Racial Differences in Initial Treatment for Clinically Localized Prostate Cancer

Results from the Prostate Cancer Outcomes Study

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OBJECTIVE: We examined whether there were racial differences in initial treatment for clinically localized prostate cancer and investigated whether demographic, socioeconomic, clinical, or tumor characteristics could explain any racial differences.

DESIGN: Prospective cohort study.

SETTING: Population-based tumor registries in Connecticut, Los Angeles, and Atlanta.

PARTICIPANTS: We evaluated 1144 African-American and non-Hispanic white men, aged 50 to 74 years, with clinically localized cancer diagnosed between October 1994 and October 1995.

MEASUREMENTS AND MAIN RESULTS: We obtained demographic, socioeconomic, and clinical data from patient surveys and medical record abstractions. We reported adjusted percentages for receiving treatment derived from multinomial logistic regression. We found an interaction between race and tumor aggressiveness. Among men with more aggressive cancers (PSA $\geq$ 20 ng/mL or Gleason score $\geq$ 8), African Americans were less likely to undergo radical prostatectomy than non-Hispanic whites (35.2% vs 52.0%), but more likely to receive conservative management (38.9% vs 16.3%, $P = .003$). Among the 71% of subjects with less aggressive cancers, African Americans and non-Hispanic whites were equally likely to receive either radical prostatectomy or radiation therapy (80.0% vs 84.5%, $P = .2$).

CONCLUSIONS: African Americans with more aggressive cancers were less likely to undergo radical prostatectomy and more likely to be treated conservatively. These treatment differences may reflect African Americans' greater likelihood for presenting with pathologically advanced cancer for which surgery has limited effectiveness. Among men with less aggressive cancers—the majority of cases—there were no racial differences in undergoing radical prostatectomy or radiation therapy.

KEY WORDS: prostatic neoplasms; prostatectomy; radiation therapy; patient selection; African Americans.

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African Americans have a significantly higher prostate cancer incidence and mortality than any other racial or ethnic group.¹ Because African Americans present at a younger age than non-Hispanic whites and at a higher tumor stage and grade, the increased mortality has been attributed to more aggressive cancers.² Although some investigators have found no racial differences in mortality after adjusting for stage at diagnosis,^{3–6} selected data from the Surveillance, Epidemiology, and End Results (SEER) program show African Americans with poorer survival across all stages.⁷

Racial differences in mortality for early stage disease could reflect disparities in treatment, particularly for clinically localized prostate cancer. Greater than 80% of men with newly diagnosed cancers have local or regional stage disease,¹ and the majority of men with clinically localized cancer are offered aggressive treatment with radical prostatectomy or radiation therapy.⁸ The use of radical prostatectomy and radiation therapy has increased substantially during the past decade.^{9,10} However, previous studies using cancer registry data collected between 1984 and 1993 have generally found that African Americans with early stage cancer were less likely than non-Hispanic whites to receive radical prostatectomy and more likely to receive conservative management.^{11–13} Although these studies raised questions about racial differences in cancer treatment and outcomes, they also had important limitations. Much of the data were collected before the era of PSA screening and before widespread use of nerve-sparing prostatectomy techniques,¹⁴ or newer forms of external beam radiation and brachytherapy,¹⁵ that can reduce treatment complications. Furthermore, cancer registries cannot readily identify men who presented with clinically localized cancer.

The Prostate Cancer Outcomes Study (PCOS) was initiated in 1994 to collect data from a population-based cohort of men with newly diagnosed prostate cancer to assess the impact of cancer treatments on health-related quality of life outcomes. The objectives of the current analysis were to use PCOS data to examine whether there were racial differences in initial treatment for clinically localized prostate cancer and to investigate whether demographic, socioeconomic, clinical, or tumor characteristics could explain any racial differences.

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METHODS

Study Subjects

Participants were selected from the National Cancer Institute's SEER program, a population-based tumor registry system that provides information on cancer incidence and survival for selected geographic regions within the United States. Details of the PCOS have been published elsewhere.¹⁶ Briefly, PCOS subjects were identified using a rapid case ascertainment system to identify men diagnosed with microscopically confirmed invasive carcinoma of the prostate between October 1, 1994 and October 31, 1995. Diagnosed patients resided in the states of Connecticut, Utah, and New Mexico and in the metropolitan areas of Atlanta, GA, Los Angeles, CA, and King County, WA (which includes Seattle). Eligible patients were men aged 20 through 89 years at the time of diagnosis, except in King County, where men aged less than 60 years were not included because they were eligible for another study. The institutional review board of each participating institution approved the study.

