

Roots of Prostate Cancer in African-American Men

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To fully understand the role of genetics and environment (biotic, abiotic and sociocultural) in the prostate cancer disparity experienced by African-American men, this paper examined the rates of prostate cancer among African-American men and one of their ancestral populations in west Africa. Data sources were from the World Health Organization (WHO) and reported hospital records in the literature. Based on the WHO's worldwide cancer data, west African men have much lower prostate cancer incidence and mortality compared to African-American men. For example, compared to Nigerian men, African-American men are >10 times likely to develop prostate cancer and 3.5 times likely to die from the disease. However, contrary to the global ranking by WHO, there is documented evidence in the literature indicating that prostate cancer in at least one west African country is similar to rates found in the United States and in Caribbean Islands. To better address prostate cancer disparity, future studies should study populations and subgroups from central and west Africa, the original source population for African Americans.

Key words: prostate cancer ■ African Americans ■ men's health

The report of the Descriptive Epidemiology Group of the International Agency for Research on Cancer (IARC)¹ presents estimates of the incidence and prevalence of and mortality from 27 cancers for all countries in the world. The report estimated that in 2002, prostate cancer ranked first for the five-year prevalent cases of all cancers among men in the world. There were 2,368,669 reported cases. Prostate cancer ranked second among men for new cancer cases for all ages worldwide. In the United States, the 2005 cancer morbidity and mortality estimates by the American Cancer Society² indicate that prostate cancer will continue to lead the new cancer cases and will be the second leading cause of cancer deaths in men. Among men, it is estimated that 232,090 new prostate cancer cases and 30,350 prostate cancer deaths will be reported in 2005.² Although prostate cancer affects men regardless of their racial group, a disproportionate burden is experienced by African-American men. African-American men are 2.4 times more likely to die of prostate cancer compared with white men.² They also have the highest incidence of prostate cancer compared to other racial/ethnic groups in the United States.

The worldwide differences in the incidence of prostate cancer and the noticeable variations among ethnic groups are noted by Gronberg³ to be caused by multiple factors, including genetic susceptibility, external risk factors, health differences and cancer registration. A comprehensive understanding of the reason(s) for the ethnic variations in prostate cancer morbidity and mortality within the United States remains elusive. This ethnic variation has even been found to persist when dietary and lifestyle factors were accounted for among men of similar educational level.⁴ An important question that needs to be answered is: Does this prostate cancer disparity also exist among the original source population for African Americans? In this paper, we examined the prostate cancer burden experienced by one of the ancestral populations of African Americans in attempt to understand the prostate cancer disparity experienced by African-American men.

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The Ancestral Group of African Americans

African Americans are blacks of African origin living in the United States. The forefathers of African Americans were originally taken from Africa as slaves. From the transatlantic slave trade between 1450 and 1900,⁵ the number of Africans imported to Americas was up to five times that of Africans imported to Europe. Most of the slaves arrived in Brazil, Spanish Empire, British West Indies and French West Indies. Only 4.4% of the slaves ended up in British North America and the United States.⁵ The African regions where slaves were mainly sourced for the transatlantic slave trade were Senegambia, Upper Guinea, Windward Coast, Gold Coast, Bight of Benin, Bight of Biafra, west central and southeast.⁶

Over 10 million slaves were exported between 1650 and 1900. The majority of the transatlantic slaves were from Bight of Benin and Bight of Biafra. These two regions, approximated to be the country Nigeria,^{7,9} alone supplied about 3.5 million slaves, constituting about 35% of the slaves. Other countries representing the regions of the slave trade are Senegal-Gambia, Sierra Leone, Ivory Coast, Ghana and Cameroon-North Angola.

