Eliminating cancer disparities—not only for racial/minority groups but for all underserved populations—must be a priority for those involved in cancer care. For individual practitioners, the first step in addressing disparities is accomplished through understanding the possibility that disparities exist in varying depth and complexity for each racial or ethnic minority patient.

Racial and ethnic diversity is increasing and shifting rapidly in the US population, resulting in unique challenges to the health-care system. As of 2004, Hispanics were the largest minority group, representing approximately 14% (41.3 million) of the total US population.[1] Other groups are increasing in size as well. For example, Asians are increasing at triple the rate of the US population.[2]

Cancer has an impact on racial and ethnic minorities in distinctive ways. For men, African-Americans have the highest cancer incidence and mortality, followed by whites and Hispanics. For women, whites have the highest incidence, but African-Americans have the highest mortality, followed by whites, Native Americans/Alaskan Natives, and Hispanics.[3,4] Disparities between incidence and mortality rates become apparent when details, such as the use of screening/prevention strategies and stage of diagnosis, are considered.

The government has made addressing health-care disparities a priority through the Healthy People 2010 initiative.[5] One of the program goals is the complete elimination of disparities in health care. Accomplishing this goal requires an understanding of existing racial and ethnic disparities. This review begins to unravel some of the causes underlying racial/ethnic discrepancies in cancer care. In order to provide a context for discussion of a broad and diverse topic, this review will highlight breast cancer as a prototype.

### Disparities in Cancer Incidence and Survival

The Surveillance, Epidemiology, and End Results (SEER) program of the National Cancer Institute (NCI) reports substantially lower age-adjusted breast cancer rates for minority women.[4] The incidence rate for white women is 141.1 cases per 100,000, 119.4 for African-Americans, 96.6 for Asian/Pacific Islanders, 89.9 for Hispanics, and 54.8 for American Indians/Alaskan Natives. However, these statistics do not tell the full story of lower screening rates, advanced-stage diagnosis, and increased mortality among these racial/ethnic groups. Differences in mortality between non-Hispanic white women and minorities are most dramatic for African-Americans, whose mortality rate is 34.7 per 100,000 across all age groups. For white women, the mortality rate is 25.9 per 100,000, despite the higher incidence.[4]

Evaluation of SEER data also revealed a 60% increased risk of a stage IV diagnosis in white Hispanic women of South/Central American origin. This risk increased dramatically to 260% for Puerto Rican women.[6] Although Hispanic women faced an increased mortality rate, further analysis suggests regional differences. In New Mexico, which has a large Hispanic population, breast cancer mortality rates have remained relatively stable at approximately 20% of incidence (personal communication, New Mexico Tumor Registry).[7]

### Underlying Factors

What factors account for disparities in breast cancer outcome? Several studies have shown that African-American and Hispanic women tend to be diagnosed with more advanced-stage cancers and are less likely to receive standard of care in a timely manner.[6,8,9] Use of mammography has led to earlier stage at diagnosis, and less frequent use may partly explain the more advanced stage at diagnosis, where chance for cure is reduced. According to the American Cancer Society (ACS), 72.1% of non-Hispanic white women over the age of 40 had received a mammogram in the past 2 years. This rate declines to 68.2% for African-Americans, 62.6% for Hispanics/Latinos, 57.0% for
Asian-Americans, and 52.0% for American Indians/Alaskan Natives.[10] Since ethnic minorities are disproportionately of lower socioeconomic status, the 2005 National Health Disparities Report (NHDR)[11] stratified screening mammography by income and education level to distinguish the effects of race/ethnicity and socio-economic status. Interestingly, after controlling for income, African Americans and Hispanics in the lower income groups were more likely to receive mammography than their white and non-Hispanic white counterparts, respectively. Furthermore, after controlling for education, black high school graduates were more likely to receive mammography than white high school graduates. Failure to receive standard of care in a timely manner or to complete recommended therapy may also account for some of the outcome disparities. In a study by Hershman et al,[12] those who halted treatment early were more likely to die than those who completed treatment. Approximately 31% of African-American women with breast cancer stopped treatment prematurely, and African-American women were more than twice as likely to die from breast cancer as white women (of whom only 23% did not complete therapy). In this study, all the women had health insurance, so continued access to care is less likely to be a deterrent for completing therapy. The reasons for disparity in treatment completion among the racial groups in this study were not elaborated on, but the authors plan to investigate this issue. Other studies corroborate this trend of decrease in treatment among racial/ethnic minority groups when adjusted for socioeconomic status and access to care.[13]