Eligible patients were sampled within strata of age, self-described race/ethnicity, and tumor registry to ensure adequate demographic representation. Patients with a race or ethnicity other than non-Hispanic white, African American, or Hispanic were excluded, because the numbers in these groups were small and race/ethnicity could not be readily identified at the time of sampling.

The PCOS randomly sampled a total of 5,672 subjects from 11,137 eligible prostate cancer cases. The current analysis of racial differences in initial treatment for clinically localized prostate cancer compared non-Hispanic whites with African Americans. Because few African-American men were identified in King County, WA, Utah, and New Mexico, we restricted our subjects to the 3,074 sampled non-Hispanic and African-American subjects residing in Los Angeles, Connecticut, or Atlanta. Among the subjects in these registries, 1,690 had clinically localized cancers, 1,444 completed a health-related quality-of-life survey questionnaire 6 months after initial diagnosis, and 1,174 were aged 50 to 74 years. We used the data from these subjects (884 non-Hispanic whites and 430 African Americans) to evaluate racial differences in initial treatment for clinically localized prostate cancer. Responders to the 6-month survey were similar to nonresponders with respect to age, race, comorbidity, tumor aggressiveness, and initial treatment. We were unable to compare socioeconomic status because these items were found only on the survey.

Data Collection

We collected data on general and disease-specific measures of health-related quality of life, symptoms, and specific treatments received for prostate cancer using a mailed self-administered health-related quality-of-life questionnaire. Disease-specific health-related quality of life was

measured using a newly adapted prostate cancer-specific instrument, based on items from three existing instruments.¹⁷⁻¹⁹ Most participants completing the survey returned the self-administered questionnaire (91%); those who did not return the questionnaire were contacted by telephone and completed the survey by telephone or in person. Subjects were asked to recall their health-related quality of life and symptoms, including the domains of urinary, bowel, and sexual function, just before their prostate cancer was diagnosed. Demographic and socioeconomic questions from this survey were used to determine race/ethnicity, employment status, educational level, household income, insurance status, and marital status. Subjects were also asked about the effect of insurance status on treatment decisions, a proxy variable for the adequacy of insurance coverage.

Comorbidity was ascertained from a questionnaire item that asked subjects about the presence or absence of 12 medical conditions that were believed likely to affect prostate cancer treatment decisions and long-term quality of life. The conditions were derived from the Charlson index,²⁰ as well as the expert opinion of the PCOS investigators. A subject was asked whether a doctor had ever told him that he had any of the 12 conditions. A comorbidity score ranging from 0 to 12 was then assigned to each subject. For each of 9 conditions (arthritis, diabetes, depression, hypertension, chest pain, heart attack, heart failure, chronic lung disease, ulcers), 1 point was added to the comorbidity score if the subject indicated that he had the condition and was limited by or taking medication for it. This approach was used to increase the likelihood that the self-reported condition was a factor in the subject's current health status rather than a historical event. The presence of stroke, inflammatory bowel disease, or liver disease was felt to substantially influence treatment selection. Therefore, 1 point was added to the comorbidity score for each of these conditions when a subject reported being told by a doctor that he had the condition, even when he indicated that he was neither limited by nor taking medication for the condition. In the analyses, comorbidity scores were divided into the categories of 0, 1, 2, and greater than or equal to 3 points.

Participants were asked to sign a release form allowing investigators to review medical records from all physicians and facilities diagnosing or providing care for prostate cancer. Trained abstractors used standard protocols to review these medical records and collect information on PSA levels, tumor characteristics, clinical staging procedures and results, and treatment details. A random sample of 5% of the medical records was reabstracted to assess and correct systematic coding errors.

Initial treatment, determined from medical record abstractions, was classified using a hierarchy based on the most aggressive treatment received within the 6 months after diagnosis. Anyone undergoing radical prostatectomy was classified as surgical treatment even if he also received radiation therapy or androgen deprivation. Radiation

treatment could also include androgen deprivation, and conservative management could include androgen deprivation or watchful waiting. We also reviewed treatments reported on the 12- and 24-month surveys to assess whether there were any racial differences in treatment received following the first 6 months after diagnosis. However, these self-reported treatments were not validated by medical record review.

