High Prevalence of Screen Detected Prostate Cancer in West Africans: Implications for Racial Disparity of Prostate Cancer

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Abbreviations and Acronyms

DRE = digital rectal examination

fPSA = free PSA

PSA = prostate specific antigen

PSAD = PSA density

TRUS = transrectal ultrasound

Accepted for publication April 10, 2014.

Study received institutional review board approval.

Supported by the National Institutes of Health Intramural Research Program (National Cancer Institute), National Center on Minority Health and Center to Reduce Cancer Disparities (National Cancer Institute).

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† Financial interest and/or other relationship with Gilead Sciences.

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Purpose: To our knowledge the reasons for the high rates of prostate cancer in black American men are unknown. Genetic and lifestyle factors have been implicated. Better understanding of prostate cancer rates in West African men would help clarify why black American men have such high rates since the groups share genetic ancestry and yet have different lifestyles and screening practices. To estimate the prostate cancer burden in West African men we performed a population based screening study with biopsy confirmation in Ghana.

Materials and Methods: We randomly selected 1,037 healthy men 50 to 74 years old from Accra, Ghana for prostate cancer screening with prostate specific antigen testing and digital rectal examination. Men with a positive screen result (positive digital rectal examination or prostate specific antigen greater than 2.5 ng/ml) underwent transrectal ultrasound guided biopsies.

Results: Of the 1,037 men 154 (14.9%) had a positive digital rectal examination and 272 (26.2%) had prostate specific antigen greater than 2.5 ng/ml, including 166 with prostate specific antigen greater than 4.0 ng/ml. A total of 352 men (33.9%) had a positive screen by prostate specific antigen or digital rectal examination and 307 (87%) underwent biopsy. Of these men 73 were confirmed to have prostate cancer, yielding a 7.0% screen detected prostate cancer prevalence (65 patients), including 5.8% with prostate specific antigen greater than 4.0 ng/ml.

Conclusions: In this relatively unscreened population in Africa the screen detected prostate cancer prevalence is high, suggesting a possible role of genetics in prostate cancer etiology and the disparity in prostate cancer risk between black and white American men. Further studies are needed to confirm the high prostate cancer burden in African men and the role of genetics in prostate cancer etiology.

Key Words: prostatic neoplasms, prostate-specific antigen, mass screening, African Americans, Africa

0022-5347/14/1923-0730/0
THE JOURNAL OF UROLOGY®

http://dx.doi.org/10.1016/j.juro.2014.04.017
Vol. 192, 730-736, September 2014
Printed in U.S.A.

PROSTATE cancer is the most commonly diagnosed nonmelanoma cancer in men in most Western countries.[1] Despite the high morbidity and mortality of prostate cancer (it is the second leading cause of cancer death in men in the United States) until recently the only established risk factors were advancing age, race and a family history of prostate cancer.[1] Of the well established risk factors race is the most dramatic with incidence and mortality rates in black American men almost twice those of white American men and 5 times higher than those of Asian men living in Asia.[2,3] Genetics, environmental and lifestyle factors have been implicated to explain the large racial difference in prostate cancer risk, including differences in 5α-reductase activity in the prostate.[4,5] More recently genome-wide association studies implicated several areas of the genome as risk factors.[6–12] It is currently unclear how much of the racial difference in prostate cancer risk can be attributable to these risk loci.

Reports of population based incidence rate of prostate cancer in African men are limited because there are few population based cancer registries in this continent.[13] Using the limited reported incidence we recently observed that the age adjusted incidence of prostate cancer in Africa is increasing and the prostate cancer incidence varies widely on the continent.[14,15] More comprehensive population based data on the prostate cancer burden in West Africa are needed for cancer prevention and control efforts.

Better understanding of prostate cancer rates in West African men would provide insight into prostate cancer etiology and reasons for the large racial disparity since West African and black American men share similar genetic ancestry. To help determine the burden of prostate cancer in West African men, we performed a population based prostate cancer screening with diagnostic and therapeutic followup in a probability sample of healthy men between ages 50 and 74 in Greater Accra, Ghana.

MATERIALS AND METHODS

Study Subjects

This study was approved by the NCI (National Cancer Institute) and University of Ghana institutional review boards. Details of this study population were described previously.[16,17] Briefly, to enroll a population based probability sample of men from Accra for screening, we collaborated with the Ghana Census Bureau and used 2000 Ghana Population and Housing Census data to construct a sampling frame for enrolling about 1,000 men 50 to 74 years old in the Greater Accra Region (population about 3 million). Based on census data we used a 3-stage design to select probability samples. 1) The primary sampling unit was the enumeration unit, which is the smallest well-defined geographic unit in Greater Accra. 2) The secondary sampling unit was the household in the enumeration areas. 3) The ultimate sampling unit was men between ages 50 and 74 years who resided in the selected households.

We first selected 300 enumeration areas randomly with probability proportional to the number of households in each enumeration area. We estimated that we would need to sample 7,500 households to identify about 1,000 men eligible for study. Thus, we selected 25 households randomly from each enumeration area, resulting in 7,500 households from Greater Accra. Door-to-door visits were made to enumerate all members of the selected household and identify men eligible for study. We selected the oldest eligible man in each household as the potential study participant. Based on these mechanisms we identified 1,049 men who were eligible for study, of whom 3 were too ill to be screened and 9 refused to participate, yielding a 98.8% response.

Interview and Blood Collection

Consenting participants were brought to the Korle-Bu Hospital for an interview in person and a health examination. Trained interviewers used a structured questionnaire to elicit epidemiological information, including ethnicity, education, smoking, alcohol use, medical history, screening history, family history of cancer and medical care system utilization. Height, weight, and waist and hip circumferences were measured at the interview. Overnight fasting blood was collected from each participant before DRE. Collected blood was processed at a central laboratory in Korle-Bu Hospital within 4 hours of collection and stored at −70C.

Prostate Cancer Screening

We used DRE and serum PSA for prostate cancer screening in study participants between September 2004 and September 2006. DRE was performed by experienced Ghanaian urologists. Total PSA and fPSA were measured in duplicate at UCLA. Before January 2004 the Hybritech Tandem®-R PSA and fPSA assays were used. Because these assays were not available after 2004, we changed to the Access® 2 Hybritech PSA and fPSA assays. Parallel evaluation data between these 2 generations of assays were within 10%. Samples with PSA greater than 100 ng/ml were retested. The percent ratio of fPSA to total PSA was calculated using the formula, (fPSA/PSA) × 100.

TRUS Guided Biopsy

Men with total PSA 2.5 ng/ml or greater and/or positive DRE were offered TRUS guided biopsy at Korle-Bu Hospital. TRUS was also used to estimate prostate volume. PSAD was calculated by the formula, PSA/prostate volume. At 24 hours before and 5 days after biopsy the men received ciprofloxacin (500 mg) or Zinnat™ (cefuroxime 250 mg) twice daily to prevent infection. A short medical history was taken before biopsy to assess contraindications to the procedure. A total of 12, 17 to 19 mm biopsy cores were collected with 2 cores from each of 6 designated areas of the prostate. Any visible lesions were also taken. Each core was preserved in 10% formalin buffer solution for preparation of pathology slides.