Research Article

Cancer Epidemiology, Biomarkers & Prevention

White–Black Differences in Cancer Incidence, Stage at Diagnosis, and Survival among Adults Aged 85 Years and Older in the United States

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Abstract

Background: Increased life expectancy, growth of minority populations, and advances in cancer screening and treatment have resulted in an increasing number of older, racially diverse cancer survivors. Potential black/white disparities in cancer incidence, stage, and survival among the oldest old (≥85 years) were examined using data from the SEER Program of the National Cancer Institute.

Methods: Differences in cancer incidence and stage at diagnosis were examined for cases diagnosed within the most recent 5-year period, and changes in these differences over time were examined for white and black cases aged ≥85 years. Five-year relative cancer survival rate was also examined by race.

Results: Among those aged ≥85 years, black men had higher colorectal, lung and bronchus, and prostate cancer incidence rates than white men, respectively. From 1973 to 2012, lung and bronchus and female breast cancer incidence increased, while colorectal and prostate cancer incidence decreased among this population. Blacks had higher rates of unstaged cancer compared with whites. The 5-year relative survival rate for all invasive cancers combined was higher for whites than blacks. Notably, whites had more than three times the relative survival rate of lung and bronchus cancer when diagnosed at localized (35.1% vs. 11.6%) and regional (12.2% vs. 3.2%) stages than blacks, respectively.

Conclusions: White and black differences in cancer incidence, stage, and survival exist in the ≥85 population.

Impact: Continued efforts are needed to reduce white and black differences in cancer prevention and treatment among the ≥85 population. *Cancer Epidemiol Biomarkers Prev; 25(11); 1517–23. ©2016 AACR.*

Introduction

Cancer is predominately a disease of the elderly, with over half of all newly cancer diagnoses and almost three quarters of cancer-related deaths occurring in patients older than 65 years (1). Demographic projections indicate that within the elderly population, the oldest old, defined as people aged 85 years and older (hereafter, referred to as ≥85 years), is the fastest growing segment of the U.S. population (2). Increased life expectancy and advances in cancer screening have resulted in an increasing number of cancer diagnoses in the ≥85 population. In 2008, within the United States, approximately 7% of all cancers diagnosed and 14% of cancer-related deaths occurred in patients ≥85 years (3). By 2030, the ≥85 population is projected to represent 9% of new cancer cases and 23% of the cancer-related deaths in the United States (3). Along with the increasing cancer incidence and mortality rates among this growing population, the future cohort of the ≥85 population will be more racially diverse than the current ≥85 population (4). In the United States, racial minority populations are expected to increase from 83 million in 2000 to 157 million in 2030 and experience a more than 100% increase in cancer incidence by 2030 (4). These demographic and clinical changes will undoubtedly have a profound impact on cancer prevention and treatment (5).

The changing population demographics in the United States emphasize the urgency of awareness and elimination of cancer disparities among the ≥85 population. Previous studies have identified strategies to reduce white and black differences in cancer including community-based outreach and education (6–8), improved access to health services (9–11), and increased diversity of participants in clinical trials (12, 13). However, the ≥85 population has not been well studied in this context. A few studies (3, 14, 15) have reported cancer incidence rates among the ≥85 population in the United States; however, none have examined cancer disparities in this population. More research is needed to examine cancer disparities by race because racial minorities have disproportionally higher prevalence, incidence, and mortality rates of cancer and lower cancer survival probabilities compared with whites (16, 17). This study sought to identify potential white and black differences in cancer incidence rates, stage at diagnosis, and survival probabilities among individuals aged ≥85 using data from the Surveillance, Epidemiology, and End Results (SEER) Program of the National Cancer Institute. The hypothesis tested was that there would be a continuation of cancer disparities between whites and blacks in the ≥85 population as evidenced in several studies on younger cohorts. If this hypothesis is confirmed, these results may assist in the allocation of resources to reduce cancer disparities among individuals aged ≥85 years.