Clinical cancer stage determinations were based on an algorithm using clinical information on digital rectal examinations and imaging test results abstracted from the medical records. The algorithm was necessary because the community-based medical records were not detailed enough to classify cases with tumor-node-metastasis staging.²¹ The clinically localized cancers included T1 and T2 tumors. T1 tumors were defined as confined to the prostate with a normal digital rectal examination and no positive scans (magnetic resonance imaging, computed tomography, or bone scan) or evidence of metastasis. T2 tumors were defined as confined to the prostate with abnormal or suspicious digital rectal examinations, but no positive scans or evidence of metastasis. Advanced cancers included T3 tumors defined as extending beyond the prostate without positive scans or evidence of metastasis and T4 tumors defined as having at least 1 positive scan, positive lymph node, or distant metastasis.

Statistical Analysis

We used contingency tables to examine racial differences in demographics (age, geographic location, marital status), socioeconomic status (education, effect of insurance), comorbidity score, urinary leakage, erectile dysfunction, bowel urgency, PSA at diagnosis, Gleason score, diagnostic work-up, and treatment. We did not use household income to measure socioeconomic status because this variable was highly correlated with education and the item response rate was poor. We defined clinically "more aggressive" cancers as having PSA levels ≥ 20 ng/mL or Gleason score ≥ 8 . Clinically "less aggressive" cancers were defined as PSA levels < 20 ng/mL and Gleason score < 8 . These categories were selected because both PSA values ≥ 20 ng/mL and high Gleason scores predict pathologically advanced disease.²² We also used contingency tables to examine the association between patient characteristics and the three major treatment options: surgery, radiation, and conservative management.

We evaluated the effect of race on treatment decisions, including surgery, radiation, or conservative management, using multinomial logistic regression models. We selected independent variables that were significantly associated either with initial therapy or race in the contingency tables' analyses, using a significance level of .05. We also examined potential interaction effects between race and other demographic variables, socioeconomic status, and clinical and tumor characteristics.

The results of the logistic regression models are shown as percentages receiving the treatment of interest, adjust-

ing for the independent variables included in the model. These percentages were directly adjusted to the distribution of the variables among the weighted sample used in each model.²³ The probability of receiving the treatment of interest can then be directly compared across levels of the variables included in the model.

We performed the regression analyses with the Survey Data Analysis (SUDAAN) statistical package to account for the complex sample design.²⁴ We used the Horvitz-Thompson weight, which is the inverse of the sampling stratum (defined by age, race/ethnicity, and study area), to obtain unbiased estimates of the variables of interest for all eligible prostate cancer patients in the Los Angeles, Atlanta, and Connecticut PCOS areas. All estimates presented in this report were weighted to this population. All *P* values were two-sided.

Investigators had no conflicts of interest in conducting the study or writing the manuscript. The principal investigator of the PCOS and several coinvestigators work for the National Cancer Institute, the funding agency, and were involved in study design, data collection and analysis, interpreting data, and writing this report. The National Cancer Institute reviewed this report for scientific content and approved submission. Investigators had full access to all of the study data and accept full responsibility for the integrity of the data and the accuracy of the data analysis.

RESULTS

Baseline characteristics of African Americans and non-Hispanic whites with clinically localized prostate cancer are shown in Table 1. African Americans were generally younger than non-Hispanic whites, with lower socioeconomic status, greater comorbidity, and more aggressive cancers based on higher PSA levels and Gleason scores.

The unadjusted associations between patient characteristics and initial treatment are shown in Table 2. A similar proportion of non-Hispanic whites and African Americans underwent radical prostatectomy, but African Americans were less likely to receive radiation therapy and more likely to receive conservative management. Most men who were younger than 65 years or healthy underwent radical prostatectomy. Men who reported better urinary, bowel, and sexual function before their cancer diagnosis were also more likely to undergo surgery. Although the majority of men with aggressive tumors underwent radical prostatectomy, a substantial proportion underwent radiation therapy or conservative management.

