part to greater reduction in initiation of smoking among blacks since the late 1970s (Fig. 1; refs. 11, 17, 18). This article examines recent temporal trends in lung cancer rates among young adults (ages 20-39).

Materials and Methods

Mortality data for cancers of the lung and bronchus (lung cancer) from 1992 to 2006 were obtained from the National Center for Health Statistics for 41 states that have high-quality information for Hispanic origin on death certificates (19).² Lung cancer incidence data for the corresponding time interval were obtained from 12 cancer registries that participate in the National Cancer Institute's Surveillance Epidemiology and End Results (SEER) program (20).² These registries include San Francisco, Connecticut, Detroit, Hawaii, Iowa, New Mexico, Seattle,

Utah, Atlanta, San Jose-Monterey, Los Angeles, and Rural Georgia, and cover ~14% of the U.S. population.

We analyzed lung cancer incidence and death rates for non-Hispanic whites and non-Hispanic blacks ages 20 to 39, beginning in 1992, the first and the third year, respectively, that data by Hispanic ethnicity were publicly available. We restricted our analysis to non-Hispanic whites and non-Hispanic blacks (hereafter called whites and blacks, respectively, for convenience) to minimize the influence of recent Hispanic immigrants on the lung cancer trends. Hispanic immigrants were less likely to be smokers compared with the general population (21). We also restricted our analysis to ages 20 to 39 to ensure that lung cancer cases and deaths from 1992 to 2006 in this age included birth cohorts who reached adolescence before and after the accelerated decline in smoking initiation among black adolescents began in the late 1970s.

Trends in lung cancer incidence and death rates from 1992 to 2006 were described using joinpoint regression analysis, which involves fitting a series of joined straight lines on a log scale to the trends in the annual age-standardized rates. The resultant trends of varying time periods were described by annual percent change, i.e., the slope of the line segment (22). We also calculated the black-to-white rate ratios and their 95% confidence intervals by sex averaged over 3-y time intervals over the corresponding period using the method by Tiwari et al., which is available in SEER*Stat (23).

Results

Among men, lung cancer death rates from 1992 to 2006 decreased by 7.9% per year in blacks and 3.6% per year in whites (Table 1; Fig. 2, left). Among women, death rates decreased by 4.8% per year in blacks, compared with

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Requests for reprints: Ahmedin Jemal, American Cancer Society, 250 Williams Street Northeast, Atlanta, GA 30303-1002. Phone: 404-329-7557; Fax: 404-327-6450. E-mail: ajemal@cancer.org

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¹ http://seer.cancer.gov/csr/1975_2006/

² <http://www.seer.cancer.gov/>

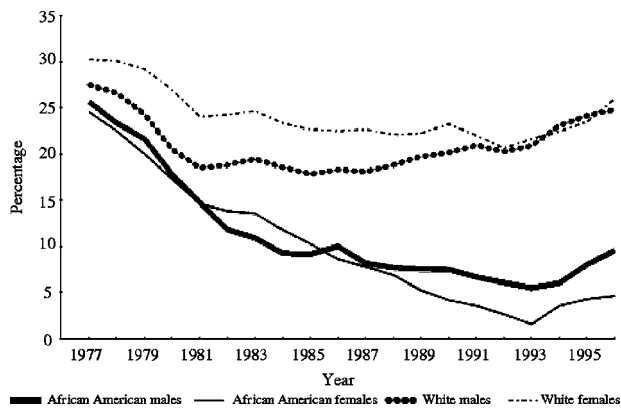


Figure 1. Trends in daily smoking among African American and white high school seniors, by gender, United States (1977-1996). Source: U.S. Department of Health and Human Services (11). Derived from the Institute for Social Research, University of Michigan (unpublished data from the Monitoring the Future surveys, 1976-1996).

1.9% per year in whites (Table 1; Fig. 2, right). As a result, between 1992 to 1994 and 2004 to 2006, the black-to-white lung cancer mortality rate ratio (95% confidence intervals) decreased from 2.16 (1.90-2.44) to 1.28 (1.05-1.55) for men and from 1.47 (1.25-1.71) to 0.97 (0.78-1.19) for women. Similarly, the black-to-white incidence rate ratio dropped from 2.05 (1.52-2.74) to 1.30 (0.84-1.94) in men and from 1.75 (1.29-2.33) to 1.22 (0.82-1.76) in women.

Discussion

The convergence in lung cancer rates between whites and blacks under the age of 40 likely reflects the greater de-

crease in initiation of smoking among blacks since the late 1970s (11, 17), which resulted in a more rapid decrease in smoking prevalence in 25- to 34-year-olds among blacks than whites. Between 1990 to 1992 and 2002 to 2004, current smoking prevalence among 25- to 34-year-old men decreased from 34.6% to 26.5% in blacks and from 32.7% to 29.7% in whites (9). Among women ages 25 to 34, smoking prevalence during the corresponding two time intervals decreased from 29.2% to 16.2% in blacks and from 30.9% to 26.3% in whites. The reasons for the lower initiation of smoking since the late 1970s among black adolescents have yet to be fully understood, but may include higher sensitivity to the price of cigarettes among black youth (24, 25), higher levels of participation in high school sport programs, and stronger antismoking norms in the black community (16, 26, 27).

Although lung cancer rates under the age of 40 are low, lung cancer rates in young adults provide an early indicator of generational changes in smoking prevalence and lung cancer rates and trends in the future (1, 28, 29). If cohorts of young blacks born after the early 1960s continue to show lower smoking prevalence as they get older, racial differences in age-adjusted lung cancer rates will diminish among men. The favorable trend among blacks could be further accelerated by programs targeting cessation among blacks, who may have higher motivation to quit (16, 26, 30), but less access to tobacco cessation counseling and treatment (31-33). Efforts are also needed to reduce initiation among white adolescents. Because youth initiation is highly sensitive to price change (24), increases in excise taxes especially among states with low tax rates would be an important measure.