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Materials and Methods

Data from the National Cancer Institute's SEER database were used for these analyses. SEER is a collection of 18 high-quality population-based cancer registries with very high estimated completeness of reporting. These registries capture data covering approximately 30% of the U.S. population (18). All data were publicly available, de-identified, and exempted from Institutional Review Board review.

White and black adults, regardless of ethnicity, aged ≥85 years diagnosed with invasive colorectal, lung and bronchus, breast (females only), and prostate cancer were included in analyses pertaining to incidence and survival rates. For analyses pertaining to stage at diagnosis, *in situ* cancers were also included. Because it was not feasible to examine incidence, stage at diagnosis, and survival for all of the 23 SEER groupings of cancer sites/types in the scope of this effort, we selected the four most common cancers which represent nearly half (46%) of invasive cancers among those aged ≥85 years.

Using SEER*Stat statistical software (version 8.2.1; National Cancer Institute), differences in cancer incidence and stage at diagnosis were examined among whites and blacks for cases diagnosed from 2008 to 2012, and changes in incidence over time were examined for cases diagnosed from 1973 to 2012. For comparisons of 2008–2012 data (incidence and stage at diagnosis), 18 SEER registries were used (19). For comparisons of trends in incidence rates from 1973 to 2012, data from the original nine SEER registries were used (20). For comparisons of relative survival rates (19), 18 SEER registries were used. All cancer incidence rates were age-adjusted using the 2000 U.S. standard population (19 age groups—Census P25-1130). For sex-specific cancers (female breast, prostate), rates were calculated using denominators that were sex specific.

For stage at diagnosis, "derived SEER summary stage (2000)" was used to determine the proportion diagnosed late stage. Proportions were used to ascertain potential differences in stage at diagnosis. Five-year relative cancer survival rates for invasive colorectal, lung and bronchus, breast, and prostate cancers were examined for whites and blacks, regardless of ethnicity among those ≥85 years and diagnosed from 2005 to 2011. Years selected above for incidence, stage at diagnosis, and survival rates were chosen because they are the most recent years available and to be consistent with years included in summary statistics reported in the Cancer Statistics Review (18).

Results

There were 148,383 white and black men and women aged ≥85 years diagnosed with invasive cancer in the 18 SEER registries from 2008 to 2012. Of the 148,383 white and black adults ≥85 years with cancer, 68,675 were diagnosed with one of the four cancer sites of interest: 21,104 (30.7%) individuals were diagnosed with colorectal, 21,781 (31.7%) with lung and bronchus, 16,184 (23.6%) breast (women only), and 9,606 (14.0%) with prostate cancer within this population. Of these patients, 63,331 (92.2%) were white and 5,344 (7.8%) were black.

Incidence

Among whites and blacks, regardless of ethnicity, aged ≥85 years, the highest age-adjusted cancer incidence rates per 100,000 individuals were for colorectal (364.9), lung and bronchus (321.5), breast (256.1), and prostate (181.7) cancers from 2008 to 2012. Figure 1 shows that the incidence of invasive colorectal, breast, and prostate cancer declined (with the exception of increased incidence of prostate cancer from 1988 to 1991, likely due to increases in screening) among white and black adults 85 years and older from 1973 to 2012. In contrast, lung and bronchus cancer incidence among white and black adults aged ≥85 years increased steadily over these years, until stabilizing and decreasing in the last few years.

