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Health Disparities and Inequities in Prostate Radiotherapy

COMPPARE ACTIVATION WORKSHOP:
RECRUITMENT, RETENTION, AND MAXIMIZING THE VALUE OF COMPPARE
March 23, 2019
Amelia Island, Florida

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Disclosures

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- No conflicts of interest to disclose

Objectives

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- To review reported health disparities and inequities in the use radiotherapy for prostate cancer:
  - Diagnostic/Staging Work-up
  - Treatment
    - Omission
    - Delay
    - Type
  - Clinical outcomes

Definitions

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- Health disparities:
  - differences in the incidence, prevalence, mortality, and burden of diseases and other adverse health conditions that exist among specific population groups.
    - National Institute on Minority Health and Health Disparities (NIMHD).

- NIH-designated U.S. health disparity populations:
  - Blacks/African Americans
  - Hispanics/Latinos
  - American Indians/Alaska Natives
  - Asian Americans
  - Native Hawaiians and other Pacific Islanders
  - Socioeconomically disadvantaged populations
  - Underserved rural populations
  - Sexual and gender minorities

Definitions

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What Is Health Equity? A Definition

For general purposes, health equity can be defined as follows:

Health equity means that everyone has a fair and just opportunity to be as healthy as possible. This requires removing obstacles to health such as poverty, discrimination, and their consequences, including powerlessness and lack of access to good jobs with fair pay, quality education and housing, safe environments, and health care.

Robert Wood Johnson Foundation

Definitions

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- **6 Domains of Health Care Quality**: (National Academy of Medicine)
  1) **Safe**: Avoiding harm to patients from the care that is intended to help them.
  2) **Effective**: Providing services based on scientific knowledge to all who could benefit and refraining from providing services to those not likely to benefit (avoiding underuse and misuse, respectively).
  3) **Patient-centered**: Providing care that is respectful of and responsive to individual patient preferences, needs, and values and ensuring that patient values guide all clinical decisions.
  4) **Timely**: Reducing waits and sometimes harmful delays for both those who receive and those who give care.
  5) **Efficient**: Avoiding waste, including waste of equipment, supplies, ideas, and energy.
  6) **Equitable**: Providing care that does not vary in quality because of personal characteristics such as gender, ethnicity, geographic location, and socioeconomic status.

Prostate cancer RT disparities literature review

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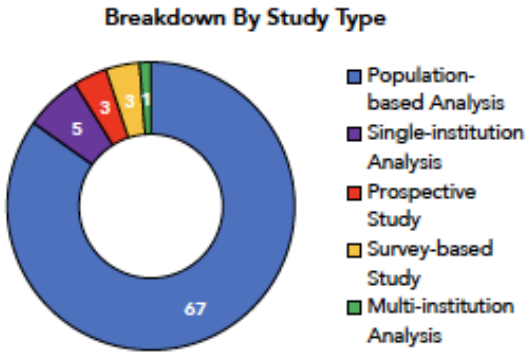
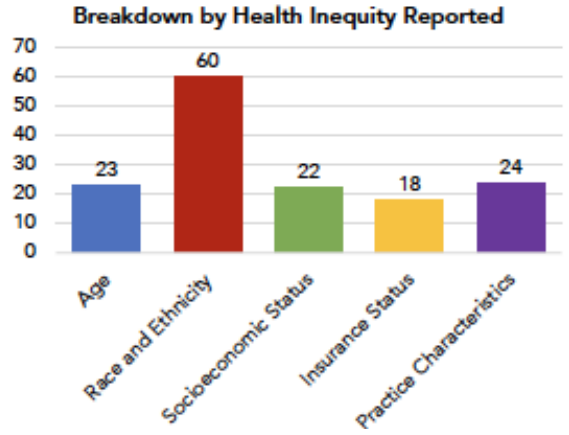
Methods

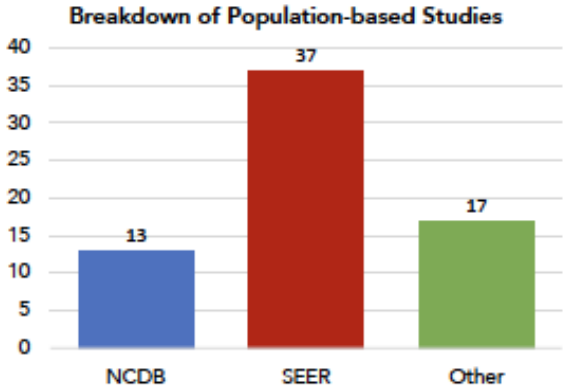
- Generated a comprehensive literature search in the PubMed database with the query:
  - prostate AND (radiation OR proton) AND (disparities OR "socioeconomic status" OR "health services research" OR inequity OR race[Title])
- Studies were excluded if they:
  - Did not examine RT or related resource utilization
  - Did not address health inequities
  - Were not based in the United States

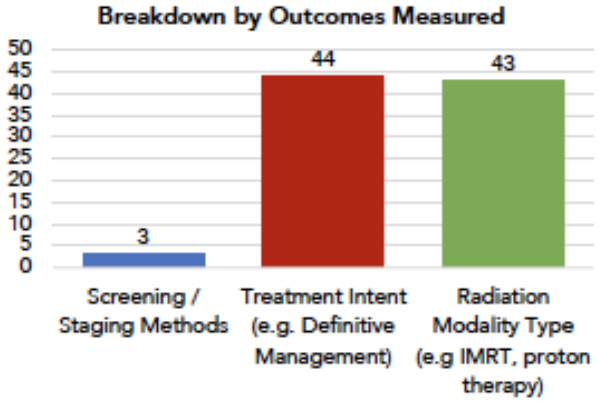
Results

- 79 studies met inclusion criteria (with 281 studies returned in the initial search query)
- Studies were published between 1991 and 2017
- 78% of studies published after 2010
- Study types included: population-based analyses, single-institution analyses, prospective studies, survey-based studies, and a multi-institutional analysis
- Population databases included the National Cancer Database (NCDB), Surveillance, Epidemiology, and End Results (SEER) database, and Other (Medicare, Veteran Affairs, and state specific registries)









- yielded 79 studies

Katipally R, Deville C. ARS 2018

Background

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- Well-documented disparities exist in prostate cancer incidence, morbidity, and mortality in Black vs. White males in the United States

Chornokur G, Dalton K, Borysova ME, Kumar NB. Disparities at presentation, diagnosis, treatment, and survival in African American men, affected by prostate cancer. Prostate. 2011 Jun 15;71(9):985-97.
Bock CH, Powell I, Kittles RA, Hsing AW, Carpten J. Racial disparities in prostate cancer incidence, biochemical recurrence, and mortality. Prostate Cancer. 2011;2011:716178

