
Differences in Cancer Incidence, Mortality, and Survival between African Americans and Whites

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This report highlights selected evidence of different cancer patterns among African Americans and whites and considers potential risk factors associated with these cancers. During the years 1987 to 1991, African Americans experienced higher incidence and mortality rates than whites for multiple myeloma and for cancers of the oropharynx, colorectum, lung and bronchus, cervix, and prostate. African Americans had lower incidence and mortality for cancer of the urinary bladder. The incidence of breast cancer was higher among white women, but mortality was higher among African American women. Five-year relative survival for the period 1983 to 1990 was generally lower among African Americans than whites for cancers of the oropharynx, colorectum, cervix, prostate, and female breast but slightly higher for multiple myeloma. From 1973 to 1991, there were significant declines in cervical cancer incidence among women of both races, oropharyngeal cancer mortality among whites, and bladder cancer mortality for whites and African Americans. Risk factors for the more prominent cancers suggest that efforts aimed at changing lifestyles, achieving socioeconomic parity, and insuring environmental equity are likely to relieve African Americans of much of their disproportionate cancer burden. — Environ Health Perspect 103(Suppl 8):275–281 (1995)

Key words: African Americans, breast cancer, cancer, cervical cancer, colorectal cancer, ethnicity, multiple myeloma, oropharyngeal cancer, prostate cancer, race

Introduction

Interest has intensified in recent years regarding the variation of cancer incidence and mortality among racial groups, particularly among African Americans, who comprise the largest racial minority group in the United States (1). Particularly germane are demographic changes, the lack of substantial gains against established cancers, and increasing evidence that higher percentages of African Americans and Hispanics than whites live in areas polluted by potential environmental carcinogens (2). Descriptive and analytic epidemiologic studies have provided abundant information concerning the African American community's disproportionate cancer burden, a burden that is marked by increasing mortality rates for many cancers in sharp contrast to more favorable trends among whites (3).

During the period from 1987 to 1991, African Americans in the United States

experienced higher incidence and mortality rates than whites for multiple myeloma and for cancers of the oropharynx, colorectum, lung and bronchus, cervix, and prostate, (Table 1). African Americans had lower incidence and mortality for cancer of the urinary bladder. The incidence of breast cancer was higher among white women, but mortality was higher among African American women. Five-year relative survival for the period 1983 to 1990 generally was lower among African Americans than whites for cancers of the oropharynx, colorectum, cervix, prostate, and female breast, but slightly higher for multiple myeloma. From 1973 to 1991, there were significant declines in cervical cancer incidence among women of both races, oropharyngeal cancer mortality among whites, and bladder cancer mortality among both whites and African Americans.

This report highlights selected cancer sites and briefly considers some of the potential risk factors investigated to explain differences in incidence and mortality among African Americans and whites. More detailed discussions of risk factors such as socioeconomic status (4–11) can be found elsewhere.

Oral Cavity and Pharynx

The National Cancer Institute estimated that there would be 29,600 new cases and

7925 deaths in 1994 attributable to cancer of the oral cavity and pharynx, including lip, salivary gland, and nasopharynx (Table 1) (3). African American men have the highest incidence and mortality rates, and the racial disparity has been increasing over time. African American men are the only racial/gender group to experience increases in both incidence and mortality during the 1987 to 1991 period (3). In addition, African American men have the poorest 5-year survival rates for these types of cancer.

The primary risk factors for cancer of the oral cavity and pharynx are alcohol and tobacco consumption (12). Day et al. (12) reported that differences in the relative risks and prevalences of exposure to alcohol and tobacco account for most of the racial variation. The interactions (multiplicative effects) of alcohol and tobacco were associated with greater risk among African Americans than whites. The reasons for higher risks among African Americans who consume alcohol than among white individuals who drink are not known, but may be related to the types of alcohol beverages consumed. Other factors, such as diet, may also play a role. Interventions aimed at reducing alcohol and tobacco use represent the best opportunities to prevent these cancers. Tobacco use trends suggest that interventions should target certain age groups (Table 2).

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Abbreviation used: SEER, Surveillance, Epidemiology, and End Results Program.

Table 1. Incidence, mortality, and survival for selected cancers in the United States among blacks and whites.

