SA–CME Information

Disparities in Lung Cancer for Black Patients in the U.S.: An Overview of Contributing Factors and Potential Strategies for Radiation Oncologists to Bridge the Gap

Description

This review article describes key factors that contribute to lung cancer disparities for Black patients and discusses strategies and future directions for radiation oncologists to bridge the gap. Topics discussed are contributing factors for disparities in lung cancer incidence, disparities in lung cancer prevention, disparities in lung cancer treatment and outcomes, and potential strategies to overcome barriers.

Learning Objectives

After completing this activity, participants will be able to:

1. Understand the roles that socioeconomic status, smoking, genetics, and resilience factors play in contributing to disparities in lung cancer incidence in Black/African American individuals
2. Understand how current lung cancer prevention strategies and disparities in treatment lead to worse outcomes for Blacks with lung cancer
3. Adopt strategies in the clinic to reduce cancer disparities and address barriers to social equity

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Disparities in Lung Cancer for Black Patients in the US: An Overview of Contributing Factors and Potential Strategies for Radiation Oncologists to Bridge the Gap

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The tragic death of George Floyd from asphyxiation has fueled a movement against social injustice and racism that has highlighted inequities that exist in all sectors of the United States. The ongoing coronavirus disease 2019 (COVID-19) pandemic has also increasingly brought to light the disparate health outcomes that exist among racial and ethnic minorities. The field of oncology is not immune to such inequities, as racial and socioeconomic factors play a pivotal role in cancer control.

Black individuals comprise 13% of the United States population and assume a disproportionate burden of cancer with the worst outcomes of all racial and ethnic groups for most cancers.[1,2] Lung cancer is the second most common cancer in the United States.[3] Black men are approximately 15% more likely to develop lung cancer compared to White men and have the highest lung cancer mortality of all racial and ethnic groups.[4,5] Lung cancer in the Black population is a multifactorial problem and to reduce such disparities, an understanding of all contributing variables in cancer prevention, diagnosis, and treatment is imperative. Furthermore, the care of lung cancer patients is multidisciplinary, and radiation oncologists play an important role in delivering individualized care. This review article provides background on key factors that contribute to lung cancer disparities for Black patients and discusses strategies and future directions for radiation oncologists to bridge the gap.

Contributing Factors for Disparities in Lung Cancer Incidence

Socioeconomic Status

Socioeconomic status (SES), which is strongly correlated with race in the United States, is the most critical driving force for lung cancer disparities.[2,5] Household income and education status are key determinants of SES. In 2018, the poverty rate for Blacks (20.8%) was more than double that of Whites (8.1%), and in 2019, 26.1% of Blacks vs 40.2% of Whites had obtained at least a 4-year college degree.[2,5-7] Individuals with a lower SES encounter several barriers to accessing health care due to difficulties obtaining adequate health insurance coverage, which frequently contributes to more advanced cancer diagnoses and a higher risk of cancer death.[2,5,8-10] In 2019, 10.1% of Blacks were uninsured compared to 6.3% of Whites, although notable strides by the passage of the Patient Protection and Affordable Care Act in 2010 and the expansion of Medicaid reduced the number of uninsured Blacks by 50%.[2,11] However, healthcare in the United States remains in flux, and the accessibility of health care in the future remains uncertain, which in turn may disproportionally affect the Black community.

The interaction of SES with race/ethnicity, gender, and tobacco use is complex. It is well established that patients in lower socioeconomic brackets smoke more; however, studies have shown that despite matching for socioeconomic status, Blacks still have a higher incidence of lung cancer.[12-14] Interestingly, the increased lung cancer mortality rate in Blacks vs Whites is most pronounced when examining only males at higher education levels, likely because this is one of the only subcategories where Blacks actually have higher smoking rates than Whites.[15] On the other hand, Black

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women are less likely to smoke than White women for every SES level.[16]

Smoking

As smoking is one of the strongest risk factors for lung cancer development, differences in smoking exposure could potentially lead to the observed disparities in lung cancer incidence and outcomes in Black patients. Blacks diagnosed with lung cancer tend to be light or intermittent smokers that start smoking later in life. However, when matching smoking rates across racial groups, Blacks still have a higher lung cancer incidence, suggesting that Blacks are more susceptible to lung cancer at lower levels of tobacco use.[17,18] Furthermore, racial, ethnic, and generational trends in smoking are constantly evolving and the prevalence of smoking depends on the age at which it is measured. For example, Whites are more likely to be current smokers up to age 50, after which Blacks have a higher smoking prevalence; in addition, the intensity of smoking varies between Blacks and Whites, with Blacks being more likely to be lower-intensity, longer-duration smokers.[19] Cigarette preferences are also different among Black vs White smokers as approximately 70% to 85% of Blacks vs 20% to 30% of Whites use mentholated cigarettes that counter the irritant toxins of the tobacco product.[20] It is theorized that mentholation may affect individual smoking behavior and thereby potentially increase cancer risk.[21]