Since the slave trade, African Americans, through intermarriage and interbreeding with Native Americans and Europeans of diverse ethnic backgrounds, have gene pools that are more heterogeneous.^{10,11} However, being the primary source population for

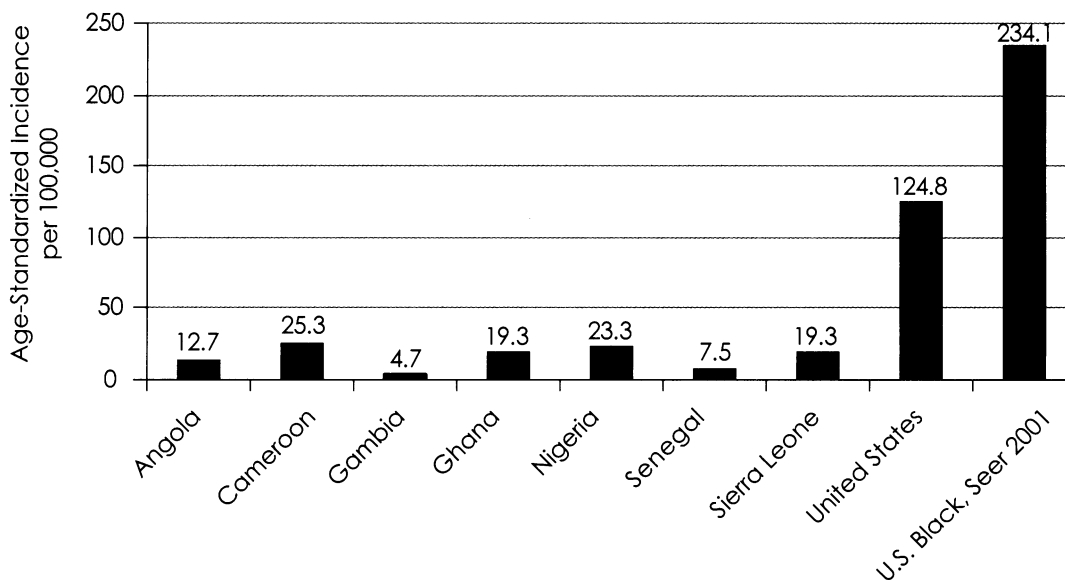
African Americans, central and west Africans share similar genetic structure with African Americans. Below we explore the concept that this shared genetic structure may be one of the factors responsible for the ethnic differences in prostate cancer risk.

Prostate Cancer Incidence and Mortality among Ancestral Groups of African Americans Compared with African Americans

Prostate cancer morbidity and mortality rates vary worldwide among diverse groups. In general, the more developed regions have higher morbidity and mortality rates compared with less developed regions.¹ In 2002, the United States was documented as having the highest prostate cancer incidence (124.8), while Barbados led in prostate cancer mortality (55.3).¹ Worldwide prostate cancer statistics for African men in Nigeria, Senegal, Gambia, Sierra Leone, Ivory Coast, Ghana, Cameroon and Angola provide an interesting observation compared to African-American men (Figures 1 and 2). The reported prostate cancer incidence and mortality for the ancestral relatives of African Americans are very low. For example, compared to Nigerians, African Americans are >10 times likely to develop prostate cancer and 3.5 times likely to die from the disease.

Based on the worldwide comparison,¹ can we conclude that prostate cancer incidence among African-American men in the United States is higher than that

Figure 1. Age-standardized incidence rates for prostate cancer



Source: Ferlay J, Bray F, Pisani P, and Parkin DM. GLOBOCAN 2002: Cancer Incidence, Mortality and Prevalence Worldwide. IARC CancerBase No. 5, version 2.0, IARC Press, Lyon, 2004

seen in other black men sharing the same genetic characteristic? If this is the case, it indicates that environmental conditions and/or the lifestyle of African-American men may be major factors responsible for the prostate cancer disparities experienced by this group. We propose that the true prostate cancer rates for west Africans may be underestimated by IARC,¹ since there are no data available on cancer incidence and mortality for most of the west African countries. For example, the cancer incidence rates for 16 countries in western Africa was based on unweighted averages of Guinea, Conakry (1996–1999), Gambia (1997–1998), Mali, Bamako (1993–1997), Niger and Niamey (1993–1999).¹ In cases where the cancer incidence rates for a country are not available, the method of cancer data estimation by IARC is based on data provided from select cities in the country and/or regional data. Thus, the international cancer rates published by IARC¹ depend on the degree of detail and accuracy of the data available for each country.