Cancer type	Incidence per 10 ⁵ , 1987–1991, Black/White	% Change, 1973–1991, Black/White	Mortality per 10 ⁵ , 1987–1991, Black/White	% Change, 1973–1991, Black/White	5-Year relative survival rate, 1983–1990, Black/White	1994 Projected cancer burden	
						New cases (%)	Deaths (%)
Oral cavity and pharynx							
Male	23.7/15.8	38.3/–11.2	9.2/4.2	15.6/–27.3	28.5/52.5	19,800 (3)	5,150 (2)
Female	6.5/6.2	–0.6/–0.1	2.3/1.6	1.6/–13.2	47.1/59.1	9,800 (2)	2,775 (1)
Colorectal							
Male	60.9/58.7	36.1/3.0	28.0/23.3	25.1/–11.2	48.6/60.7	75,000 (12)	27,000 (10)
Female	46.7/39.9	20.0/–6.6	20.6/15.6	3.8/–23.6	50.2/59.2	74,000 (13)	28,000 (11)
Lung and bronchus							
Male	122.4/80.7	15.8/7.9	105.5/73.9	38.2/17.1	10.6/12.1	100,000 (16)	94,000 (33)
Female	44.5/41.3	124.2/125.7	30.4/30.9	129.7/134.2	12.3/16.2	72,000 (13)	59,000 (23)
Breast							
Female	94.0/113.2	30.3/25.8	31.2/27.2	20.2/0.6	65.8/81.6	182,000 (32)	46,000 (18)
Cervix							
Female	14.0/7.8	–57.1/–35.4	6.7/2.6	–48.2/–41.3	56.4/69.9	15,000 (3)	4,600 (2)
Prostate							
Male	163.1/121.2	81.9/127.1	52.0/23.6	39.2/21.3	66.4/81.3	200,000 (32)	38,000 (13)
Bladder							
Male	15.0/32.3	28.5/13.2	4.8/5.8	–14.3/–21.7	66.0/82.6	38,000 (6)	7,000 (2)
Female	5.9/7.8	33.9/13.0	2.4/1.6	–20.7/–19.6	48.7/75.2	13,000 (2)	3,600 (1)
Multiple myeloma							
Male	11.1/5.1	3.2/27.2	7.2/3.4	46.1/31.8	31.1/28.0	6,500 (1)	5,000 (2)
Female	7.7/3.3	9.2/–0.1	4.9/2.2	45.1/28.2	27.9/26.8	6,200 (1)	4,800 (2)
All sites							
Male	557.2/464.0	33.9/31.1	316.8/213.3	23.6/5.6	35.7/50.8	632,000	283,000
Female	331.8/348.0	17.7/15.0	166.9/139.6	13.3/8.1	45.5/59.8	576,000	255,000

^aPercent of all cancer deaths for that gender. From Reis et al. (3).

Table 2. Percent of persons 18 years old and over currently smoking cigarettes by gender, race, and age, United States, selected years 1979 to 1990.

Gender and race	Age	Year			
		1979	1983	1987	1990
Men					
White	18–24	34.3	32.5	29.2	27.4
	25–34	43.6	38.6	33.8	31.6
	35–44	41.3	40.8	36.2	33.5
	45–54	38.3	35.0	32.4	28.7
	≥65	20.5	20.6	16.0	13.7
Black	18–24	40.2	34.2	24.9	21.3
	25–34	47.5	39.9	44.9	33.8
	35–44	48.6	45.5	44.0	42.0
	45–54	50.0	44.8	44.3	36.7
	≥65	26.2	38.9	30.3	21.5
Women					
White	18–24	34.5	36.5	27.8	25.4
	25–34	34.1	32.2	31.9	28.5
	35–44	37.2	34.8	29.2	25.0
	45–54	30.6	30.6	29.0	25.4
	≥65	13.8	13.2	13.9	11.5
Black	18–24	31.8	32.0	20.4	10.0
	25–34	35.2	38.0	35.8	29.1
	35–44	37.7	32.7	35.3	25.5
	45–54	34.2	36.3	28.4	22.6
	≥65	8.5	13.1	11.7	11.1

From Reis et al. (3).