Cancer Facts & Figures for African Americans 2016-2018

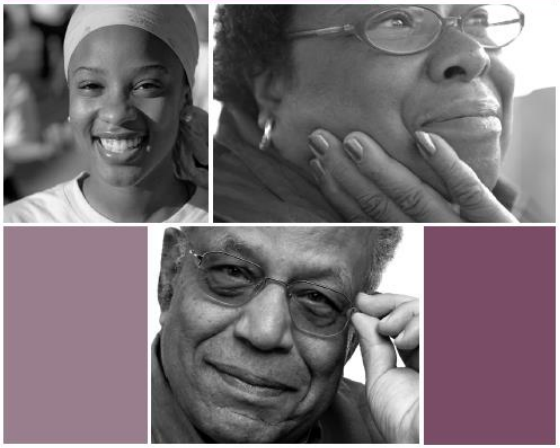


Figure 2. Leading Sites of New Cancer Cases and Deaths among Blacks, 2016 Estimates*

Estimated New Cases		Estimated Deaths	
Male	**Female**	**Male**	**Female**
Prostate 29,530 (31%)	Breast 30,700 (32%)	Lung & bronchus 9,710 (27%)	Lung & bronchus 7,340 (22%)
Lung & bronchus 13,720 (15%)	Lung & bronchus 11,010 (11%)	Prostate 4,450 (12%)	Breast 6,310 (19%)
Colon & rectum 8,690 (9%)	Colon & rectum 8,550 (9%)	Colon & rectum 3,800 (11%)	Colon & rectum 3,230 (10%)
Kidney & renal pelvis 4,830 (5%)	Uterine corpus 6,440 (7%)	Liver & intrahepatic bile duct 2,880 (8%)	Pancreas 2,550 (8%)
Liver & intrahepatic bile duct 4,250 (5%)	Thyroid 4,230 (4%)	Pancreas 2,390 (7%)	Uterine corpus 2,110 (6%)
Non-Hodgkin lymphoma 3,230 (3%)	Pancreas 3,490 (4%)	Stomach 1,160 (3%)	Ovary 1,370 (4%)
Pancreas 3,210 (3%)	Myeloma 3,120 (3%)	Leukemia 1,110 (3%)	Liver & intrahepatic bile duct 1,020 (3%)
Myeloma 3,070 (3%)	Kidney & renal pelvis 3,030 (3%)	Myeloma 1,040 (3%)	Myeloma 990 (3%)
Urinary bladder 2,910 (3%)	Non-Hodgkin lymphoma 2,750 (3%)	Esophagus 920 (3%)	Leukemia 910 (3%)
Leukemia 2,840 (3%)	Leukemia 2,560 (3%)	Kidney & renal pelvis 860 (2%)	Uterine cervix 750 (2%)
All sites 93,990	All sites 95,920	All sites 35,660	All sites 33,750

*Excludes basal cell and squamous cell skin cancers and in situ carcinoma with the exception of urinary bladder.

Table 2. Lifetime Probability of Developing or Dying from Invasive Cancers by Race/Ethnicity and Sex, US, 2010-2012*

		Developing		Dying	
		Black (%)	**NH White (%)**	**Black (%)**	**NH White (%)**
All Sites†	Male	40.8 (1 in 2)	42.4 (1 in 2)	23.4 (1 in 4)	22.8 (1 in 4)
	Female	34.3 (1 in 3)	39.0 (1 in 3)	19.4 (1 in 5)	19.5 (1 in 5)
Prostate	Male	18.2 (1 in 6)	13.3 (1 in 8)	4.4 (1 in 23)	2.4 (1 in 42)
Breast	Female	11.1 (1 in 9)	13.1 (1 in 8)	3.3 (1 in 31)	2.7 (1 in 37)
Lung & bronchus	Male	7.5 (1 in 13)	7.5 (1 in 13)	6.4 (1 in 16)	6.6 (1 in 15)
	Female	5.4 (1 in 19)	6.7 (1 in 15)	4.2 (1 in 24)	5.3 (1 in 19)
Colon & rectum	Male	4.9 (1 in 21)	4.6 (1 in 22)	2.4 (1 in 42)	1.9 (1 in 52)
	Female	4.7 (1 in 21)	4.3 (1 in 23)	2.1 (1 in 47)	1.8 (1 in 56)

Background

ELSEVIER
Urologic Oncology: Seminars and Original Investigations 33 (2015) 70.e15–70.e22
UROLOGIC ONCOLOGY

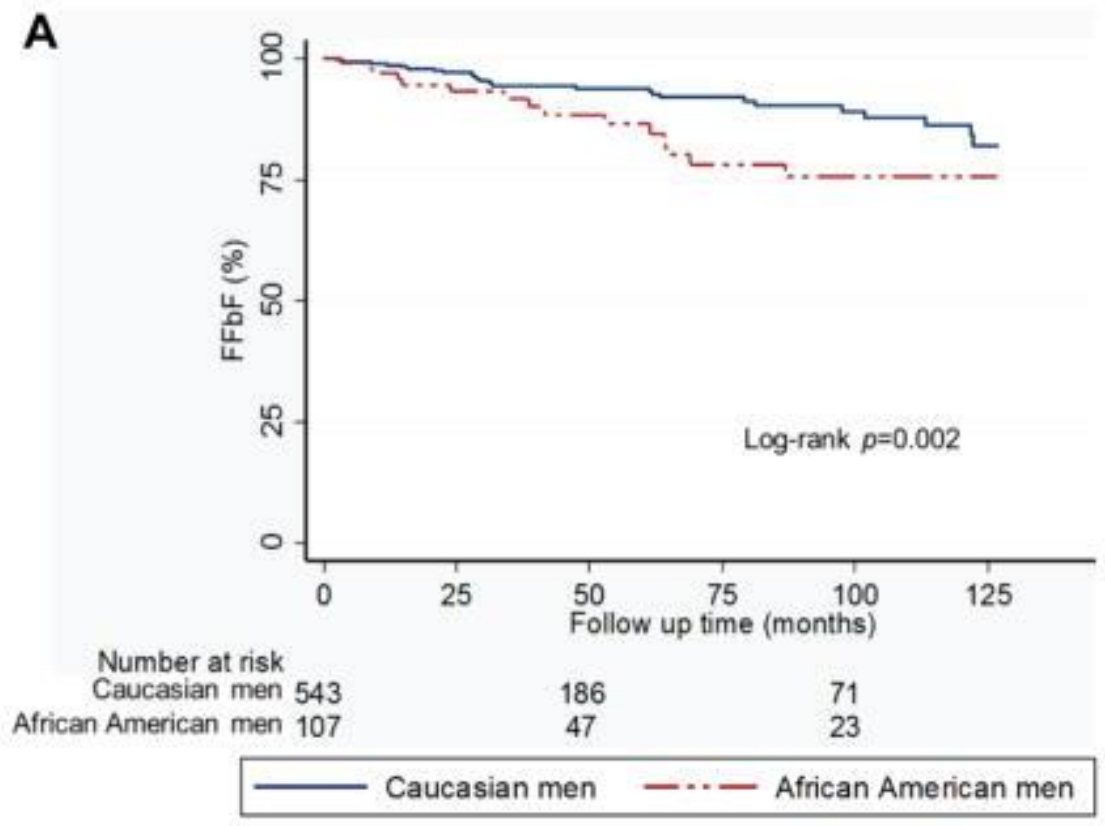
Original article

African American men with low-grade prostate cancer have increased disease recurrence after prostatectomy compared with Caucasian men