We calculated the percentages of non-Hispanic whites and African Americans receiving radical prostatectomy, radiation therapy, or conservative management, adjusted for demographic, socioeconomic, and clinical variables (Table 3). We found a significant interaction between race and tumor aggressiveness. Among men with clinically more aggressive cancers, we found that African Americans were less likely to undergo radical prostatectomy than non-Hispanic whites and more likely to undergo conservative

Table 1. Distribution of Baseline Patient Characteristics by Race*†

Patient Characteristic	NHW, n (%)	AA, n (%)	P Value
Age at diagnosis			.001
50–64	435 (43.3)	207 (53.0)	
65–74	371 (56.7)	161 (47.0)	
Registry			.0000
Connecticut	401 (36.4)	45 (14.8)	
Atlanta	128 (19.2)	103 (30.6)	
Los Angeles	277 (44.4)	220 (54.6)	
Marital status			.0000
Not married	134 (16.7)	110 (29.5)	
Married	665 (82.4)	254 (69.3)	
Education			<.0001
Less than high school graduate	95 (11.7)	121 (34.4)	
High school graduate/some college	333 (41.7)	174 (45.8)	
College graduate	371 (45.4)	66 (17.9)	
Insurance influenced treatment decision			.01
Not at all	613 (74.9)	249 (67.4)	
Only a little/somewhat	108 (13.0)	44 (11.8)	
A lot	73 (10.6)	63 (17.6)	
Comorbidity index			<.0001
0	349 (40.3)	109 (29.3)	
1	267 (34.8)	103 (27.6)	
2	116 (13.9)	88 (23.2)	
3+	74 (11.0)	68 (19.9)	
Urinary leakage			.05
Daily or more	62 (8.0)	40 (11.8)	
Weekly or less	73 (10.4)	39 (10.1)	
Not at all	666 (81.6)	281 (76.1)	
Urgent bowel movements			.91
Almost everyday	8 (1.3)	6 (1.8)	
Some days	117 (13.4)	50 (14.4)	
Rarely / not at all	677 (84.5)	309 (83.1)	
Erections			.56
None	68 (10.0)	40 (12.6)	
Partial only	104 (13.6)	50 (14.8)	
Hard/hard and partial	609 (73.2)	264 (68.9)	
Abnormal DRE			.18
No	318 (39.2)	155 (42.5)	
Yes	409 (51.0)	166 (45.1)	
PSA (ng/mL)			<.0001
<10.0	562 (70.1)	197 (53.6)	
10.0–19.9	141 (17.2)	76 (20.9)	
≥20.0	72 (8.6)	73 (19.6)	
Gleason score			.35
2–4	107 (12.7)	49 (13.1)	
5–7	580 (71.9)	245 (67.1)	
8–10	71 (8.2)	39 (10.7)	
Tumor aggressiveness			.0002
PSA ≥ 20 ng/mL or Gleason ≥ 8	128 (15.1)	94 (25.4)	
PSA < 20 ng/mL and Gleason < 8	609 (75.1)	229 (62.9)	
Bone scan			.12
Negative	520 (63.2)	218 (60.3)	
Equivocal	54 (6.0)	14 (3.8)	
Not done / unknown	232 (30.9)	136 (35.8)	

* Weighted to reflect all eligible prostate cancer patients in the study area.

† Column percentages may not total to 100% owing to missing data.

NHW, non-Hispanic white; AA, African American; DRE, digital rectal examination; PSA, prostate-specific antigen.