Colorectal

Colorectal cancer is one of the nation's most common malignancies, accounting for one in every eight cancers in the United States. In 1994, there were an estimated 149,000 new cases and 51,000 deaths associated with colorectal cancer (3). African Americans have greater incidence and mortality from colorectal cancer than whites, with the greatest racial differences occurring among women. While incidence declined among white women and mortality decreased among both white men and women during the 1973 to 1991 period, rates among African Americans rose. The incidence of colorectal cancer increased 36.1% among African American men yet only 3.0% among white men. Mortality rose 25.1% among African American men but decreased 11.2% among white men during the same period. The disparities increase with age. African Americans are more likely to be diagnosed at a later stage of disease than whites for both colon and rectal cancers (13). The rate of survival is worse for African Americans than for whites and, in general, did not increase during the years 1983 to 1990, a period during in which survival rates among whites improved.

Risk factors for colorectal cancer that might explain some of the racial differences are diet, alcohol consumption, physical activity, exogenous hormone exposure, parity, genetic susceptibility, cancer genotype, and smoking (14,15). A combination of prevention regimes may present the best opportunity to lower rates among African Americans and reverse diverging racial trends.

Lung

Lung cancer accounted for 14% of all cancer cases and 28% of all cancer deaths in the United States during 1994, with an estimated 172,000 new cases and 153,000 deaths (Table 1) (3). African American men have significantly higher incidence and mortality rates than white men.

Tobacco use was recognized nearly 40 years ago as the leading risk factor for lung cancer (16). Cigarette smoking patterns explain some of the racial differences. With the exception of young women, African Americans generally have higher smoking rates than whites (Table 2). Recent investigations of genetic polymorphisms and lung cancer found no racial differences in the prevalence of alleles for cytochrome P450 2E1 (17) but did find differences in allelic

frequency for *L-myc*, *p53*, and *CYP1A1* genes (18–20). Research regarding the role of these genetic differences in lung cancer etiology is under way. Socioeconomic factors may also explain some of the racial variation in lung cancer (21). Differential environmental and occupational exposures may also explain a portion of the lung cancer excess. There is some evidence that African Americans disproportionately reside or work in areas exposed to industrial chemicals (2,22).

Breast

Breast cancer is the most common invasive cancer among women, representing 32% of all new cancer cases and 18% of cancer deaths in the United States (3). Since 1988, breast cancer has been the leading cause of death in the United States for women between 40 and 55 years old. In 1994, there were approximately 182,000 breast cancer cases diagnosed and 46,300 deaths (Table 1) (3). Although white women are diagnosed more often with breast cancer than African American women, mortality rates are higher among African American women. While there has been little to no increase in breast cancer mortality among whites, African American women have experienced a 20% increase from 1973 to 1991. On average, African American women are diagnosed in later stages than white women, and have less improvement over time (23). Age-specific, 5-year relative survival rates are nearly 15% lower among African American women than white women (Table 3).

Breast cancer risk factors that have been investigated as possible explanations

for the racial variation include socioeconomic factors (21,24), reproductive patterns (25–28), hormones (29–32), lifestyle (33,35), health care access (35–37), age (38), proximity or contact with pesticides (39), diet (40), and genetic susceptibility (41,42).

One of the earliest analysis of factors associated with stage at diagnosis for breast cancer among African American and white women was conducted by the National Cancer Institute’s African American/White Cancer Survival Study Group (43). It assessed in a single study the relationship of sociodemographic, behavioral, clinicopathologic, and health care access factors to variations in stage at diagnosis of breast cancer among African American and white participants. The results indicated that some factors associated with stage at diagnosis are differentially expressed in African Americans and whites. Among African Americans only, the investigators observed that access to health care, lifestyle, and other antecedent medical experiences influence disease stage at diagnosis. These findings suggest that the advanced stage of breast cancer at diagnosis is related in part to the poorer access to health care common to socioeconomically disadvantaged populations.

Addressing essentially the same issue, Lacey (44) identified several barriers to breast cancer prevention and early detection for urban, low-income African American women, including: *a*) other urgent life priorities, *b*) financial restrictions related to cost, *c*) quality of available health resources, *d*) limited knowledge regarding cancer, *e*) relatively few available sources of

information regarding cancer prevention and detection, and *f*) poor adherence with follow-up recommendations. This study found no evidence that African American women belonging to lower socioeconomic classes were disinterested in their health or less likely than whites to participate in health promotion activities.