The reported difference in prostate cancer burden among Africans has been attributed to several factors, including underreporting,¹² lack of appropriate diagnosis,¹²⁻¹⁵ limited access to care,¹³ differences in technical manpower and infrastructure,¹³ and the quality of cancer data systems.^{13,16-19} Especially important is the quality of the data from cancer registries in Africa. Direct comparisons of the prostate cancer burden experienced by African-American men to that of their African ancestral relatives cannot be done if there are differences in the data reporting methods for incidence and prevalence of

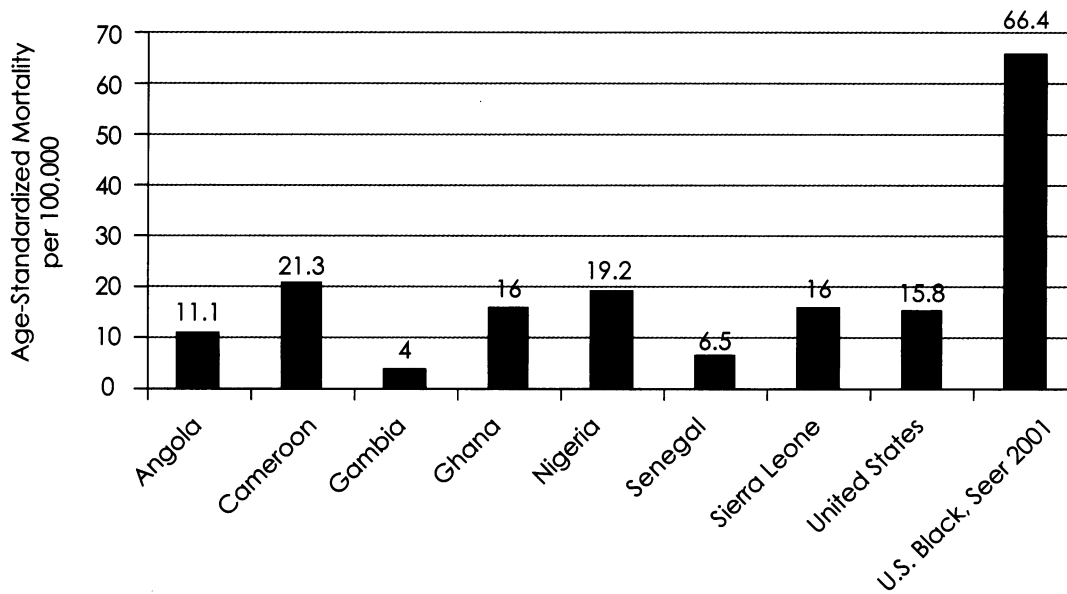
and mortality from prostate cancer.

Cancer registries make it possible to delineate public health priorities as well as plan and monitor comprehensive strategies for cancer control. However, as specified by the International Association of Cancer Registries, “The comparative value of the statistics which cancer registries produce depends upon the use of common methods, and definitions, so that international collaboration in this area has a very important role.”²⁰ For valid comparisons among African-American men and their descendants from different countries, the definitions for collecting, coding and presenting data have to be comparable among registries. In the absence of a viable cancer registration system that allows comparison of population-based information on prostate cancer incidence and outcome, it cannot be concluded that prostate cancer burden among African-American men is significantly higher than that of their ancestral groups. A close review of the ancestral group that has significant genetic ties to African Americans, i.e., Nigerians, provides an insight on possible relative contribution of genetics as a risk factor for prostate cancer.

Prostate Cancer Burden in West Africa: Case Analysis of Nigeria

African-American men have the highest incidence of prostate cancer in the United States,² and African Caribbean men have the highest rate of prostate cancer in the world.²¹ The high risk of prostate cancer in these groups (both of west African descent) suggests that west African men are likely to also have a high

Figure 2. Age-standardized mortality rates for prostate cancer¹



Source: Ferlay J, Bray F, Pisani P, et al. GLOBOCAN 2002: Cancer Incidence, Mortality and Prevalence Worldwide. IARC CancerBase No. 5, version 2.0, IARC Press, Lyon, 2004

incidence of prostate cancer. The 2002 age-standardized prostate cancer incidence rate estimated for Nigeria, the most populous country in west Africa, was 23.3.¹ Presently, there is no national cancer registry in Nigeria to accurately document prostate cancer burden in Nigerian men. However, contrary to the global rankings by the World Health Organization, several studies indicate higher incidence of prostate cancer in Nigerian men.^{12,14,22-33} These findings directly conflict with global rankings of low prostate cancer risk for Nigerian men.