Table 2. Distribution of Treatments by Baseline Patient Characteristics*

Patient Characteristic	Treatment			P Value
	Conservative	Radiation	Prostatectomy	
Race				.0003
NHW	112 (15.8)	216 (28.6)	478 (55.6)	
AA	91 (25.7)	70 (20.0)	207 (54.3)	
Age at diagnosis				<.0001
50–64	62 (10.0)	100 (15.1)	480 (74.9)	
65–74	141 (24.4)	186 (36.6)	205 (39.1)	
Registry				<.0001
Connecticut	60 (15.1)	139 (34.8)	247 (50.0)	
Atlanta	26 (10.3)	57 (28.8)	148 (60.8)	
Los Angeles	117 (23.2)	90 (20.4)	290 (56.4)	
Marital status				.005
Not married	62 (27.5)	55 (23.4)	127 (49.1)	
Married	139 (15.5)	227 (27.5)	553 (57.0)	
Education				.08
Less than high school graduate	51 (22.3)	62 (32.1)	103 (45.6)	
High school graduate/some college	84 (17.9)	117 (25.2)	306 (57.0)	
College graduate	64 (15.9)	102 (26.1)	271 (58.0)	
Insurance influenced treatment decision				.005
Not at all	161 (19.7)	198 (26.1)	503 (54.1)	
Only a little/somewhat	15 (9.7)	35 (22.7)	102 (67.6)	
A lot	20 (13.8)	43 (33.4)	73 (52.8)	
Comorbidity index				.0001
0	56 (14.3)	92 (23.2)	310 (62.4)	
1	64 (15.3)	96 (27.3)	210 (57.4)	
2	42 (20.5)	51 (28.1)	111 (51.4)	
3+	41 (31.6)	47 (34.8)	54 (33.6)	
Urinary leakage				<.0001
Daily or more	26 (26.4)	42 (42.6)	34 (30.9)	
Weekly or less	28 (21.7)	44 (41.8)	40 (36.5)	
Not at all	147 (16.4)	197 (23.3)	603 (60.3)	
Urgent bowel movements				.06
Almost everyday	3 (27.3)	8 (53.4)	3 (19.4)	
Some days	30 (19.3)	53 (33.1)	84 (47.6)	
Rarely/not at all	170 (17.7)	222 (25.2)	594 (57.1)	
Erections				.0001
None	27 (22.3)	39 (40.0)	42 (37.7)	
Partial only	37 (23.5)	50 (33.1)	67 (43.4)	
Hard/hard and partial	130 (15.9)	184 (23.4)	559 (60.7)	
Abnormal DRE				.47
No	73 (16.6)	119 (27.5)	281 (56.0)	
Yes	100 (17.3)	137 (26.3)	338 (56.4)	
PSA (ng/mL)				.0001
<10.0	106 (15.5)	179 (27.1)	474 (57.4)	
10.0–19.9	36 (16.5)	57 (26.6)	124 (56.9)	
≥20.0	45 (29.0)	45 (32.8)	55 (38.2)	
Gleason score				.09
2–4	31 (25.9)	33 (23.3)	92 (50.8)	
5–7	132 (15.9)	208 (27.6)	485 (56.6)	
8–10	28 (23.6)	31 (31.6)	51 (44.8)	
Tumor aggressiveness				.001
PSA ≥ 20 ng/mL or Gleason ≥ 8	57 (24.6)	66 (31.9)	99 (43.5)	
PSA < 20 ng/mL and Gleason < 8	123 (15.8)	204 (27.1)	511 (57.1)	
Bone scan				.0001
Negative	98 (13.8)	195 (29.7)	445 (56.5)	
Equivocal	8 (10.2)	16 (24.1)	75 (62.4)	
Not done/unknown	97 (27.1)	75 (21.7)	196 (51.2)	

* Weighted to reflect all eligible prostate cancer patients in the study area.

NHW, non-Hispanic white; AA, African American; DRE, digital rectal examination; PSA, prostate-specific antigen.

Table 3. Adjusted Percentage Distributions for Patients to Receive Treatment by Tumor Aggressiveness*

Covariate	Treatment			P Value
	Conservative	Radiation	Prostatectomy	
Gleason < 8 and PSA < 20 ng/mL				.21
NHW	15.5	27.8	56.7	
AA	20.0	20.6	59.5	
Gleason ≥ 8 or PSA ≥ 20 ng/mL				.003
NHW	16.3	31.7	52.0	
AA	38.9	25.9	35.2	
Gleason or PSA unknown				.72
NHW	19.8	17.7	62.5	
AA	18.4	11.9	69.7	
Age at diagnosis				.0001
50–64	10.9	16.3	72.8	
65–74	23.4	34.8	41.8	
Registry				.001
Connecticut	17.1	31.4	51.4	
Atlanta	10.5	29.4	60.1	
Los Angeles	21.1	21.3	57.6	
Marital status				.04
Not married	23.1	21.2	55.7	
Married	16.3	27.6	56.1	
Education				.92
Less than high school graduate	18.7	26.2	55.1	
High school graduate/some college	17.0	25.5	57.5	
College graduate	18.2	27.2	54.6	
Insurance influenced treatment decision				.02
Not at all	19.6	25.6	54.9	
Only a little / somewhat	10.7	24.1	65.2	
A lot	13.8	33.4	52.8	
Comorbidity index				.03
0	17.1	24.5	54.9	
1	14.4	27.1	58.5	
2	17.7	26.3	56.0	
3+	27.4	29.8	42.5	
Urinary leakage				<.001
Daily or more	21.0	38.2	40.7	
Weekly or less	19.3	39.4	41.4	
Not at all	17.2	23.2	59.5	
Urgent bowel movements				.24
Almost everyday	25.0	42.6	32.3	
Some days	21.0	29.9	49.1	
Rarely / not at all	17.2	25.4	47.4	
Erections				.41
None	16.3	32.0	51.7	
Partial only	20.2	29.2	50.6	
Hard/hard and partial	17.6	24.7	57.6	
Abnormal DRE				.60
No	16.8	28.5	54.8	
Yes	17.5	25.0	57.5	
Bone scan				<.001
Negative	14.1	27.9	58.0	
Equivocal	11.4	17.9	70.7	
Not done / unknown	26.2	24.6	49.1	