Kosj Yamoah, M.D., Ph.D.[a,*], Curtiland Deville, M.D.[b], Neha Vapiwala, M.D.[b], Elaine Spangler, M.S.[b], Chamita M. Zeigler-Johnson, Ph.D.[a], Bruce Malkowicz, M.D.[b], David I. Lee, M.D.[b], Michael Kattan, Ph.D.[c], Adam P. Dicker, M.D., Ph.D.[a], Timothy R. Rebbeck, Ph.D.[b]

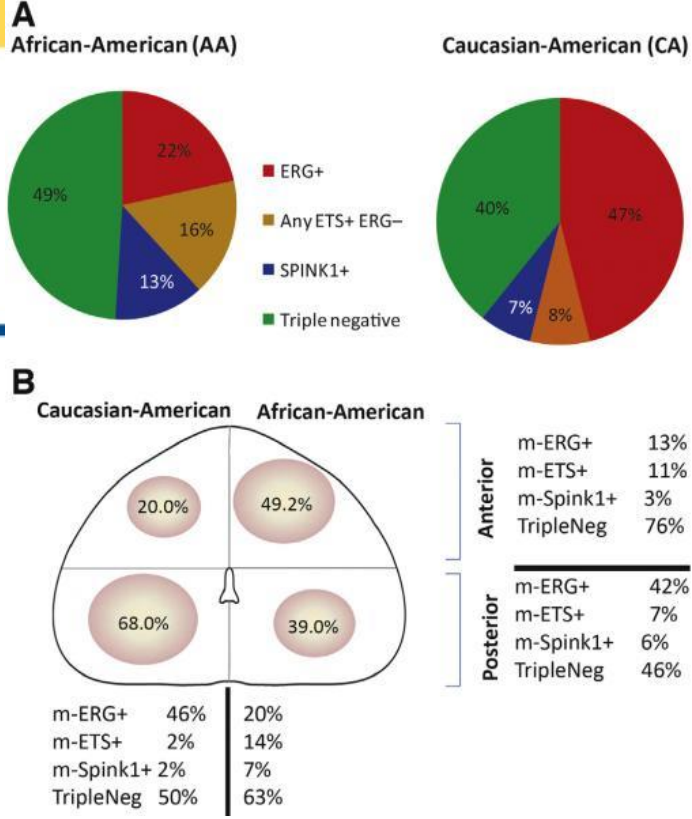
[a] Department of Radiation Oncology, Sidney Kimmel Cancer Center and Sidney Kimmel Medical College of Thomas Jefferson University, Philadelphia, PA
[b] The Abramson Cancer Center, University of Pennsylvania Perelman School of Medicine, Philadelphia, PA
[c] Cleveland Clinic, Cleveland, OH

- Black men with low grade prostate cancer had increased recurrence after radical prostatectomy



Background

- Black men classified as having very low risk prostate cancer, eligible for active surveillance, were more likely to have:
  - adverse pathologic features at the time of radical prostatectomy
  - larger dominant intraprostatic lesions with high prevalence of anterior foci.



Sundi D, Ross AE, et al. African American men with very low-risk prostate cancer exhibit adverse oncologic outcomes after radical prostatectomy: should active surveillance still be an option for them? J Clin Oncol. 2013 Aug 20;31(24):2991-7.

Sundi D, Kryvenko ON, et al. Pathological Examination of Radical Prostatectomy Specimens in Men with Very Low Risk Disease at Biopsy Reveals Distinct Zonal Distribution of Cancer in Black American Men. J Urol. 2013 Jun 14.

Advances in Radiation Oncology (2016) 1, 325-332

advances in radiation oncology

www.advancesradonc.org

Scientific Article

Disparities in staging prostate magnetic resonance imaging utilization for nonmetastatic prostate cancer patients undergoing definitive radiation therapy

Ayobami Ajayi BA [a], Wei-Ting Hwang PhD [b], Neha Vapiwala MD [a], Mark Rosen MD PhD [c], Christina H. Chapman MD [d], Stefan Both PhD [e], Meera Shah BS [f], Xingmei Wang MS [b], Atu Agawu MD MPH [g], Peter Gabriel MD [a], John Christodouleas MD MPH [a], Zelig Tochner MD [a], Curtiland Deville MD [h,*]