The 5-year survival differences among women with the same stage disease suggest that the clinical course of the disease is different among African American women (45). As with other cancers, age modifies risk, and African American mortality rates decline below those found among whites above age 69 (3).

Uterine Cervix

Cancer of the uterine cervix is the third most common malignancy of the female reproductive system in the United States (3). The incidence among African American women is approximately twice that found among white women—14.0 per 100,000 women compared to 7.8 per 100,000 women, respectively (3). This disparity is evident primarily among women age 65 and over, with African American women experiencing nearly 3 times the incidence of white women during the years 1987 to 1991 (41.8 per 100,000 women compared to 15.3 per 100,000 women) (3). African American mortality rates (6.7 per 100,000) have been about 3 times that among whites (2.6 per 100,000), which is also primarily attributed to the excess incidence of cervix cancer among African American women age 65 and over (3). Between 1973 and 1991, the incidence of invasive cervical cancer decreased for both African Americans and whites by 55.1 and 35.4%, respectively. This has not been a steady decline over the time period, and it has differed by both race and age. Most of the decline in the incidence of invasive cervical cancer observed among white women occurred during the 1970s and early 1980s. The decline in incidence has been relatively steady among African American women, with some evidence of a possible slowing or plateauing in the rate of decrease during the mid 1980s.

Cervical cancer is generally detected later among African Americans than whites. Between 1983 and 1990, 39% of invasive cervical cancers among African Americans were detected while the disease was localized (i.e., confined to the cervix uteri) compared to 53% for whites (3). These differences in incidence rates by race are evidenced among younger and older

Table 3. Five-year relative survival rates for selected cancers among black and white women, by age group, in the United States, 1983–1990.

Age	Oral cavity and pharynx, %	Colon and rectum, %	Lung and bronchus, %	Breast, %	Uterine cervix, %	Urinary bladder, %	Multiple myeloma, %
Black women							
<45	64.5	55.7	16.4	62.3	68.6	N/A	46.5
45–54	46.5	58.8	13.7	65.9	55.6	N/A	29.3
55–64	49.1	56.7	15.9	66.2	52.4	55.5	33.6
65–74	31.3	46.8	8.3	69.3	47.8	47.6	23.9
≥75	30.4	42.3	6.6	67.2	29.7	42.1	19.2
<65	52.1	57.1	15.3	64.7	61.4	54.2	34.6
>65	30.8	45.0	7.8	68.6	40.9	45.3	22.0
White women							
<45	85.4	61.0	28.7	78.2	81.1	89.5	47.3
45–54	65.4	61.5	20.7	81.7	68.7	88.7	37.3
55–64	56.5	60.7	17.1	81.4	64.0	83.2	30.6
65–74	52.2	60.4	15.3	83.5	55.1	75.4	25.9
≥75	54.5	57.4	10.1	82.2	42.5	62.9	20.7
<65	64.7	60.9	19.0	80.6	75.0	85.3	33.9
>65	53.0	58.9	13.6	83.0	50.5	69.6	23.3

N/A, not available because statistic cannot be calculated due to small numbers. From Reis et al. (3).

women. In women under 50 years of age, 52% of the invasive cervical cancers detected in African American women were diagnosed at the localized stage compared to 67% among white women. Among women 50 years of age and older, 27% of the invasive cervical cancers diagnosed among African American women were localized, as were 36% detected among white women (3). Five-year survival rates are lower among African Americans (56.4%) than whites (69.9%), with little change over the last two decades (3).

Several factors may have stymied attempts to reduce these disparities, including the failure among women with abnormal Pap smear results to seek follow-up care. Poor, uninsured, single, and young women are least likely to follow recommendations regarding follow-up care. Individuals with abnormal Pap test results are usually referred to another facility for treatment. These facilities are often located farther away than the facility of initial diagnosis and may necessitate an additional appointment, which requires the individual to miss more time at work. Cost may also act as a barrier. A pelvic examination that includes a Pap test can cost \$100 or more; a fee that may not be covered by health insurance plans, which often provide little preventive coverage.

Sexually transmitted human papilloma virus infection is the primary risk factor for most cases of cervical dysplasia and carcinoma, although other etiologic factors are probably involved (46). Providing effective barriers to infection during sexual intercourse, as well as health education, could reduce the incidence of cervical cancer among women of both racial groups. Improved access to health care may reduce mortality among African American women and improve survival rates associated with this preventable cancer.