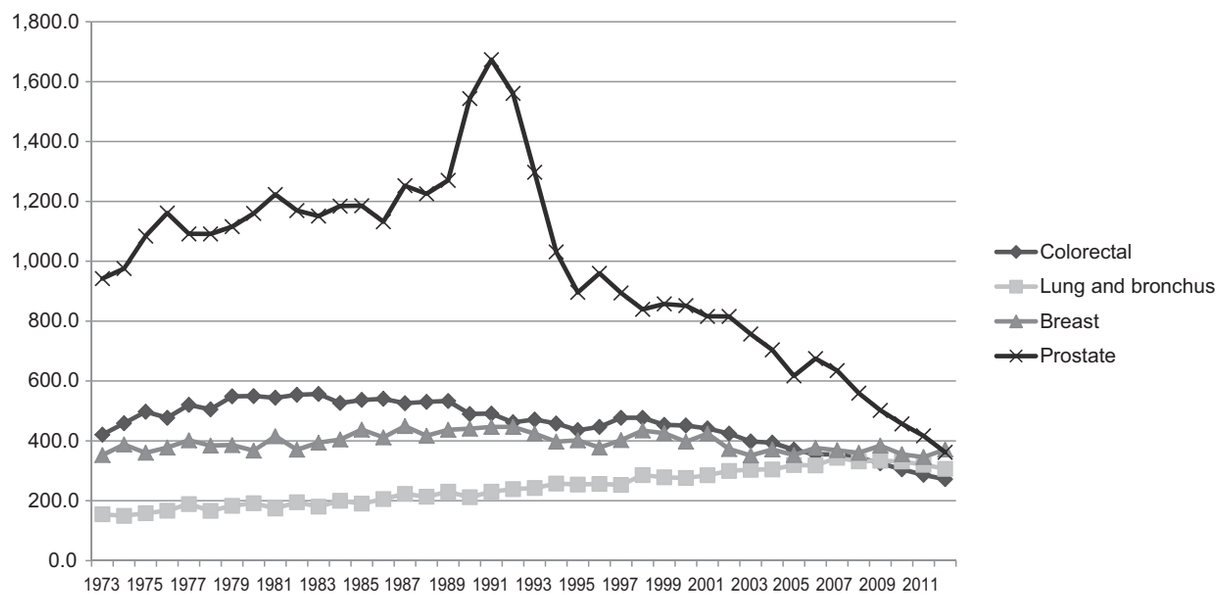

Figure 1.
Incidence trends of colorectal, lung and bronchus, breast, and prostate cancer among men and women aged ≥85 years, 1973–2012.

Figure 2A to D shows the incidence trends of invasive colorectal, lung and bronchus, breast, and prostate cancer among white and black adults aged ≥85 years from 1973 to 2012. Specifically, from 1973 to 2001 and 2009 to 2012, white men had higher incidence rates of colorectal cancer than black men. In 2002 to 2008, black men aged ≥85 years had higher colorectal cancer incidence rates than white men. During more than half of the years from 1973 to 2012, black adults aged ≥85 years had higher lung and bronchus cancer incidence rates than white adults. From 1973 to 1995, white women had higher incidence rates of breast cancer than black women. However, in 1995, 2005 to 2008, and 2012, black women aged ≥85 years had higher breast cancer incidence rates than white women. Finally, with the exception of 1973 and 1980, black men aged ≥85 years had higher prostate cancer incidence rates than white men from 1973 to 2012.

Stage at diagnosis

Cancer stage at diagnosis among men and women aged ≥85 years differed between whites and blacks. White men and women had earlier staging (e.g., *in situ*, localized) for colorectal, lung and bronchus, and breast cancers compared to black men and women aged ≥85 years. Black adults aged ≥85 years had higher proportions of regional stage lung and bronchus (17.6% vs. 16.5%), and breast (24.8% vs. 22.1%) cancers compared with whites. Black adults aged ≥85 years had higher proportions of distant stage colorectal (20.2% vs. 16.7%), lung and bronchus (50.6% vs. 49.7%), and breast (7.3% vs. 6.5%) cancers compared to whites. Finally, blacks aged ≥85 years had higher proportions of unstaged/missing stage colorectal (17.7% vs. 14.1%), breast (9.7% vs. 8.7%), and prostate (30.3% vs. 23.7%) cancers compared with whites (Fig. 3A–D).