As early as 1981, Udeh,²² in a 10-year retrospective study of prostate carcinoma in Nigeria, reported an increasing incidence of prostate cancer among Nigerians. Also, Lawani et al.,²³ conducted a 20-year review of the genitourinary tract tumors in Ibadan, a populous city in Nigeria, and concluded that prostate cancer was the most common urological cancer in Ibadan. Reports of high incidence of prostate cancer have also been found in Lagos²⁴ and Benin,²⁵ two other cities in Nigeria. By the late 1990s, it was apparent that the global report of low prostate cancer incidence among Nigerian men was an underestimation. In a prospective study, Osegbe²⁶ investigated the validity of the prostate cancer global ranking for Nigerian men studying men age ≥ 45 years with prostatic symptoms. Osegbe found the hospital incidence rate to be 127 per 100,000 cases, concluding that prostate cancer rate among Nigerian men may be as great as the rate seen in African-American men. In another study, Ogunbiyi and Shittu¹⁴ used the Ibadan Cancer Registry to show a high incidence of prostate cancer among Nigerian men. Comparing 1980–1988 and 1989–1996 registry data, the authors found prostate cancer to constitute 11% of all male cancers, ranking first among all cancers in Nigerian men.

Recent studies continue to support the evidence of high prostate cancer risk among Nigerians. Eke and Sapira,²⁷ in a 14-year retrospective study of prostate cancer patients in Port Harcourt, reported a hospital incidence of 114 per 100,000. Nwofor and Oranusi²⁸ also investigated prostate cancer patients between the ages of 44–92 in Nnewi, Nigeria. In the five-year retrospective study, prostate cancer was found to constitute 77% of all urological cancer, making it the most common urological cancer among Nnewi men. In agreement with these studies, other prostate cancer investigations have found high prostate cancer risk in different regions of Nigeria, including the north,^{29,30} southeast,^{31,32} west,³³⁻³⁶ and the rural south.¹²

Understanding Prostate Cancer Disparity

Prostate cancer occurs all over the world, while the prevalence of the aggressive forms of prostate cancer vary³⁴⁻³⁷ with significant burden for African-American

men. Understanding the primary reasons for the prostate cancer disparity experienced by African-American men is essential for successful intervention programs to eliminate this disparity. Available evidence seems to indicate that this disparity may be shared by other black men of African descent, especially those with origins from west Africa. Unfortunately, the cancer data available in most African countries do not permit valid global comparisons of prostate cancer incidence and mortality. Thus, at this time there is no conclusive evidence on prostate cancer risk in African black men. There are more questions than answers: What is responsible for the high prostate cancer burden among African-American men? Is the disparate burden in African-American men present in the source population, i.e., indigenous west and central African men? Does the similar genetic characteristic of black men of west and central African ancestry put them at higher risk for prostate cancer compared with other groups? Or are there common environmental conditions/lifestyle factors among these men that may be responsible for the prostate cancer burden experienced by this group? What is the relative contribution of genetic, lifestyle and environmental factors in prostate cancer incidence and mortality among this group?

Next Steps

African-American men continue to experience a significant burden of prostate cancer compared to other ethnic groups in the United States. At first glance, the high rates of prostate cancer incidence and mortality reported among black men in the Caribbean Islands, as well as the increasing evidence of high prostate cancer burden among Nigerians, may suggest strong influence of genetics. However, only about 5–10% of prostate cancer cases have been linked to high-risk inherited genetic factors or prostate cancer susceptibility genes.³⁸ With the realization that biotic, abiotic and sociocultural environmental factors also affect the development and progression of prostate cancer,^{3,39} it is necessary to confirm shared environmental factors that may also predispose African-American men and their ancestral relatives to prostate cancer.

To fully understand the role of environment and genetics in prostate cancer disparity as well as to begin to successfully address this disparity, more studies need to be conducted among indigenous west and central Africans. From the case analysis of Nigeria, it appears that the incidence rates based on hospital series data may be similar to rates in the United States data for African-American men. Future studies should focus on comparisons of prostate cancer risk factors among black men of similar ancestral origin to African Americans.

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