Prostate

Prostate cancer is the most commonly diagnosed malignancy and the second highest cause of cancer-related deaths among men in the United States, accounting for 32% of new cancer cases and 13% of cancer deaths (Table 1) (3). Prostate cancer is a disease primarily of older men; it is uncommon below 55 years of age. Incidence increases rapidly with age to more than 1000 cases per 100,000 individuals among men over 75 years of age.

Although the incidence and mortality rates associated with prostate cancer are higher among African Americans than

whites in the United States, there are wide variations in the incidence of prostate cancer among African populations (47). In Nigeria and the Caribbean, prostate cancer incidence is much lower than among African Americans. This suggests that migration and accompanying changes in environmental conditions may have affected prostate cancer risk among African Americans (48).

Prostate cancer is biologically heterogeneous in presentation and outcome. It remains latent in some men but intensively aggressive in others. The proportion of early curable prostate cancer has increased (49). In 1990, African American men were more likely to be diagnosed with stage IV (29.3%) prostate cancer than white men (17.8%). African American men had poorer 5-year survival (66.4%) than white men (81.3%) (3). This corresponded to a greater prevalence of advanced prostate cancer among African American men. Whether this difference could be explained by differences in urinary obstructive symptoms was investigated by Brawn et al. (50). They concluded that survival, stratified by stage and grade, was not affected adversely by obstructive symptoms. Neither racial differences in the incidence of obstructive symptoms nor the frequency with which obstructive symptoms required surgical correction explain the later stage at diagnosis found among African American men. Presentation at a later stage was almost twice as common among rural African Americans as among urban African Americans, suggesting a possible role for socioeconomic factors and access to health care (51).

The etiology of prostate cancer has not been well characterized and many unresolved issues remain. Some investigations have indicated that individuals with prostate cancer tend to consume more dietary animal fat than those not diagnosed and, therefore, a vegetarian lifestyle may reduce risk (48). Prostate cancer has also been linked to a history of venereal disease, having multiple sexual partners, and some occupations, primarily farming and jobs involving exposure to cadmium (48). In one study of prostate cancer in the southeastern United States, farming accounted for 38% of the geographic difference in prostate cancer mortality rates among African Americans (52). Detailed studies of specific agricultural exposures and prostate cancer among African American men have not been conducted to date. Vasectomy has been identified as a potential risk factor for prostate cancer in some

studies but not in others (53). In any event, vasectomy cannot explain the excess risk among African Americans, because the prevalence of vasectomy is much lower among African Americans than whites (53). Tobacco use does not appear to be associated with prostate cancer nor does it explain the racial disparities (54).

A rapidly evolving interest in familial aggregation of prostate cancer has expanded the base of evidence supporting family history as a risk factor for this disease. A hospital-based study found a 2-fold elevated risk among men who had a father or brother with carcinoma of the prostate (55). The risk increased to 6.1 if both a first-degree and second-degree relative were affected. Other studies have noted similar trends of increasing risk with increasing numbers of affected relatives. For example, men with two or three first-degree relatives had a 5-fold and 11-fold increased risk of prostate cancer, respectively, compared with persons without a family history of the disease (56–58). Family history and genetic susceptibility may play a role in the racial differences in incidence rates associated with prostate cancer.

The higher mortality among African American men also suggests the role of other factors in determining stage of cancer at diagnosis, such as delay in seeking health care, demographic variables, socioeconomic status, functional status, and social support. Among African American men, there is evidence to link delays in seeking health care with less favorable disease outcome. Analysis of the Surveillance, Epidemiology and End Results (SEER) program data from Detroit shows that increases in cancer detection were less among African American men at the same time that increases in detection trends were being recorded for other segments of the population (59). Similar evidence was found in the 1990 National Cancer Data Base report (49), where there were large differences in the proportion of advanced cancers diagnosed among African American and white men. The authors concluded that "Regrettably, not all segments of the population at risk are benefiting from early detection of prostate cancer."

Bladder

Urinary bladder cancer accounts for 78,800 new cases and 21,900 deaths each year in the United States (3). African Americans have lower incidence of bladder cancer than whites (Table 1), but the 5-year relative survival is lower among African Americans

Table 4. Five-year relative survival rates for selected cancers among black and white men by age group, in the United States, 1983–1990.