Survival

The 5-year survival rate for all invasive cancers combined was higher for whites than blacks in this age group [43.2% (95% CI, 42.6–43.7) vs. 32.1% (95% CI, 30.4–33.8), not shown in figures]. Figure 4 shows that survival rates for colorectal cancer diagnosed at localized [83.0% (95% CI, 79.6–85.9) vs. 67.8% (95% CI, 57.3–76.2)] and regional [60.7% (95% CI, 57.6–63.5) vs. 51.8% (95% CI, 41.2–61.5)] stages were higher for whites than blacks, respectively. Whites had more than three times the survival rates of lung and bronchus cancer diagnosed at localized [35.1% (95% CI, 31.2–39.0) vs. 11.6% (95% CI, 4.4–22.5)] and regional [12.2% (95% CI, 9.8–14.7) vs. 3.2% (95% CI, 0.8–8.8)] stages than blacks, respectively. White women had higher survival rates of breast cancer diagnosed at localized [100.0% (95% CI, 100.0) vs. 80.0 (95% CI, 67.7–88.0)], regional [65.8% (95% CI, 61.5–69.7) vs. 45.3% (95% CI, 34.1–55.8)] and distant [17.7% (95% CI, 13.6–22.2) vs. 5.4% (95% CI, 0.5–20.1)] stages than black women, respectively. Finally, white men had higher survival rates of prostate cancer diagnosed at localized [100.0% (95% CI, 100.0) vs. 99.6% (95% CI, 66.1–100.0)], regional [70.2% (95% CI, 54.6–81.3) vs. 68.3% (95% CI, 34.0–87.4)], and distant [16.5% (95% CI, 13.3–20.1) vs. 13.1% (95% CI, 7.0–21.2)] stages than black men. White men had a higher survival rate for prostate cancer among those with unstaged cancers or missing stage [44.8% (95% CI, 38.9–50.6) vs. 39.6% (95% CI, 26.4–52.4)] compared with black men.