Diagnostic/ Staging

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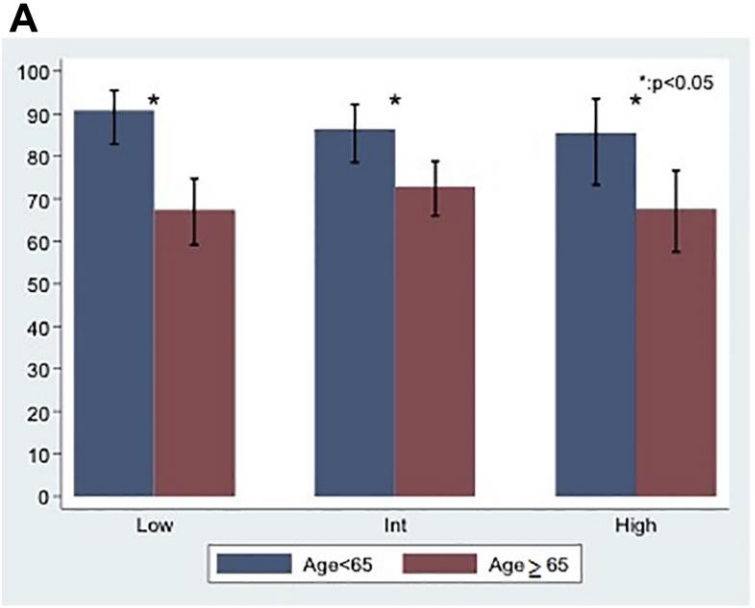
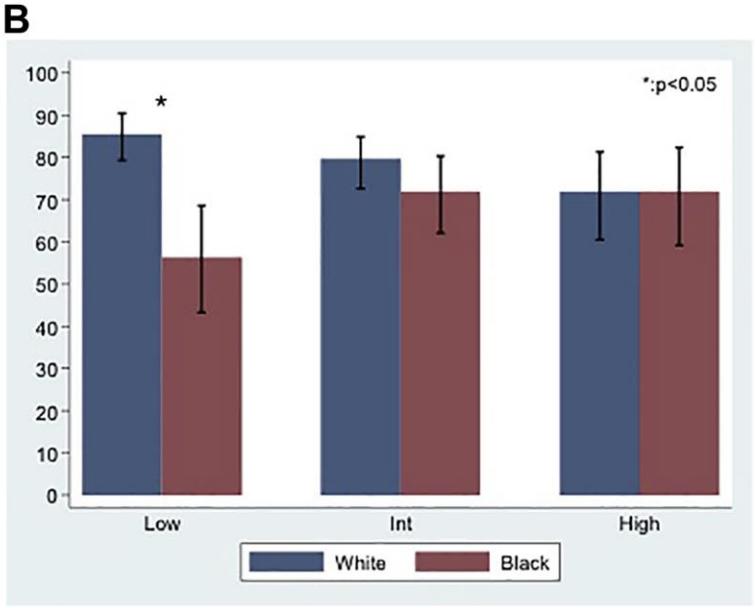
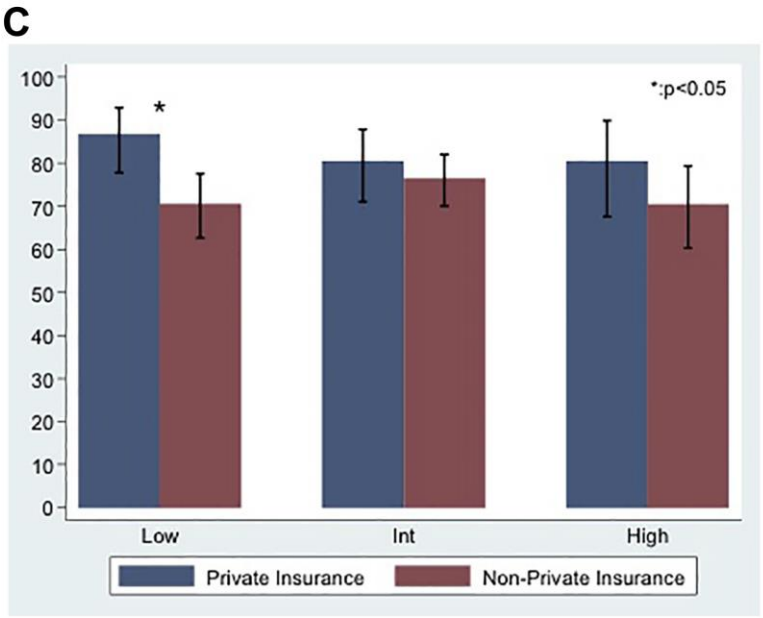
		OR (95% CI)	P-value
Age (years)		0.92 (0.89, 0.94)	<0.001
Race	Black vs. White	0.51 (0.35, 0.73)	<0.001
	Other vs. White	1.40 (0.61, 3.23)	0.432
Poverty	Yes vs. No	0.53 (0.36, 0.77)	<0.001
Distance (mi)	≥ 45 vs. <45	1.79 (1.11, 2.88)	0.017
Primary Insurance	Non-private vs. Private	0.57 (0.39, 0.84)	0.005
Treatment Year	2008-2009 vs. 2005-2007	0.43 (-0.05, 2.63)	0.076
	2010-2013 vs. 2005-2007	1.40 (0.61, 3.23)	0.432
PSA (ng/mL)		0.99 (0.98, 1.01)	0.354
Gleason Score	7 vs. 6	0.96 (0.66, 1.41)	0.845
	8 vs. 6	0.87 (0.44, 1.72)	0.683
	9 vs. 6	0.56 (0.27, 1.15)	0.112
Clinical T stage	T2 vs. T1	0.81 (0.53, 1.24)	0.337
	T3 vs. T1	3.37 (1.42, 7.97)	0.006
Risk Group	Intermediate vs. High	1.27 (0.81, 2.00)	0.296
	Low vs. High	1.17 (0.73, 1.86)	0.514
Percent positive biopsy cores		0.64 (0.25, 1.63)	0.348
IPSS		0.99 (0.95, 1.03)	0.589

- 705 non-metastatic PCa patients
- RT from 2005-2013
- Uni- and multivariable logistic regression evaluated the relationship of clinical and demographic characteristics with MRI utilization







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Age, Race, and Insurance associated on multivariable analysis

(A) older patients across all risk groups and (B) Black or (C) non-private insurance patients in the low risk group were **less likely to undergo MRI.**

Treatment Delay

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Cancer

American Cancer Society

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Original Article

Racial differences in time from prostate cancer diagnosis to treatment initiation

A Population-Based Study

William A. Stokes BS, Laura H. Hendrix MS, Trevor J. Royce MS, Ian M. Allen BS, Paul A. Godley MD, PhD, Andrew Z. Wang MD, Ronald C. Chen MD, MPH

First published: 28 May 2013 Full publication history

DOI: 10.1002/cncr.27975 View/save citation

- The IOM has identified **timely delivery of care** as an **indicator for quality** health care
- Treatment delay is a potentially modifiable obstacle that can contribute to the disparities among Black vs White prostate cancer patients in recurrence and mortality.

Treatment Delay

Cancer
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Original Article

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- Using SEER-Medicare linked database
- compared time from diagnosis to treatment in 2,506 AA and 21,454 Caucasian patients
- diagnosed with localized prostate cancer from 2004-2007 and treated within 12 mo.
- Linear regression to assess potential differences in time to treatment between AA and Caucasian patients, after adjusting for sociodemographic and clinical covariates.

Treatment Delay

Cancer
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Original Article

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Results:

- Time from diagnosis to definitive (prostatectomy or radiation) treatment was longer for AA patients in all risk groups
  - **and most pronounced in high-risk (96 vs. 105 days, P<.001)**
- Racial differences persisted (β = 7.6 for AA) on multivariate analysis.
- Delay was longer in more recent years.

Conclusion:

- AA patients with prostate cancer experienced longer time from diagnosis to treatment than Caucasian patients with prostate cancer.