Segregation and other geographic factors are also important influencers of smoking habits. Segregated neighborhoods where living conditions are challenging impose additional stressors on those living within them, thereby facilitating the onset of smoking, making smoking cessation more difficult, and deterring individuals from seeking medical care or adhering to treatment regimens.[16]

Genetics

To date, no genetic mutations specific to Black people have been identified as a risk factor for lung cancer; in fact, African-born Black men and women were found to have an approximately 65% lower frequency of lung cancer compared with Blacks born in the United States.[22] Although some heterogeneity in cancer incidence has been documented between regions of birth in Africa, additional studies are warranted to compare the rate of lung cancer in Blacks, Whites, and native Africans.[22] Kytola et al examined tumor genomics and found a significantly higher mutation rate in the *TP53* gene in the Black patient subgroup, suggesting that genomic instability caused by tobacco may contribute to cancer outcome disparities among different racial/ethnic groups.[23] Other studies have proposed that racial differences in nicotine metabolism may add to the observed disparities in lung cancer incidence. Although the link to malignancy has not been clarified, it has been shown that Blacks have higher circulating levels of urinary and blood cotinine concentration; cotinine is a major metabolite of nicotine, as more than 70% of nicotine is converted to cotinine by the CYP2A6 enzyme.[24]

Resilience Factors

Protective resources and coping mechanisms may potentially mitigate the negative effects of risk factors for developing lung cancer. Higher levels of religious engagement by Black women compared to White women may partially explain why Black women have a lower smoking rate.[16] A study by Alexander et al showed that Black adolescents have significantly stronger religious beliefs against smoking than do White adolescents, although the protective effect of religious beliefs on initiating smoking was stronger for Whites than for Blacks.[25]

Disparities in Lung Cancer Prevention

Currently, the U.S. Preventive Services Taskforce (USPSTF) has drafted new lung cancer screening criteria using low-dose computed tomography (LDCT) for adults ages 50 to 80 years with a 20 pack-year smoking history and who either smoke or quit within the last 15 years.[26,27] These recommendations were formed based on the findings of the National Lung Screening Trial (NLST), in which a 20% reduction in lung cancer mortality was found in those screened with LDCT vs chest x-rays in a largely White cohort with < 5% of Black patients included. The recommendations were recently modified in draft form in 2020 based on the results of a USPSTF-commissioned systematic review.[26,28]

Blacks are typically diagnosed with lung cancer at earlier ages compared to Whites; for example, Black men between ages 40 and 54 are two to four times more likely than White men to develop lung cancer, even after adjusting for smoking.[29] Furthermore, as noted previously, Blacks with lung cancer often have lower overall tobacco exposure. As age and smoking history comprise the main eligibility criteria for LDCT screening, this may contribute to racial disparities in lung cancer outcomes. A recent study of lung cancer cases diagnosed between 1998 and 2014 found that Blacks were more likely to be deemed ineligible for LDCT screening compared to Whites,[30] although the recently drafted USPSTF guidelines have decreased the smoking age and pack-year requirement, which may help reduce future disparities. Alternatively, an individualized lung cancer risk model has also been proposed that includes additional demographic, clinical, and smoking variables, which would significantly increase eligibility of Blacks for lung cancer screening and reduce mortality as well.[31]

Disparities in Lung Cancer Treatment and Outcomes

The 5-year survival rate for lung cancer is lower for Black patients vs White patients (16% vs 19%) and Black men have the highest lung cancer death rate of any racial or ethnic group.[2] Despite the lung cancer mortality gap, studies