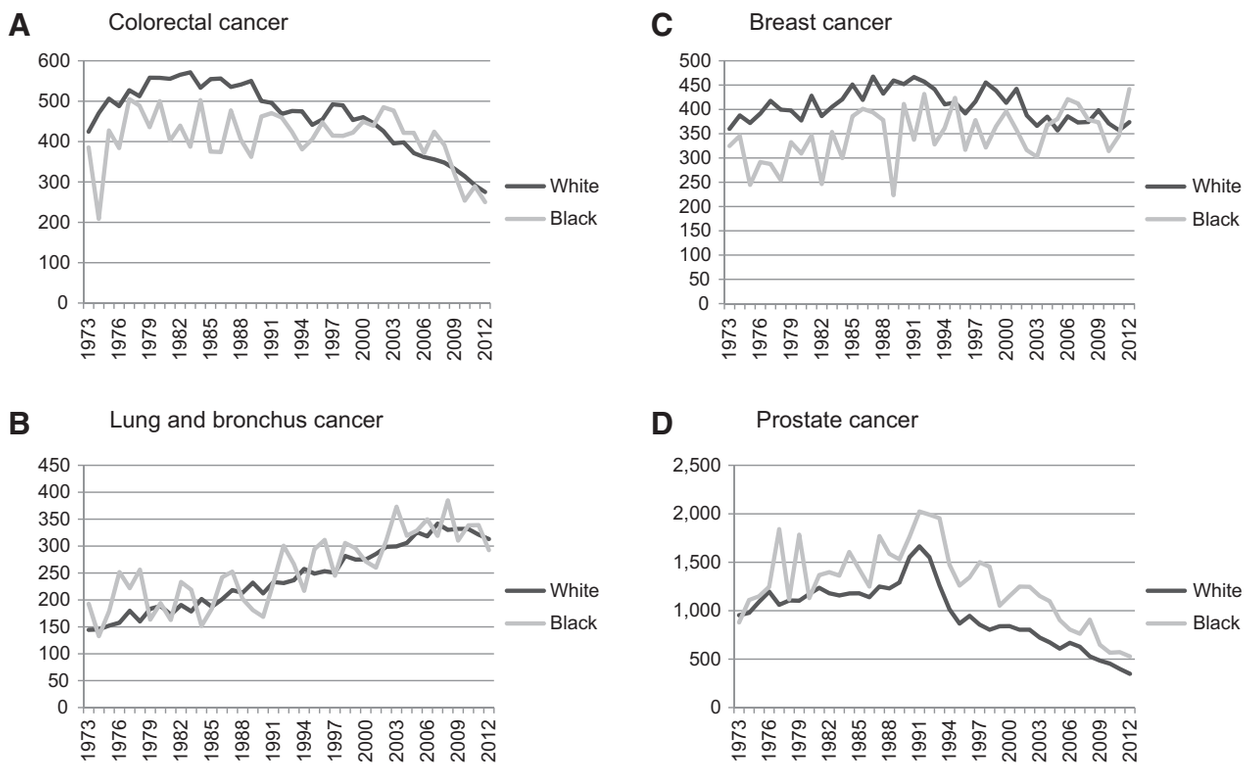

Figure 2.
Incidence trends of colorectal, lung and bronchus, breast, and prostate cancer among white and black adults aged ≥85 years, 1973–2012.