Age	Oral cavity and pharynx, %	Colon and rectum, %	Lung and bronchus, %	Urinary bladder, %	Prostate, %	Multiple myeloma, %
Black men						
<45	33.6	47.8	11.4	85.3	—	27.8
45–54	31.0	51.1	10.5	70.9	66.5	38.7
55–64	25.3	53.2	11.9	69.2	67.7	39.1
65–74	25.4	49.5	10.8	65.0	70.7	26.5
≥75	18.8	38.0	5.5	47.8	57.8	20.1
<65	29.2	51.6	11.4	72.6	67.3	37.3
>65	24.8	45.6	9.5	59.1	66.0	24.1
White men						
<45	54.0	54.1	18.8	93.0	70.0	45.8
45–54	54.3	60.7	14.5	89.0	77.3	44.1
55–64	49.8	61.3	13.5	85.6	82.3	34.1
65–74	52.3	62.6	11.4	82.4	84.9	25.0
≥75	57.9	58.0	7.9	73.0	76.2	13.3
<65	51.8	60.4	14.1	87.3	81.6	37.7
>65	53.9	60.9	10.3	79.0	81.2	20.5

From Reis et al. (3).

diagnosed with this type of cancer than among whites (Tables 3,4). The higher incidence among whites is primarily due to excess localized tumors, whereas the incidence of more advanced tumors is similar among both racial groups (60). These data suggest that whites are more likely to be diagnosed with conditions that go undetected among African Americans and are less likely to progress to more extensive disease. Among both African Americans and whites in one large case–control study, smoking accounted for most of the bladder cancer risk (48 and 43%, respectively) (60). Workers in high-risk occupations involving exposure to dyes, rubber, leather, ink, or paints accounted for 22% of cases among African Americans and 28% of cases among whites. History of bladder infection was linked to approximately twice as much disease among African Americans as whites (15% compared to 8%).

Multiple Myeloma

There are approximately 12,700 new cases and 9800 deaths from multiple myeloma

annually in the United States (Table 1) (3). The incidence and mortality of multiple myeloma are approximately 2-fold greater among African Americans than whites. With a largely unknown etiology and the highest world-wide incidence rates occurring among African American African descendants, investigators struggle to identify risk factors (61). Studies of occupational exposures (62), human leukocyte antigens (63), and chronic antigenic stimulation (64) have not been found to explain the disparities between African Americans and whites.

Conclusion

Available data suggest that there continue to be differences by race in the incidence and mortality for common types of cancers. Studies of these patterns suggest etiologic factors and have led to the identification of probable causes. These factors, however, generally fail to satisfactorily explain the racial differences in incidence and mortality rates. This may be due to the inappropriate use of race and ethnicity as surrogates for

social and economic status. It may be easier to use race as a surrogate for social and economic status than to identify a person of color who has limited resources, lives in a substandard residential environment, works in a high-risk occupational setting, or is a single parent exposed to multiple risk factors—psychological, physiological, or both. Focusing on the poor surrogate of race, however, may limit the sensitivity of our research.

There are racial biologic variations and within-race individual differences, both inherited and acquired. These differences may modify various phases of the multi-stage process of carcinogenesis such as the capacity to convert procarcinogens to carcinogens, to detoxify carcinogens, and to repair DNA. Future progress in untangling the multifactorial dimensions of African American/white differences in cancer burden must move beyond traditional epidemiologic methods. Cancer risk characterization must include more emphasis on biological evaluation of qualitative inter-individual differences in susceptibility. This approach can be enhanced by significant advances that have been achieved in the molecular, genetic, and biologic aspects of the more common types of cancers.

The intense activity of those studying the molecular and genetic aspect of human cancer undoubtedly will generate further advances in the identification and characterization of cancer risk. Thus, it does not seem overly optimistic to suggest that approaches that combine clinical, epidemiological, and molecular research ultimately will illuminate more clearly the primary and secondary determinants of racial/ethnic differences in cancer incidence and mortality. The results of this research in conjunction with lifestyle changes, socioeconomic parity, and environmental equity, has the potential to bring about the most effective prevention and control strategies to relieve African Americans of their disproportionate share of the cancer burden.

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