Treatment Delay/ Omission

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Cancer
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Original Article

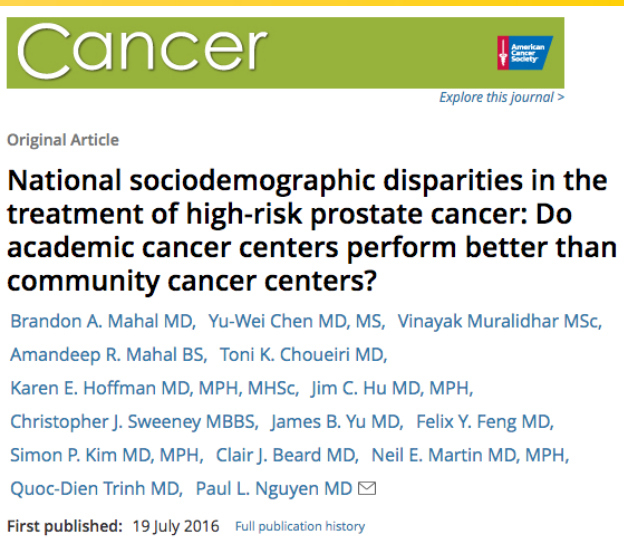
National sociodemographic disparities in the treatment of high-risk prostate cancer: Do academic cancer centers perform better than community cancer centers?

Brandon A. Mahal MD, Yu-Wei Chen MD, MS, Vinayak Muralidhar MSc, Amandeep R. Mahal BS, Toni K. Choueiri MD, Karen E. Hoffman MD, MPH, MHSc, Jim C. Hu MD, MPH, Christopher J. Sweeney MBBS, James B. Yu MD, Felix Y. Feng MD, Simon P. Kim MD, MPH, Clair J. Beard MD, Neil E. Martin MD, MPH, Quoc-Dien Trinh MD, Paul L. Nguyen MD ✉

First published: 19 July 2016 Full publication history

- The NCDB identified 138,019 patients diagnosed with nonmetastatic, high-risk prostate cancer from 2004-2012.
- Multivariable logistic analysis was used to identify independent determinants of definitive therapy.
- stratified by academic versus community cancer center.

Treatment Delay/ Omission



Results:

- Blacks, Hispanics, and uninsured patients:
  - less likely to receive definitive treatment at:
    - Community center hospitals (by 40%, 31% 75% respectively)
    - Academic hospitals (by 50%, 44%, 69%)
  - are more likely to experience treatment delays regardless of hospital type
    - Community centers: at least 15, 10 and 19 days
    - Academic centers: at least 19, 11 and 18 days

Treatment Delay/ Omission

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Original Article

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First published: 19 July 2016 Full publication history

⟸ No…

Conclusion:

- Academic cancer centers demonstrate similarly high rates of sociodemographic disparities as Community cancer centers.

Treatment Type

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Original Article

National Trends and Determinants of Proton Therapy Use for Prostate Cancer: A National Cancer Data Base Study

Brandon A. Mahal, MD[1,2]; Yu-Wei Chen, MD, MS[3]; Jason A. Efstathiou, MD, DPhil[2,4]; Vinayak Muralidhar, MSc[2]; Karen E. Hoffman, MD, MPH, MHSc[5]; James B. Yu, MD[6]; Felix Y. Feng, MD[7]; Clair J. Beard, MD[2,3]; Neil E. Martin, MD, MPH[2,3]; Peter F. Orio III, DO[2,3]; and Paul L. Nguyen, MD[2,3]

- NCDB 187,730 nonmetastatic prostate cancer EBRT from 2004-2012
- Multivariable logistic regression analysis adjusted for sociodemographic and clinical factors was used to identify independent determinants of proton therapy use.

Cancer Volume 122, Issue 10, pages 1505-1512, 11 MAR 2016

National trends and determinants of proton therapy use for prostate cancer: A National Cancer Data Base study

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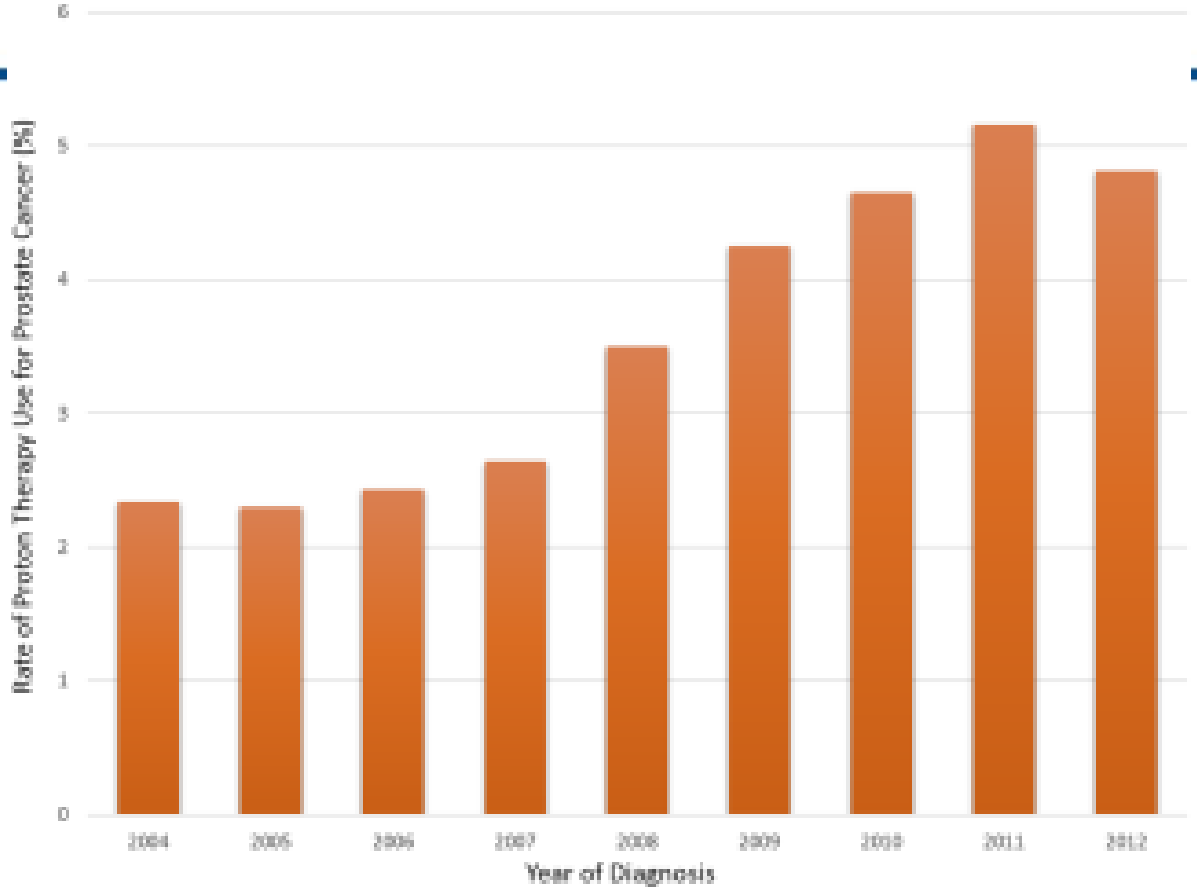

- Proton therapy use increased significantly 2.3% 2004, 5.2% 2011, and 4.8% 2012 (P<.0001).