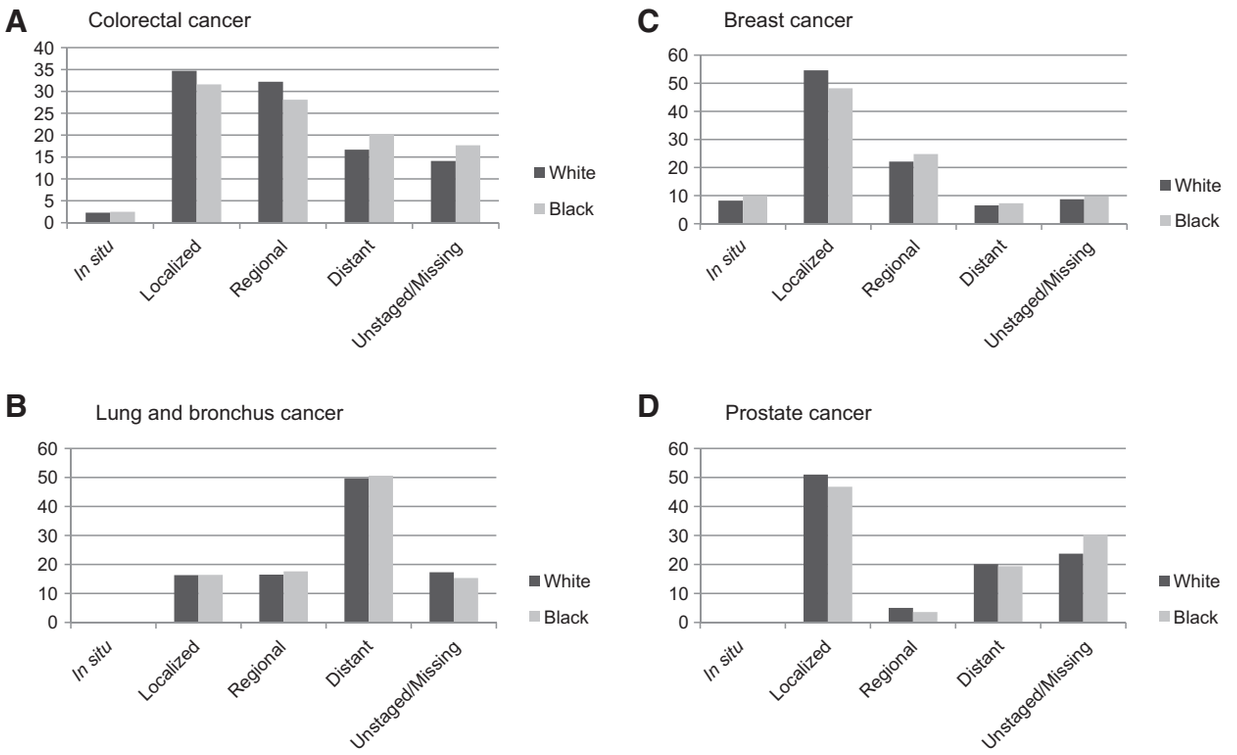

Figure 3.
Cancer staging among white and black adults aged ≥85 years, diagnosed 2008 to 2012.

Discussion

This study sought to identify the presence of disparities in cancer incidence, stage at diagnosis, and survival between white and black adults aged ≥85 years regardless of ethnicity. Results demonstrate continued white and black differences across the cancer continuum among the fastest growing age group of the U.S. population. The most striking difference was that the 5-year relative survival rate for all invasive cancers was considerably higher for whites than blacks in this age group.

Survival disparities may be the result of inequalities in access to and receipt of quality health care and differences in comorbidities and socioeconomic status influencing treatment options and survival (21–23). This study found that black adults were less often diagnosed with localized stages of colorectal, breast, and prostate cancer, when early treatment results in more successful outcomes. Other factors such as aggressiveness of treatment by race and age may contribute to the overall survival of adults aged ≥85 years. Several studies (14, 24, 25) have found that aggressiveness of cancer treatments decreases with increasing age. For example, a study by Schonberg and colleagues (14) reported that women aged ≥80 years with breast cancer characteristics and health status similar to those of younger women received less aggressive treatment and experienced higher mortality from early-stage breast cancer. A number of studies (17, 26–29) have also reported significant racial inequities in the recommendation and dissemination of cancer treatments. Gross and colleagues (28) found continued white and black differences in cancer therapy between white and black Medicare beneficiaries from 1992 to 2002. Reducing the influence of nonclinical factors on the receipt of cancer treatment may be an important strategy to reduce white and black differences in cancer survival (30).

As demonstrated in this study, black adults aged ≥85 years were diagnosed at more advanced stages of invasive colorectal, lung and bronchus, and breast cancer compared with whites. A number of studies (31–34) have reported white and black differences in staging with black adults more likely to present with advanced-stage disease compared to whites even after accounting for tumor grade, histology, insurance status, and/or age. Differences in stage at diagnosis have thought to be primarily caused by the underutilization of cancer screening among racial minorities (27, 29, 30).

The question remains if cancer screening is beneficial for adults aged ≥85 years. This cannot be easily answered due to several reasons, including the lack of representation of the ≥85 age group in screening effectiveness studies and different screening guidelines (35, 36). For example, the American Cancer Society (ACS) recommends that "screening mammography should continue as long as a woman is in good health and is expected to live 10 more years or longer (37)." In contrast, the current U.S. Preventive Services Task Force guidelines do not recommend screening mammography after the age of 74 years (38). Some recent studies have indicated that the same benefits of mammography detection observed in younger women extend to older women (36, 39–41). Similar to the ACS guidelines, the growing consensus from the literature stresses the importance of considering the individual's