Impact of Socioeconomic Factors and Health-Care Access on Cancer Screening and Treatment

Socioeconomic status has long been thought to play an important role in health-care disparities across a wide variety of diseases. It is closely related to health-care access and acculturation in recent immigrant minority groups. Much of the research in this area related to cancer has focused on differences between African-Americans and non-Hispanic whites. Less data is available for other minority populations including Hispanics and Native Americans.

Breast Cancer in African-Americans

The curious difference between lower breast cancer incidence and higher mortality for African-Americans offers fertile ground for research. Several studies have demonstrated an attenuation of risk when controlled for socioeconomic status. Lannin and colleagues[14] demonstrated a drop from a 3.0-fold (95% confidence interval [CI] = 1.9-4.7-fold) risk of advanced-stage breast cancer in African-Americans compared to white women down to 1.8-fold (95% CI = 1.1-3.2-fold) when adjusted for socioeconomic status. For Hispanic women, Miller et al[15] found that a 50% increase in risk of advanced-stage breast cancer compared to non-Hispanic white women was reduced to a 10% elevation when adjusted for socioeconomic status. One particularly creative study used the Peters-Belson (PB) approach to evaluate discrepancies in cancer screening rates.[16] The PB approach is a complex regression analysis borrowed from social scientists who use it for wage discrimination studies. The model uses covariates that are thought to explain discrepancies between groups and then evaluates how much of the actual difference is explained by the identified variants. In the analysis of cancer screening, the covariates were age, education, income, region of residence, residing in a metropolitan statistical area, health insurance coverage, and having a usual source of care. The model was then applied to the National Health Interview Survey data. With respect to mammography rates, the covariates explained more than the difference between screening rates for non-Hispanic white women compared to both African-Americans and Hispanics. This suggests that without the covariate differences, more minority groups would participate in mammography screening than white women. This finding is consistent with the NHDR data analysis that found higher rates of screening in certain racial and ethnic subgroups. For other screening tests, including those for colon and cervical cancer, the results left differences unexplained, particularly for Hispanic women. These differences might be explained by more intangible factors such as cultural beliefs and misconceptions or they could simply be a result of differing risk factors and comorbidities.

Health-Care Access

While adjustments for socioeconomic status may reduce some of the cancer care disparities among racial/ethnic minorities, discrepancies in screening rates, advanced-stage diagnosis, and mortality are not completely explained by this variable. An additional factor closely related to socioeconomic
status is health-care access. Though related, the two factors demonstrate independent activity. Lower mammography rates and differences in the receipt of timely and adequate breast cancer treatment have been used as surrogates for health-care access. Health insurance is another way to assess health-care access. A lack of health insurance is more common among minority women and has been found to correlate with lower use of screening. One study in Boston found that 16% of individuals with insurance underwent annual mammography during the study period, compared to only 6% of those who lacked coverage.[17] Other studies have approached the access question by looking at differences in relapse rates and survival between racial groups with similar access to care. Du and colleagues[18] addressed this with a population receiving care at the Karmanos Cancer Institute, an NCI-designated Comprehensive Cancer Center affiliated with Wayne State University and the Detroit Medical Center. African-American women were more likely to present with stage III cancer ($P = .001$) and more likely to use Medicaid ($P < .001$) compared to white women. In addition, African-American women consistently had a greater number of comorbidities. When adjusted for these differences, there were no significant differences in treatments and cost of care between the two groups. In addition, the investigators found no differences in outcomes, relapse rates, or periods of disease-free survival.