Cancer
Volume 122, Issue 10, pages 1505-1512, 11 MAR 2016 DOI: 10.1002/cncr.29960
http://onlinelibrary.wiley.com/doi/10.1002/cncr.29960/full#cncr29960-fig-0002

Treatment Type

- significantly less likely to receive proton therapy even after robust multivariable adjustments:
- Blacks: OR 0.20 (0.18-0.22, P<.0001)
- Hispanics: OR 0.57 (0.48-0.66, P<.0001)
- SES
- Clinical parameters: lower PSA, low-grade or low-stage disease

TABLE 2. OR of Receipt of Proton Therapy

	OR (95% CI)	P
Age (1-y increment)	0.95 (0.94–0.95)	<.0001
Race		
Non-Hispanic white	Referent	NA
Black	0.20 (0.18–0.22)	<.0001
Hispanic	0.57 (0.48–0.66)	<.0001
Other minority	0.59 (0.50–0.69)	<.0001
Insurance status		
Medicare	Referent	NA
None	0.95 (0.79–1.15)	.60
Private	0.82 (0.76–0.88)	<.0001
Medicaid	0.18 (0.13–0.26)	<.0001
Other insurance	0.38 (0.30–0.47)	<.0001
Charlson-Deyo comorbidity score		
0	Referent	NA
1	1.20 (1.09–1.31)	.0002
≥2	0.72 (0.56–0.94)	.014
PSA (1-unit increment), ng/mL	0.98 (0.97–0.98)	<.0001
T classification		
T1	Referent	NA
T2	1.45 (1.36–1.53)	<.0001
T3	0.41 (0.33–0.52)	<.0001
T4	0.25 (0.08–0.80)	.02
Gleason score		
≤6	Referent	NA
7	0.60 (0.56–0.63)	<.0001
8–10	0.32 (0.29–0.35)	<.0001
Hospital setting		
Nonacademic	Referent	NA
Academic	123.3 (104.5–145.5)	<.0001
Household income		
<$38,000	Referent	NA
$38,000-$47,999	1.49 (1.34–1.66)	<.0001
$48,000-$62,999	1.53 (1.37–1.71)	<.0001
≥63,000	1.11 (0.99–1.26)	.082
Educational level (% with <high school)		
≥21%	Referent	NA
13%-20.9%	0.81 (0.73–0.90)	<.0001
7%-12.9%	0.82 (0.74–0.91)	.0002
<7%	1.04 (0.93–1.17)	.52
Residence		
Metropolitan	Referent	NA
Urban	0.30 (0.27–0.33)	<.0001
Rural	0.19 (0.15–0.24)	<.0001

Abbreviations: 95% CI, 95% confidence interval; NA, not applicable; OR, odds ratio; PSA, prostate-specific antigen.

Original Article

National Trends and Determinants of Proton Therapy Use for Prostate Cancer: A National Cancer Data Base Study

Brandon A. Mahal, MD[1,2]; Yu-Wei Chen, MD, MS[3]; Jason A. Efstathiou, MD, DPhil[2,4]; Vinayak Muralidhar, MSc[2]; Karen E. Hoffman, MD, MPH, MHSc[5]; James B. Yu, MD[6]; Felix Y. Feng, MD[7]; Clair J. Beard, MD[2,3]; Neil E. Martin, MD, MPH[2,3]; Peter F. Orio III, DO[2,3]; and Paul L. Nguyen, MD[2,3]

Treatment Type

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Advances in Radiation Oncology (2017) 2, 132-139

advances in radiation oncology

www.advancesradonc.org

Scientific Article

Sociodemographic disparities in the utilization of proton therapy for prostate cancer at an urban academic center

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- All low and intermediate-risk prostate cancer patients (n=633) treated from 2010-2015

Treatment Type

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- Variables associated with proton therapy:
  - Treatment years: 2011 (OR 4.87, 2.23-10.6), 2012 (OR 8.27, 3.43-19.9), and 2014 (OR 4.44, 1.94-10.2) relative to 2010
  - Distance (OR 1.14, 1.06-1.24)
  - Race:
    - Black (OR 0.29, 95% CI 0.15-0.57)
    - Other race (OR 0.42, 0.20-0.90)
  - One physician (OR 0.38, 0.18-0.81) relative to the reference physician
  - Not associated: clinical factors, such as PSA, prostate volume, IIEF, and ADT.

Treatment Type: Proton vs IMRT

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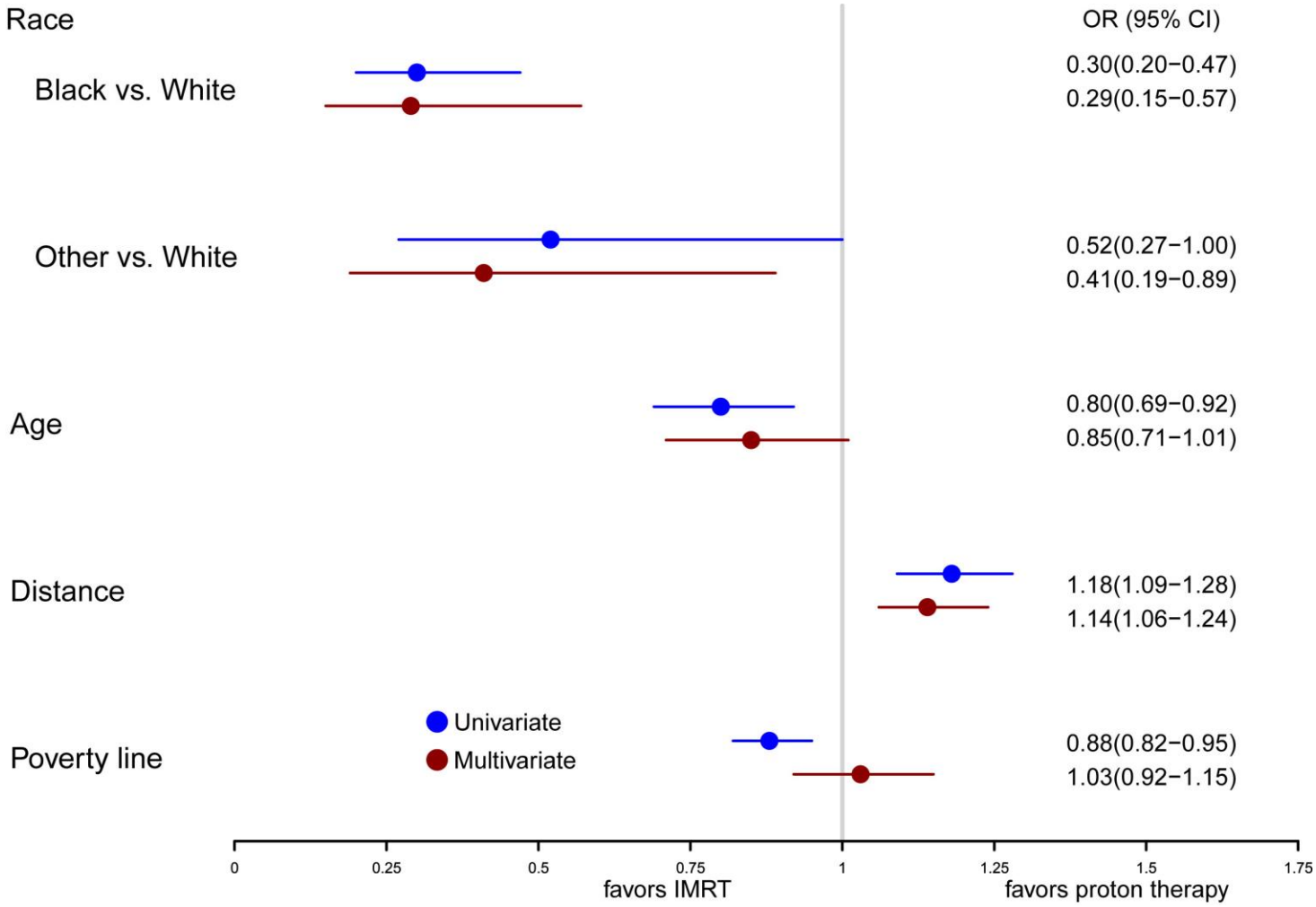