Factors in addition to smoking prevalence that may contribute to differences in lung cancer incidence and mortality trends between black and white populations include differences in occupational exposures (5), stage at diagnosis (mortality only; ref. 6),¹ treatment (mortality

Table 1. Trends in lung cancer rates among 20- to 39-year-old non-Hispanic white and non-Hispanic black men and women, United States

Sex/Race	Rate (95% confidence intervals)		Trend (1992-2006) Annual percentage change
	1992-1994	2004-2006	
U.S. mortality			
Male			
Non-Hispanic Blacks	3.04 (2.72-3.38)	1.14 (0.95-1.36)	-7.9*
Non-Hispanic Whites	1.41 (1.32-1.50)	0.90 (0.82-0.97)	-3.6*
Rate ratio (Black vs. White)	2.16 (1.90-2.44)	1.28 (1.05-1.55)	
Female			
Non-Hispanic Blacks	1.61 (1.39-1.85)	0.84 (0.69-1.02)	-4.8*
Non-Hispanic Whites	1.10 (1.02-1.18)	0.87 (0.80-0.95)	-1.9*
Rate ratio (Black vs. White)	1.47 (1.25-1.71)	0.97 (0.78-1.19)	
SEER Incidence			
Male			
Non-Hispanic Blacks	3.74 (2.87-4.78)	1.77 (1.21-2.52)	-6.5*
Non-Hispanic Whites	1.82 (1.58-2.09)	1.37 (1.13-1.64)	-2.5*
Rate ratio (Black vs. White)	2.05 (1.52-2.74)	1.30 (0.84-1.94)	
Female			
Non-Hispanic Blacks	3.15 (2.41-4.04)	1.93 (1.37-2.65)	-5.1*
Non-Hispanic Whites	1.80 (1.56-2.08)	1.59 (1.33-1.88)	-1.1
Rate ratio (Black vs. White)	1.75 (1.29-2.33)	1.22 (0.82-1.76)	

NOTE: U.S. mortality excludes data from nine states (Connecticut, Maine, Maryland, Minnesota, New Hampshire, New York, North Dakota, Oklahoma, and Vermont) and the District of Columbia because information on Hispanic origin on death certificates was incomplete in these states.

Incidence is from 12 SEER cancer registries (San Francisco, Connecticut, Detroit, Hawaii, Iowa, New Mexico, Seattle, Utah, Atlanta, San Jose-Monterey, Los Angeles, and rural Georgia).

*Indicates the annual percent change according to joinpoint regression is statistically significant, $P < 0.05$.

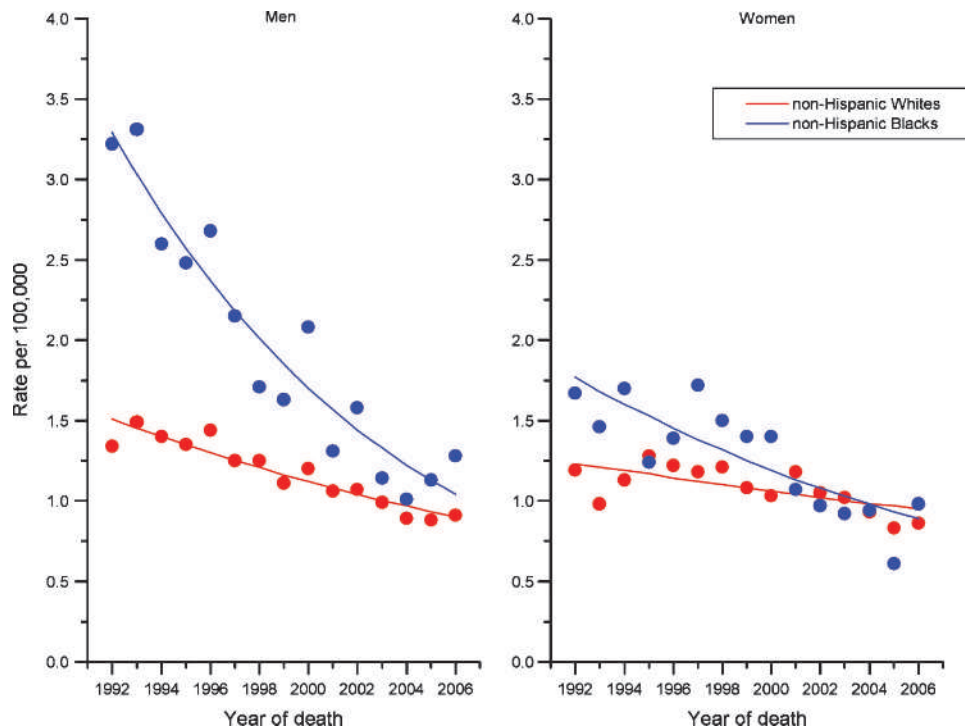


Figure 2. Trends in lung cancer death rates in 20- to 39-year-old non-Hispanic white and non-Hispanic black men and women (1992-2006). Points, observed rates; solid lines, fitted rates.

only; ref. 7), and genetic susceptibility (3, 4). However, it is unlikely that factors other than tobacco use contribute importantly to the black-white differences in temporal trends in lung cancer rates among young adults.

In conclusion, lung cancer rates between whites and blacks, by sex, under the age of 40 have converged because of accelerated reductions in lung cancer rates in blacks. If these cohorts of black men and women continue to have low smoking prevalence as they get older, we should see the elimination of racial differences in the overall lung cancer rates in men in the next 40 to 50 years.

Disclosure of Potential Conflicts of Interest

No potential conflicts of interest were disclosed.

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