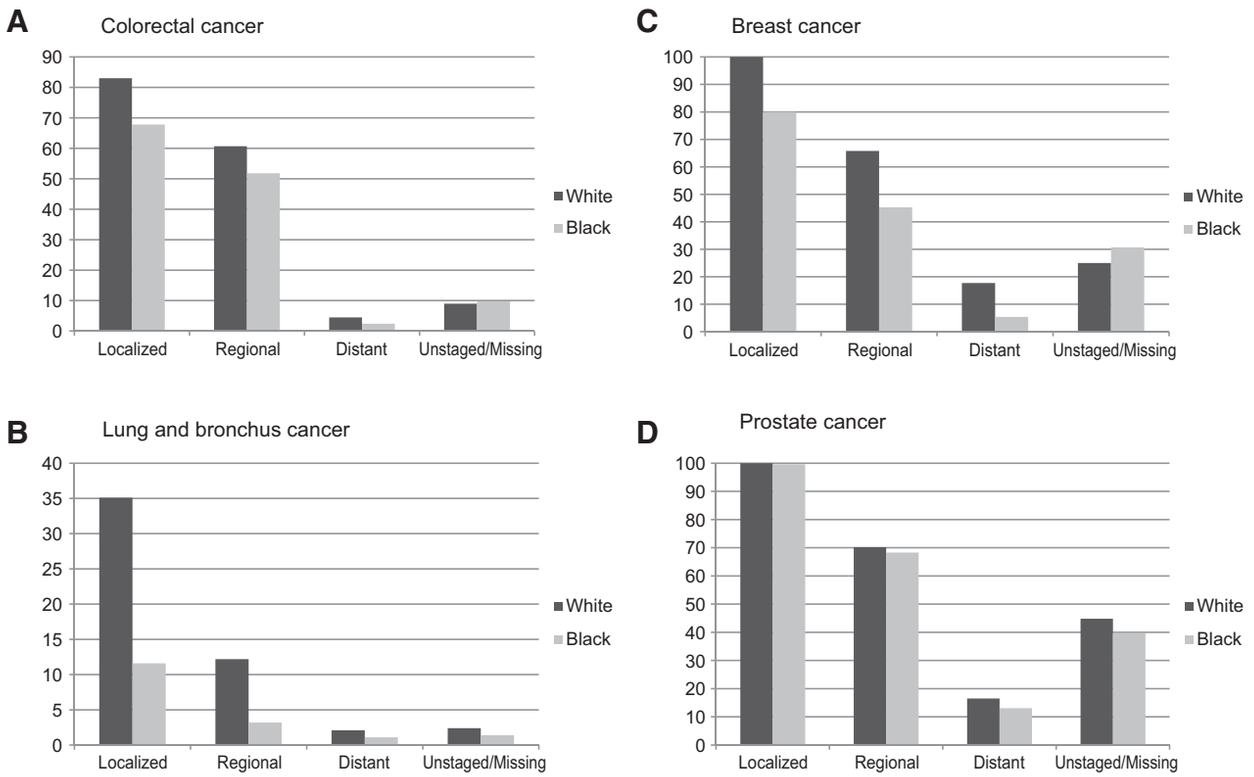

Figure 4.
Five-year relative survival rate for selected invasive cancers by stage at diagnosis, among white and black adults aged ≥85 years and diagnosed 2005 to 2011.

particular combination of functional status, personal preferences and goals, comorbidities, and life expectancy (35, 39).

This study also found higher prevalence of blacks with unstaged cancers or cancers with missing stage at diagnosis for the four main cancer types compared with whites, as suggested by results from previous studies (42–44). For example, Klasen and colleagues (43) found that patient characteristics of being older and black increased the likelihood of having unstaged/missing data. Black elderly patients may not consent to a diagnostic workup based on several factors such as fear, limited financial resources, and lower levels of health insurance and health care access, resulting in higher prevalence of unstaged/missing data (26, 43, 45). Furthermore, healthcare centers primarily treating black and older patients may have greater barriers to reporting due to limited resources (26, 29). Future research on the reasons why there are differential levels of staging between whites and blacks and the associated barriers to cancer staging is warranted to have all cancers properly staged.