Taken together, these results suggest that access to care may indeed play a role in the increased mortality experienced by many African-American women with breast cancer. However, other studies have suggested that when comparable care is available, mortality is still higher for African-American women. In such cases, the explanation may rest on other differences, including tumor biology differences. For instance, in the same study by Du et al,[18] African-Americans were more likely to have hormone receptor-negative breast cancer ($P < .001$). Hormone receptor negativity is often associated with a more aggressive tumor behavior compared to hormone receptor-positive breast cancers, which typically have a more indolent course.

**Interventions for Underserved Populations**

Although barriers and facilitators to cancer screening and treatment are multifactorial and have been studied across multiple levels of the socioeconomic framework, few studies have examined ways to employ effective interventions for historically underserved populations. For instance, the effect of patient navigation on mammography utilization is just being studied in racial/ethnic minority populations. One must also consider the impact of whether patients choose to obtain health care from providers of their own race/ethnicity. A recent study found that although African-American physicians account for less than 5% of all physicians in the United States, these physicians provide care for 25% of African-American patients.[19]

If part of bridging the gap in health care among racial/ethnic minorities is access to providers of their own race/ethnicity, the implications are daunting. What measures are needed to increase the number of minority health-care professionals? Beyond training, should the practice of a minority health-care professional be matched to a specific area of similar race/ethnicity? How will such allocation be perceived, accepted, or even accomplished?

**Impact of Cultural Beliefs on Cancer Screening and Treatment**

When working with people from different backgrounds, it is helpful to understand how their culture influences the understanding of a diagnosis and treatment decisions. Although it is difficult to quantify how culture contributes to disparities in cancer care among racial/ethnic minorities, it is not difficult to imagine how it can lead to behaviors that may contribute to observed disparities.

**Fatalism**

Fatalism, the belief of being powerless to change one's fate, is an area of cultural value particularly relevant to cancer screening and treatment. In some racial/ethnic groups, there is a pervasive belief that cancer cannot be cured and that a diagnosis is equal to a death sentence.[20,21] Suarez et al[22] reported that up to 48% of Mexican-American women they surveyed thought their chances of surviving cervical cancer were poor. In the extreme, some Hispanic women did not want to know if they had a diagnosis of breast or cervical cancer, believing that they would not be able to adequately cope.[23] These beliefs led to a lack of willingness to participate in educational programs that offer a gateway to screening.[24] Declines in fatalistic attitude have been seen in US minority populations with increased income, education, acculturation, and understanding of English.[25] One study found that higher-income, more acculturated Hispanic women along the Arizona-Mexico border were significantly ($P = .002$) more likely to have had a mammogram in the past 12 months.[26]
Family Influence

Family structure and hierarchy is another important cultural factor that can have a strong influence on cancer screening and treatment. The impact of this dynamic is not as well studied, but it can play an important role in decision-making. Hispanic women, in particular, are strongly influenced by the opinions and desires of their family members and male partners. Programs designed to increase cancer screening among Hispanic women have found that including family members and male partners in education sessions helped increase participation in screening.[27]

Embarassment

Another cultural factor is embarrassment, particularly in dealing with cancer in sensitive body parts such as the colon, breasts, cervix, and prostate. This embarrassment may lead to unwillingness to discuss sensitive topics or to ask important questions regarding treatment options and outcomes.