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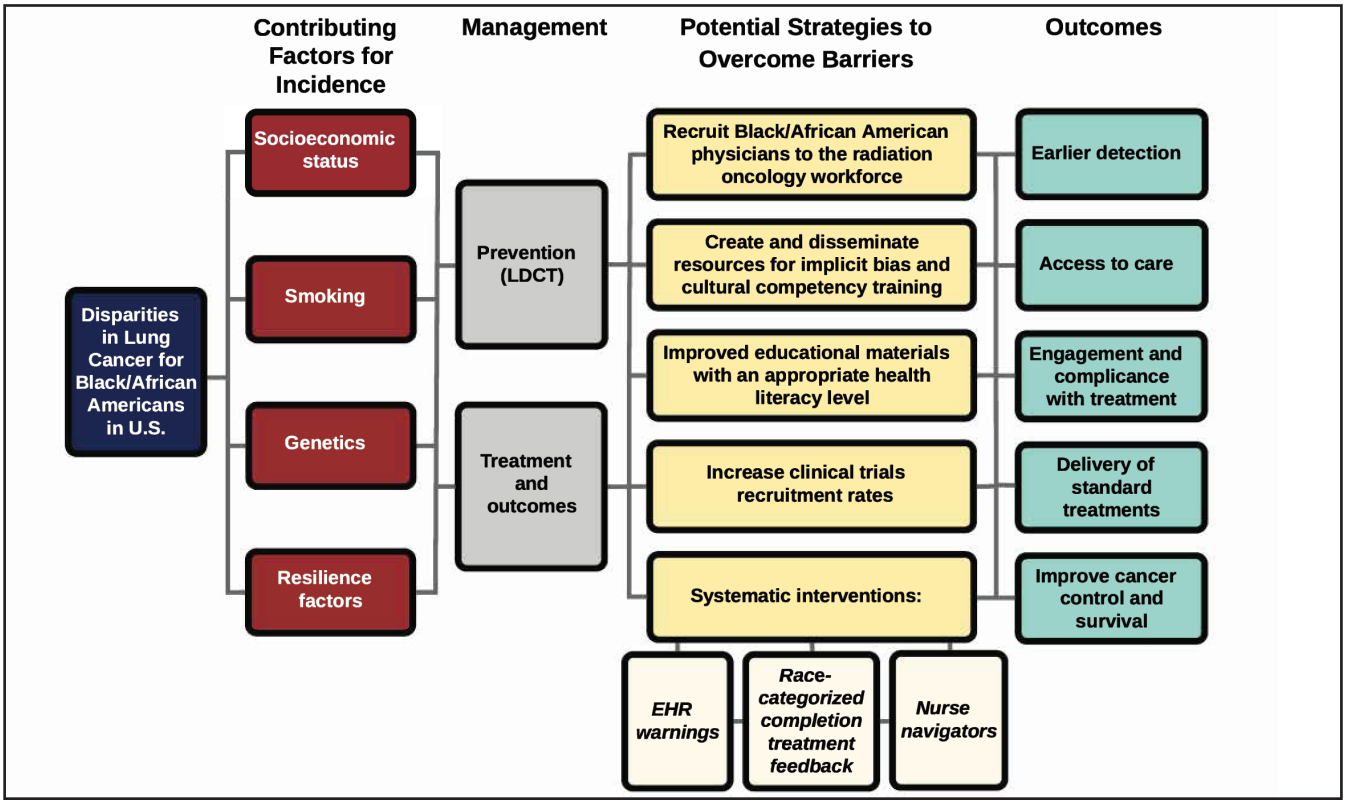

FIGURE 1. *Lung cancer disparities in Black patients is a multifactorial problem across the cancer care continuum. LDCT = low-dose computed tomography; EHR = electronic health record.*

have shown that when access to care is controlled for, much of the racial survival difference disappears.[5] Because over 50% of all lung cancer cases nationwide are diagnosed as either locally advanced or metastatic, where treatments are unlikely to be curative, diagnosing lung cancer early is critical.[4] Blacks are more likely to present with advanced disease, at least partially due to lower socioeconomic status and the corresponding increase in difficulty in accessing appropriate care.[32] Insurance status has also been linked to survival as lung cancer patients with private insurance have higher rates of surgical intervention and overall survival.[4] Nevertheless, access to care does not completely explain the disparity in lung cancer treatment. Even with equal access to care, Black patients are less likely to receive radiation treatment and systemic therapy or undergo surgical resection as compared to White patients, implying that access to high-quality care remains a challenge.[33]

Despite the disparities in lung cancer treatment outcomes for Black patients, the lung cancer incidence for Blacks has been on the decline since 1990, which in turn has coincided with a decline in lung cancer death rates for both Black men and women.[2] The decline in lung cancer death rates are due to the decreased prevalence of smoking, which has been notably more rapid in Blacks than in Whites.[2]

Potential Strategies to Overcome Barriers

Population health strategies for cancer screening and treatment have improved greatly over time; however, an unacceptable health inequity remains. Overcoming disparities in lung cancer is difficult, but data suggest potentially effective strategies can be utilized by radiation oncology departments.