Clinical Outcomes: SEER-Medicare

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- SEER-Medicare study compared survival rates among African-American and Caucasian patients across different types
- Data on treatment modality, age, race, cancer stage, tumor grade, census tract socioeconomic status, and date of death
- 5,747 black and 38,242 white patients diagnosed at age 65-84 years with clinically localized prostate cancer between 1986 -1996 in 5 SEER sites followed through 1998.

Godley PA, Schenck AP, Amamoo MA, et al. Racial differences in mortality among Medicare recipients after treatment for localized prostate cancer. J Natl Cancer Inst. 2003;95(22):1702-10.

Clinical Outcomes: SEER-Medicare

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- Median survival in black patients relative to white patients was:
  - Surgery: 1.8 years less (95%CI = 1.5-2.0 yrs)
  - RT: 0.7 years less (95%CI = 0.5 to 1.0 yrs)
  - “nonaggressive” tx: 1.0 years less (95%CI = 0.7-1.1 yrs)

Clinical Outcomes: clinical trials

Androgen Receptor Activity and Radiotherapeutic Sensitivity in African-American Men with Prostate Cancer: A Large Scale Gene Expression Analysis and Meta-Analysis of RTOG Trials

D.E. Spratt,[1] R.T. Dess,[1] H.E. Hartman,[2] B.A. Mahal,[3] W.C. Jackson,[1] P.D. Soni,[4] M. Alshalalfa,[5] N. Fishbane,[6] Z.S. Zumsteg,[7] W.U. Shipley,[8] T.M. Pisansky,[9] M. Roach, III,[10] S.G. Zhao,[1] C. Speers,[11] E. Davicioni,[6] M. Schipper,[2] P.L. Nguyen,[12] E.M. Schaeffer,[13] F.Y. Feng,[14] and H.M. Sandler[15]; [1]*Department of Radiation Oncology, University of*

- Methods:
  - Transcriptome-wide expression profiles of tumor samples from 5,831 localized PCa patients were used with tissue from a prospective cohort (n=5,239) and 2 retrospective cohorts with long-term outcomes (n=592).

Clinical Outcomes: clinical trials

Androgen Receptor Activity and Radiotherapeutic Sensitivity in African-American Men with Prostate Cancer: A Large Scale Gene Expression Analysis and Meta-Analysis of RTOG Trials

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- Results:
  - AfA tumors had decreased double strand break repair pathway expression ($p<0.001$) and increased predicted RT sensitivity ($p<0.001$).
    - **suggests AfA may have improved outcomes with RT.**
  - 4 large RTOG trials were use to clinically test whether AfA tumors are more radiosensitive
    - On both unadjusted and propensity weighted cohorts (adjusting for age, performance status, PSA, Gleason grade, T-stage, N-stage, and use/duration of hormone therapy):
    - **AfA had significantly improved outcomes compared to Whites:**
      - BCR: HR 0.82; 95% CI 0.74-0.92; p = 0.0005
      - DM: HR 0.70; (95% CI 0.57-0.86; p = 0.0008).