Misconceptions

The combination of cultural beliefs, language barriers, and differing health systems in countries of origin can lead to a jumbled understanding of cancer and its impact on health, often resulting in misconceptions. A recent telephone survey conducted on behalf of the ACS identified several misconceptions that were widely held, many by minorities. The idea that cancer surgery can spread disease throughout the body was identified as true by 41% of respondents and is most commonly held by African-Americans (odds ratio = 1.41). "Pain medications are not effective in reducing the amount of pain people have from cancer," was noted as "true/don't know" by 32.2% of respondents and was substantially more common among Hispanic respondents (odds ratio = 1.63).[28] Another group focused on women's misconceptions about cancer screening with a semistructured interview format.[29] Findings included a lack of understanding about prevention being something that is done to stop cancer before it has started or that premalignant conditions existed and were easier to treat. Many thought screening was important only if a person had symptoms or a family history. Beliefs about screening tests such as Pap smears, mammograms, and sigmoidoscopies being somehow therapeutic in their own right were not uncommon. It is easy enough to envision how these misconceptions could wreak havoc on effective communication and create a less than ideal therapeutic alliance between patient and physician, especially if the physician does not appreciate their existence. It is imperative to address cultural competence in medical training, but the task is not straightforward.

Disparities in Comorbidities and Risk Factors

Perhaps the most straightforward question when considering discrepancies in cancer care is whether the racial/ethnic minority under consideration has a substantially different risk-factor profile or significant comorbidities that affect outcomes. For instance, do Hispanic women have fewer breast cancer risk factors and therefore a lower incidence of breast cancer? Conversely, do African-American women have a greater number of comorbidities that contribute to their increased mortality?

Comorbidities

Comorbid conditions have been postulated as a possible cause for the differences in African-American's lower breast cancer risk coupled with higher rates of mortality. A cohort from the Henry Ford Health System in Detroit was followed for 10 years and evaluated for 16 comorbidity categories.[30] African-Americans had a mean of 2.46 comorbidities compared to 1.83 for whites (P < .001). The number of comorbidities was found to correlate with survival. While the effect of comorbidities on all-cause survival did not vary with race per se, African-Americans had a higher rate of comorbidities and therefore higher mortality. Diabetes and hypertension were the two most important comorbidities considered. Diabetes carried a hazard ratio of 1.85 (95% CI = 1.47-2.32) and a prevalence of 26.4% among the African-Americans compared to 9.5% in the white study population. Hypertension carried a hazard ratio of 1.65 (95% CI = 1.37-1.99) with a prevalence of 63.4% and 35.5% for African-Americans and whites, respectively. Similar research has yet to be done evaluating comorbidities and breast cancer in Hispanic women. However, the increased prevalence of diabetes (1.8 times higher in Hispanics compared to non-Hispanic whites)[31] does not bode well for Hispanic breast cancer patients.

In another study, Smith et al.[32] found that African-American women were significantly more likely
to experience modifications in their adjuvant chemotherapy for breast cancer than were white women. This disparity was not a result of excess chemotherapy-related toxicities such as neutropenia, which is a common reason for postponement of chemotherapy. Rather, excess chemotherapy modifications among African-American compared with white breast cancer patients resulted from psychosocial issues, surgical complications, and progression of disease.

**Breast Density**

Several studies have demonstrated that women with higher breast density on mammogram are at increased risk of developing breast cancer.[33,34] At the very least, breast density is known to obscure mammographic detection of breast cancer. Do the Breast Imaging, Reporting, And Data System (BI-RADS) breast density categories accurately estimate the extent of breast density among racial/ethnic populations? In one study,[35] breast density was found to be similar with Chinese women and slightly higher in Filipino women. Furthermore, the study found accuracy of mammograms to be similar in white, Chinese, and Filipino women. However, there might be more pronounced differences among other racial/ethnic groups. While it has been postulated that breast density and breast cancer risk may be the result of genetic and/or environmental factors, it is not entirely clear how breast density modulates a woman's breast cancer risk; nor do we know whether decreasing breast density will alter the risk.