Lack of physician diversity is a potential contributor for disparities, especially when caring for cancer patients.[34] Studies have demonstrated that Black academic faculty are more likely to perform health disparities research than White faculty, and minority physicians are more likely to practice in underserved communities and treat uninsured patients.[35,36] Despite a doubling of Black US graduate medical education trainees from 1984 to 2016, a disproportionate exclusion of Black physicians continues in the radiation oncology workforce.[37] Increased efforts are needed to understand barriers to radiation oncology training for Black physicians in order to develop evidence-based interventions.[37]

A cancer diagnosis is a difficult journey, and many patients find it challenging to understand and navigate the various aspects of care. Patient navigators are trained to offer support and enable completion of cancer workup and appropriate treatment in a timely manner.[38] Studies show that interventions, including use of navigators, can improve the gap in health disparities and are important to improve treatment

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compliance resulting in better outcomes; radiation oncology nurse navigators can play a vital role in facilitating care for minority patients.[39,40]

The attitude and behaviors of health care providers contribute to health disparities.[41] Physicians can look to improve the trust, communication, and overall patient relationships through implicit bias and cultural competency education. Implicit bias is a set of attitudes and beliefs that exist outside of conscious awareness and are difficult to control; prior work has suggested that most health care providers appear to have implicit bias, with a positive attitude toward White patients and a negative attitude toward Black patients.[41] Recognizing these biases and developing appropriate interventions is necessary to deliver equitable care for Black patients. Understanding what influences one's health care decisions is also important, as it opens the door to greater communication and trust, thereby decreasing barriers to health equity. Continuing to expand cultural competency training and education to all areas of health care may help improve racial and ethnic health disparities.[42] Radiation oncology professional organizations have the opportunity to champion significant change by leading the way in developing implicit bias and cultural competency training resources that are accessible to all physicians. Academic centers can also promote change by developing a focused curriculum to address these issues directed toward radiation oncology faculty and residents.

An additional area of improvement is educating lung cancer patients at an appropriate health literacy level. Health literacy is the degree to which individuals have the capacity to obtain, process, and understand basic health information needed to make appropriate health decisions.[43] Low health literacy is associated with a decreased likelihood of seeking cancer information from a health care professional, an increased sense of fatalism about cancer, decreased participation in cancer control programs, later stage of cancer diagnosis, and worsened quality of life.[44] Explaining radiation treatment to patients in simple terms can pose a challenge, and studies have demonstrated that most radiation oncology websites have patient education materials that require a high school graduate's comprehension level.[45] More readable radiation patient education materials that also consider cultural sensitivity need to be developed. Improved patient education materials could increase health literacy and allow for more productive physician-patient interactions.

Clinical trials are vital to advance cancer care, and Black patients are disproportionately not included. The primary barrier for lack of enrollment is medical distrust, although other factors such as dislike of randomization, general lack of understanding of the trial process, and increased costs also exist.[46] Physician barriers to enrollment include needing additional time and resources to potentially enroll minority patients.[46] Prior research has found that initiating an education and tailored support program increased Black enrollment in clinical trials from 9% to 16%, which potentially could be implemented in radiation oncology departments.[47]

Unfortunately, there is a paucity of data overall regarding specific evidence-based interventions that can be implemented in a radiation oncology clinic to improve the disparity that exists for Black patients with lung cancer. Cykert et al examined systemic interventions to reduce the Black-White disparity in patients with early stage lung cancer.[39] They implemented three system interventions – a real-time electronic health record (EHR) warning system, race-categorized provider feedback on their patients' completion of treatment, and a nurse navigator – and followed stage I and II lung cancer patients for five years.[39] After analyzing data from 2,841 patients enrolled in the trial, the researchers showed that these systemic interventions improved the percentage of patients who completed curative treatment (surgery or stereotactic body radiation) for both White and Black patients, while reducing the racial differences in treatment and outcome.[39] Further efforts utilizing technology such as the EHR or mobile applications will be critical to flag patients at risk for not completing treatment and notify providers not offering standard-of-care therapies for a patient based on their documented stage. Additional studies also must be completed to qualify and categorize the barriers that lung cancer patients face with radiation treatments to allow for development of more evidence-based interventions.

Conclusion

Lung cancer disparities in Black patients is a multifactorial problem in all areas of cancer control (**Figure 1**). To decrease disparities, health care providers require a fundamental understanding of the various contributing factors. In the field of radiation oncology, there are many opportunities to help bridge the gap. Recent events have brought to light the dismal impact of systemic racism on the Black community; as radiation oncologists, we can also take a stand against social inequity and work toward reducing cancer disparities.

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