* Weighted to reflect all eligible prostate cancer patients in the study area.

NHW, non-Hispanic white; AA, African American; PSA, prostate-specific antigen; DRE, digital rectal examination.

management. Racial differences in treatment selection were small and nonsignificant for less aggressive cancers, though African Americans were still slightly more likely to receive conservative management.

Given that African Americans are at increased risk for presenting with advanced stage disease,¹ we explored

whether racial differences in evaluating cancer stage may have explained the treatment disparity seen with the more aggressive cancers. Men with more aggressive cancers who did not have a staging work-up with a bone scan were significantly more likely than those who did to receive conservative management: 27.1% versus 13.6%, $P < .001$.

However, we found no significant difference in the proportion of African Americans or non-Hispanic whites who underwent a bone scan, either with more aggressive (64.5% vs 65.9%) or less aggressive cancers (50.3% vs 52.1%).

Because we defined initial treatment as occurring in the first 6 months following diagnosis, we also looked at self-reported treatment at 12 and 24 months following diagnosis. Even with these additional data, we found no changes in the racial distribution of treatment selections (data not shown).

DISCUSSION

We found a significant interaction between race and tumor aggressiveness for the initial treatment of clinically localized prostate cancer in a population-based cohort of African-American and non-Hispanic white men. Among patients with clinically more aggressive cancers, defined by elevated PSA levels and/or Gleason scores, African Americans were significantly less likely to undergo radical prostatectomy and significantly more likely to receive conservative management. However, the majority of study subjects (71.1%) had less aggressive cancers, and we found no significant racial differences in treatment for this group. Although African Americans were slightly more likely to receive conservative management, the proportions of men undergoing radical prostatectomy were essentially identical.

We considered a number of explanations for the racial differences in treating the clinically more aggressive cancers. In general, African Americans have more aggressive cancers than non-Hispanic whites and are more likely to present with advanced-stage disease.^{1,2} Men with a clinically localized cancer but elevated PSA levels and/or high Gleason scores are at increased risk of having a pathologically advanced cancer,²² and radical prostatectomy is unlikely to be curative for these patients.²⁵ Among men with more aggressive cancers, we found no racial differences in undergoing bone scans, which would detect metastatic disease. However, physicians may have empirically treated these African-American subjects as being more likely to have clinically advanced-stage disease by withholding radical prostatectomy and offering either conservative management or radiation therapy. This explanation is plausible because African Americans with more aggressive cancers were more likely to be treated conservatively (38.9% vs 16.3%), though they were slightly less likely to receive radiation therapy (25.9% vs 31.7%).

African Americans with more aggressive cancers may also have been in poorer health than non-Hispanic whites. Although adjusting for comorbidity did not explain away the racial differences in treatment, African Americans were significantly more likely to report multiple comorbid conditions. Our measure of comorbidity may not have captured baseline health and disease severity accurately enough to account for treatment differences.

Physicians also have an obvious role in influencing treatment selection. In a study of North Carolina men with

prostate cancer, Demark-Wahnefried et al. found few racial differences regarding types of treatment discussed with physicians or in receiving aggressive treatment.²⁶ Furthermore, the physician's recommendation was the most important determinant of treatment selection. Although we found no racial differences in discussing radical prostatectomy and radiation therapy among men with more aggressive cancers (data not shown), physicians may have been less likely to recommend aggressive treatment for African-American subjects if they believed them to be at increased risk for poor outcomes. Such judgments may have been based on the physician's perception of comorbidity or psychosocial conditions that we did not capture with our survey instrument. Another possibility is that aggressive treatments were recommended, but the content or the quality of the discussion dissuaded African Americans from these treatments. We do not know whether the patients fully understood their treatment options or how they weighed the uncertainties of disease prevention against known treatment complications.