Our findings corroborate those of previous studies (16, 22) that have shown higher cancer incidence rates among black compared to white adults, with the exception of breast cancer. Results from this study show, in 1995, 2005–2008, and 2012, black women aged ≥85 years had higher invasive breast cancer incidence rates than those for white women, contrasting with previous research that found white women aged 40 years and older had higher rates of invasive breast cancer incidence (22, 46), which is partially attributed to higher rates of mammography use in white women (47). However, the ACS found that in 2013, 66% of both white and black women 40 years and older had a mammogram in the past 2 years (46). Despite these generally equivalent rates of mammography, white and black differences in stage at diagnosis remain, as evidenced by this and previous studies (48–50), with older black women being diagnosed at later stages compared with older white women.

Invasive lung and bronchus cancer incidence increased over time among this population with slight decreases from 2010 to 2012. One potential reason is that adults aged ≥85 years were part of a generation of Americans that had the highest smoking rates. For example, in the mid-1960s, approximately 54% of men were smokers and 21% were former smokers (51). Since 1965, the prevalence of current smoking among older adults has declined as smoking cessation rates have increased (51). In 2014, 8.5% of older adults aged ≥65 years smoked compared with 16.7% of 18- to 24-year-olds, 20.0% of 25- to 44-year-olds, and 18.0% of 45- to 64-year-olds (52). More research is needed to explore the history and current smoking behaviors among adults aged 85 years and older.

Given the growth of this increasingly diverse population and cancer disparities within it, there is urgent need for more research in geriatric oncology. Furthermore, more effort is needed to increase recruitment of older minorities in cancer clinical trials to improve understanding of black/white differences in cancer biology, effectiveness of cancer therapy, and normal tissue response to cancer therapy (3). Additional research is also needed to better understand factors associated with race- and age-related survival disparities among the cancer patient population.

From a clinical perspective, there is a need to increase access to new treatments and ensure guideline-recommended treatments are received by all racial groups in the aged ≥85 years population. Moreover, it would be important to include the reduction of white and black differences into a larger quality improvement framework in that all patients would benefit from greater attention to measuring and improving quality of cancer care (28). Recognizing that differences in cancer care quality may be correlated to age, race, socioeconomic status, and health care system factors may assist policy makers in identifying strategies to more equally distribute clinical expertise and health infrastructure for the population aged ≥85 years.

Limitations

Our study has several limitations. Because this study uses surveillance data, there is the potential for residual confounding factors for which we do not have data, such as physical functioning, frailty, and social support. Also, the SEER dataset does not have comorbidity data. The linked SEER-Medicare dataset would supply more information about the participants; however, the study goal was to determine the presence of cancer disparities between white and black older adults. We did not examine ethnicity in this study; thus whites and blacks included Hispanics. Future research should consider including other racial groups such as Asian Americans and ethnic groups such as Hispanics/Latinos who suffer disproportionally from cancer to better identify potential cancer disparities by race and ethnic groups compared with whites (16). Finally, it was not possible to examine changes in potential disparities in mortality rates by race over time, as race-, sex-, age-, year-specific mortality rates are not routinely published or easily available.

Conclusion

This study found white–black differences in cancer incidence rates, stage at diagnosis, and survival probabilities among adults aged ≥85 years using SEER data. We demonstrated that white and black differences, previously determined in younger patient populations, exist in this fastest growing age group of the U.S. population. Better ways to reduce white and black differences in cancer prevention and treatment among this population are urgently needed.

Disclosure of Potential Conflicts of Interest

No potential conflicts of interest were disclosed.

Authors' Contributions

Conception and design: J.L. Krok-Schoen, J.L. Fisher
Development of methodology: J.L. Krok-Schoen, J.L. Fisher
Acquisition of data (provided animals, acquired and managed patients, provided facilities, etc.): J.L. Fisher, E.D. Paskett
Analysis and interpretation of data (e.g., statistical analysis, biostatistics, computational analysis): J.L. Krok-Schoen, J.L. Fisher
Writing, review, and/or revision of the manuscript: J.L. Krok-Schoen, J.L. Fisher, R.D. Baltic, E.D. Paskett
Study supervision: E.D. Paskett

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