**Other Risk Factors**

When Gail model[36] risk factors (age, number of first-degree relatives with breast cancer, ages at menarche, first birth, and menopause, and prior breast biopsy for benign breast disease) are considered, all hazard ratios comparing minority groups with whites were attenuated.[37] Adjustments to the model for mammography rates further moderated differences between the groups. Hazard ratios for Hispanics and Asian/Pacific Islanders were 0.98 and 0.94 respectively, statistically indistinguishable from a hazard ratio of 1. African American women continue to present a complex picture with a statistically significant lower breast cancer risk than white women (HR = 0.75, 95% CI = 0.61-0.92) but with higher mortality rates.

Cancer is a heterogeneous disease. This has become progressively more apparent as techniques for the molecular profiling of cancers have improved. Tumor heterogeneity is likely to be of central importance in elucidating fundamental mechanisms of carcinogenesis and development of tailored preventive and treatment strategies. Is it possible to identify subtypes that predominate in certain racial/ethnic minorities and tailor therapy accordingly? How will such information be perceived—as an advance or as some form of discrimination? How will use of such information be protected?

**Clinical Trial Participation Among Racial/Ethnic Minorities**

An understanding of biology is crucial to any advance in oncology, and a proven way to improve this knowledge is through clinical trials. Clinical trials set the standard for oncologic practice and have the potential for narrowing gaps in cancer outcomes. However, participation in clinical trials among racial/ethnic minorities is disproportionately less, and there appears to be a general acceptance that minorities do not want to participate in clinical trials. This is belied by numbers from the Minority-Based Community Clinical Oncology Program (MB-CCOP), which had a 51% to 67% minority enrollment between 1995 to 2003[38]—in marked contrast to an approximately 23% minority accrual to cooperative group trials. It would be important to find out the factors accounting for this discrepancy. This is especially important for racial/ethnic minorities in whom a cancer is known to have a higher-risk biology, higher-grade tumor, later-stage disease, and higher mortality rate. Types of studies (eg, gene profiles/polymorphisms vs treatment trials) and ease of participation/adherence, cancer risks, and comorbid conditions all likely influence racial/ethnic minority clinical trial participation. Another barrier may be the lack of feedback to minority groups recruited for clinical trial participation regarding study results. In an open forum at the University of New Mexico with former NCI director Dr. Andrew von Eschenbach, Mr. Anslem Roanhorse, director of the Navajo Health Department, expressed the following sentiment shared by many Native American leaders and community members: Native Americans have been “overstudied,” he noted, yet little to no change has come out of those studies to benefit their communities. More importantly, researchers have not come back to tell them what they have found. To publish clinical trial results in prestigious journals does little to inform research participants whether their participation led to anything that may have an impact on their own or their community's cancer risk, outcomes, and treatment decisions.
Conclusions

While many of the findings regarding treatment in women with breast cancer provide some general knowledge about disparities in cancer care among racial and ethnic minorities, a significant caveat is the great diversity within the minority group. For instance, the Hispanic ethnic group is loosely defined as people who share a common language in Spanish or a common ethnic origin in Latin, Central, or South America, or the Caribbean. It is easy to see how this creates great diversity within the group in terms of things as basic as race, less tangible belief systems, and social structures. Differing rates of acculturation, levels of education, and socioeconomic status also have a dramatic effect on an individual's or group's interaction with a physician, the health-care system, and attitudes about one's own health.

The challenge in addressing cancer disparities involves teasing out the differences from all confounding factors, including the possibility of a biologic difference. Until the contributions of each factor are better understood, our ability to truly make a difference will likely be limited. But the complexity of the problem should not be a deterrent. Eliminating cancer disparities—not only for racial/minority groups but for all underserved populations—must be a priority for those involved in cancer care. For individual practitioners, the first step in addressing disparities is accomplished through understanding the possibility that disparities exist in varying depth and complexity for each racial or ethnic minority patient.

Financial Disclosure: Dr. Royce is a member of the advisory board for Genentech and a member of the speakers bureau for Novartis.

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