We found no racial differences in treating prostate cancer for the majority of the PCOS subjects—those with less aggressive disease. Most importantly, essentially equal proportions of African Americans and non-Hispanic whites underwent radical prostatectomy in both the unadjusted and adjusted analyses. Although some previous studies have reported similar findings,^{4,26–28} they were limited either by having small sample sizes, by not adjusting results for comorbidity or tumor aggressiveness, or by excluding men pathologically upstaged after radical prostatectomy. Most studies consistently showed that African Americans were less likely than non-Hispanic whites to receive aggressive treatment, particularly radical prostatectomy, for early stage prostate cancer.^{11–13,29–33}

The conflicting results may be explained by secular trends in diagnosing prostate cancer. Many cases in the previous reports were diagnosed before PSA testing was available.^{11–13,29,33–35} Nearly three quarters of the conservatively treated men in the study by Schapira et al.¹² were diagnosed following transurethral resection of the prostate (TURP), as were more than a third of the patients evaluated by Klabunde et al.¹³ Men with a screening-detected cancer are probably more likely to consider aggressive treatment than those with incidental cancers, as evidenced by the increasing rate of radical prostatectomy and radiation following the introduction of PSA.^{9,10}

Another reason for the conflicting results was that we evaluated only subjects with clinically localized cancer. The largest previous studies used SEER data, which assign cancer stage using clinical and pathological data.^{11–13} The SEER staging will classify a man with clinically localized cancer who is upstaged following radical prostatectomy as having regional stage disease. Although Schapira et al. adjusted for SEER staging by reclassifying advanced cases with radical prostatectomy and lymphadenectomy as localized, other analyses combined local and regional cancers.^{11,13,36,37} Because radical prostatectomy is generally

reserved for local stage cancer, the racial differences seen in the combined analyses may reflect African Americans' greater likelihood for presenting with more aggressive and advanced stage cancers.

The finding that racial differences in undergoing radical prostatectomy appear to be decreasing with time raises another issue—are African Americans now receiving better care? Racial disparities have been reported for other cancers,^{38,39} end-stage renal disease,^{40,41} and coronary reperfusion,⁴² where African Americans were shown to be receiving less than optimal care. With clinically localized prostate cancer, though, there is less certainty about the benefits of aggressive treatment.⁴³ The first randomized trial demonstrating a benefit for radical prostatectomy compared to watchful waiting was just published in September, 2002.⁴⁴ Although prostate cancer deaths were significantly decreased in this Scandinavian trial, there was no significant difference for overall survival. No similar studies have been published for radiation therapy. Even though we found no racial differences for undergoing radical prostatectomy, African Americans were still slightly more likely to be managed conservatively. Given the known risks and uncertain benefits of aggressive treatment for clinically localized disease, this may be an appropriate decision.

Our analyses have some potential limitations. Baseline data on symptoms and function were obtained up to 6 months after the time of diagnosis and could be affected by recall bias. However, a validation study of the Prostate Cancer Outcomes Study showed reasonably high agreement between baseline and 6-month estimates of prediagnostic function.⁴⁵ Selection bias could be introduced by the nonresponders. In our restricted analysis, where subject eligibility was based on age, race, stage, and geographic area, 14.6% of eligible subjects did not respond. However, there were no significant differences between the responders and the nonresponders for age, race, stage, grade, or initial treatment. Finally, we may have misclassified initial treatment because treatment assignments were based on data from medical record abstractions completed within 6 months of diagnosis. We found, though, that the racial patterns for treatment persisted when we used self-reported data to obtain follow-up through 24 months after diagnosis.

We conclude that the African Americans in PCOS with more aggressive cancers were less likely than non-Hispanic whites to undergo radical prostatectomy, but more likely to undergo conservative management. This disparity may reflect African Americans' greater risk for presenting with pathologically advanced cancer and/or their values regarding the risks and benefits of surgical treatment. Comorbidity and conventional socioeconomic factors could not explain treatment differences, though more sensitive measures may be needed. Among the majority of subjects—those with less aggressive cancers—there were no significant treatment differences by race. Although the African Americans were slightly more likely to receive conservative management, the proportions of men undergoing radical prostatectomy

were essentially identical. Further research should evaluate the content and quality of treatment discussions as well as patient preferences regarding the risks and benefits of aggressive treatment.

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