Lung Cancer Disparities in the Era of Personalized Medicine

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Abstract

Widespread disparities by race and socioeconomic status in cancer outcomes are well documented. These disparities exist throughout all areas of the cancer spectrum, spanning screening, diagnosis, and treatments, as well as survivorship and end-of-life care. African-American patients and other racial/ethnic minorities are less likely than white patients to receive stage-appropriate cancer care, including surgery, radiation, and systemic therapy. The impact of personalized medicine on disparities is discussed here, along with a novel community-based intervention to address these disparities.

Key words: lung cancer, disparities, ethnicity, personalized medicine, epidemiology, vulnerable populations

Introduction

Widespread disparities in cancer morbidity and mortality by race and socioeconomic status are well documented. These disparities exist throughout all areas of the cancer spectrum, spanning screening, diagnosis, and treatment, as well as survivorship and end-of-life care. They are seen in multiple cancer types and affect both genders.[1-4] The causes of disparities are multifactorial, encompassing access to care, neighborhood/residential factors, and patient and provider factors. Some studies have focused on trust issues, especially for African Americans, who, it is hypothesized, may perceive the health establishment in a more negative light given past mistreatment, and therefore refuse care at a higher rate.[5-7]

While the preponderance of the published work in disparities discusses African Americans, other studies have reported disparities in other racial and ethnic minorities and in patients with lower socioeconomic status.[8-11] Due to a multitude of factors, patients with the most need have the greatest difficulty accessing high-level tertiary center cancer care.[12-14] Healthcare systems that provide universal access have been shown to attenuate racial and ethnic disparities in treatment, evidence that further supports the important role of income and access in explaining observed differences by race and class.[15,16] Access to high-quality care has particular resonance in the age of personalized medicine because it is no longer just a theoretical possibility, but rather a well-established mode of treatment.

Underserved Patients With Lung Cancer

Oncology treatment has made advancements in personalized medicine in many areas, but the disease that best illustrates the potential challenges for underserved patients is lung cancer. Lung cancer is the leading cause of cancer mortality for both men and women in the United States, with estimates accounting for 159,480 deaths in the year 2013.[17] African-American men have the highest incidence and mortality rate of lung cancer.[18-23] Moreover, African-American patients, both male and female, are less likely than white patients to receive stage-appropriate cancer care, including surgery, radiation, and systemic therapy.[12,21-23,25-30] Reasons for these disparities are multifactorial, with contributions from patients, providers, disease-related factors, as well as the effects of residential segregation.[18,31-33] Socioeconomic status is closely tied to tobacco addiction and to poorer outcomes in lung cancer.[34,35] This creates a situation in which low income increases the risk of lung cancer and increases the risk of dying from lung cancer, presumably from lack of appropriate treatment.[11,36]

Personalized medicine and—specifically for lung cancer—targeted therapy, is relevant for a sizable portion of patients, and there has been little research on lung cancer disparities by race/ethnicity in treatment with the targeted agents.[37-46] Frequencies of other genomically altered therapeutic targets (*EGFR*, *BRAF*, *ALK*, *MET*, *ROS-1*, *ERBB2*) are not well characterized in African-American populations to the same extent as they are in Asian and white populations, and there are even fewer in studies of patients who identify as Latino.[44,47] Indeed, the scope of diffusion of this treatment approach beyond the research centers has not been well characterized. Lynch et al[48] demonstrated a decrease in EGFR mutation testing as distance from National Cancer Institute cancer centers increased. This suggests that the diffusion of personalized medicine might not be making it out of the cancer center and into the communities where underserved

patients reside.

The recruitment of vulnerable patient populations into clinical trials has also been challenging.[49] Approximately 3% to 5% of all adult patients with cancer are on clinical trials, and while there remains some debate about representation by race, the total number of adult patients of color or low socioeconomic status remains small.[50,51] The reason for low enrollment of *underrepresented patients* (defined as lower socioeconomic status, elderly, and racial/ethnic minorities) is likely due to a combination of factors including decreased access to clinical trials and physician triage approaches.[50] As noted by Ford et al,[51] "this lack of diversity in randomized study populations reduces opportunities for discovering effects that may be particularly relevant to underrepresented populations." The lack of data on molecular targets in lung cancer for African Americans is a specific example of this problem.[52]

An Intervention for Improving Outcomes for All

As personalized medicine becomes standard, there is a possibility that cancer treatment outcomes could worsen for underrepresented populations, even as treatments improve for the general population.[53] It is our hypothesis that increasing access to high-quality cancer care, improving relationships, and providing education within the community will remove some of the structural barriers to clinical trial enrollment.

It is with this in mind that we developed an intervention to address the issues of access to high-level cancer care. The details of the intervention are published elsewhere.[54,55] The goal of the intervention is to improve local oncology outcomes for the underserved by facilitating clinical access to preventive medicine, treatment, and clinical trials. The program provides on-site evaluation services by oncologists to vulnerable populations in their community clinics in coordination with their primary care providers, and expedited referrals to the cancer center for patients with an active cancer-related issue.

The intervention is based on a nurse navigation model, with an increased presence of medical oncology clinicians in the community health center setting. Patients are evaluated for the entire spectrum of oncology-related issues, including screening, diagnosis, and survivorship. Acute treatment for malignancy is performed at the cancer center. Certainly, the treatment advances that are developed in research labs, great and small, should be made accessible to the communities most affected by cancer. Far too often, cutting-edge treatment approaches are available solely to those who have the means to obtain them. In order to combat disparities by race/ethnicity and income, more community-based interventions are needed to determine what approaches will increase access to high-level care and improve outcomes for all cancer patients.

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