Clinical Outcomes: clinical trials

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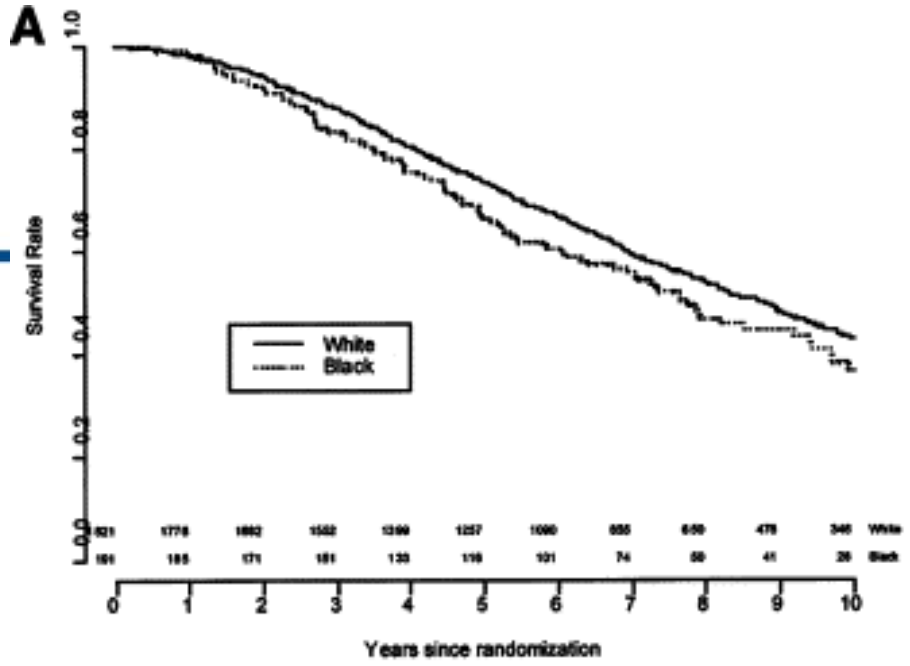
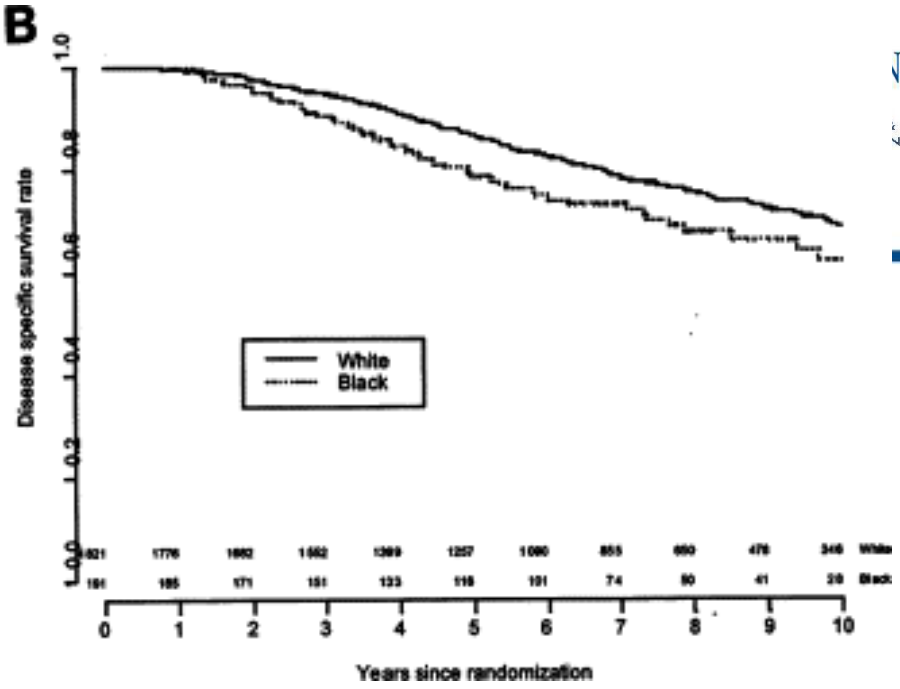
RACE AND SURVIVAL OF MEN TREATED FOR PROSTATE CANCER ON RADIATION THERAPY ONCOLOGY GROUP PHASE III RANDOMIZED TRIALS

MACK ROACH, III,* JIANDONG LU, MILJENKO V. PILEPICH, SUCHA O. ASBELL, MOHAMMED MOHIUDDIN AND DAVID GRIGNON

From the Departments of Radiation Oncology, Medical Oncology and Urology, University of California-San Francisco, San Francisco, California, Radiation Therapy Oncology Group Statistical Headquarters and Department of Radiation Oncology, Einstein Medical Center, Philadelphia, Pennsylvania, Department of Radiation Oncology, McAuley Health Center, Ann Arbor, Michigan, Department of Radiation Oncology, University of Kentucky, Lexington, Kentucky, and Department of Pathology, Wayne State University, Detroit, Michigan

- assessed the impact of race on survival
- 2,048 men treated with EBRT+/- ADT
- localized prostate cancer
- RTOG phase III randomized trials from 1975-1992





- On univariate analysis Blacks had lower overall (p=0.04, RR=1.24) and disease specific survival (p=0.016, RR=1.41).
- After adjusting for risk group and treatment type **race was no longer associated with outcome** (p>0.05).

Clinical Outcomes: clinical trials

original report

Overall Survival of Black and White Men With Metastatic Castration-Resistant Prostate Cancer Treated With Docetaxel

Susan Halabi, PhD[1]; Sandipan Dutta, PhD[1]; Catherine M. Tangen, PhD[2]; Mark Rosenthal, MD[3]; Daniel P. Petrylak, MD[4]; Ian M. Thompson Jr, MD[5]; Kim N. Chi, MD[6]; John C. Araujo, MD, PhD[7]; Christopher Logothetis, MD[7]; David I. Quinn, MBBS, PhD[8]; Karim Fizazi, MD, PhD[9]; Michael J. Morris, MD[10]; Mario A. Eisenberger, MD[11]; Daniel J. George, MD[1]; Johann S. De Bono, MD, PhD[12]; Celestia S. Higano, MD[2]; Ian F. Tannock, MD, PhD[13]; Eric J. Small, MD[14]; and William Kevin Kelly, DO[15]

TABLE 1. Summary of Trials Included in the Meta-Analysis

Trial (ClinicalTrials.gov Identifier)	Total Sample Size, No.	Calendar Year of Recruitment	Treatment Arms (No. of patients)
SWOG 9916[24] (NCT00004001)	674	Oct 1999-Jan 2003	Docetaxel + estramustine (n = 338) Mitoxantrone + prednisone (n = 336)
TAX 327[23]	1,006	Mar 2000-Jun 2002	Docetaxel + prednisone (n = 669) Mitoxantrone + prednisone (n = 337)
CALGB 90401[26] (NCT00110214)	1,050	May 2005-Dec 2007	Docetaxel + prednisone + bevacizumab (n = 524) Docetaxel + prednisone (n = 526)
SWOG 0421[28] (NCT00134056)	994	Aug 2006-May 2010	Atrasentan + docetaxel (n = 498) Placebo + docetaxel (n = 496)
VENICE[29] (NCT00519285)	1,224	Aug 2007-Feb 2010	Docetaxel + prednisone + aflibercept (n = 612) Docetaxel + placebo (n = 612)
ENTHUSE 33[27] (NCT00617669)	1,052	Jan 2008-May 2011	Docetaxel + zibotentan (n = 524) Docetaxel + placebo (n = 528)
READY[30] (NCT00744497)	1,522	Oct 2008-Apr 2011	Docetaxel + dasatinib (n = 762) Docetaxel + placebo (n = 760)
MAINSAIL[31] (NCT00988208)	1,059	Nov 2009-Nov 2011	Docetaxel + prednisone + lenalidomide (n = 533) + placebo (n = 526)
SYNERGY[32] (NCT01188187)	1,022	Aug 2010-Apr 2014	Docetaxel + prednisone + custirsen (n = 510) Docetaxel + prednisone (n = 512)

Abbreviations: CALGB, Cancer and Leukemia Group B; SWOG, Southwest Oncology Group.

- Blacks were younger and had worse performance status, higher testosterone and PSA, and lower Hgb than white men. Despite these differences, median OS:
  - Black: 21.0 mo (95%CI 19.4-22.5 mo) vs White: 21.2 mo (95%CI 20.8-21.7 mo)
- Pooled multivariable HR 0.81 (95%CI 0.72-0.91) → **Blacks decreased risk of death** compared to Whites (P<.001).
- When adjusted for known prognostic factors, significantly **increased Overall Survival in black vs white men with mCRPC** in these trials.

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Solutions and Interventions

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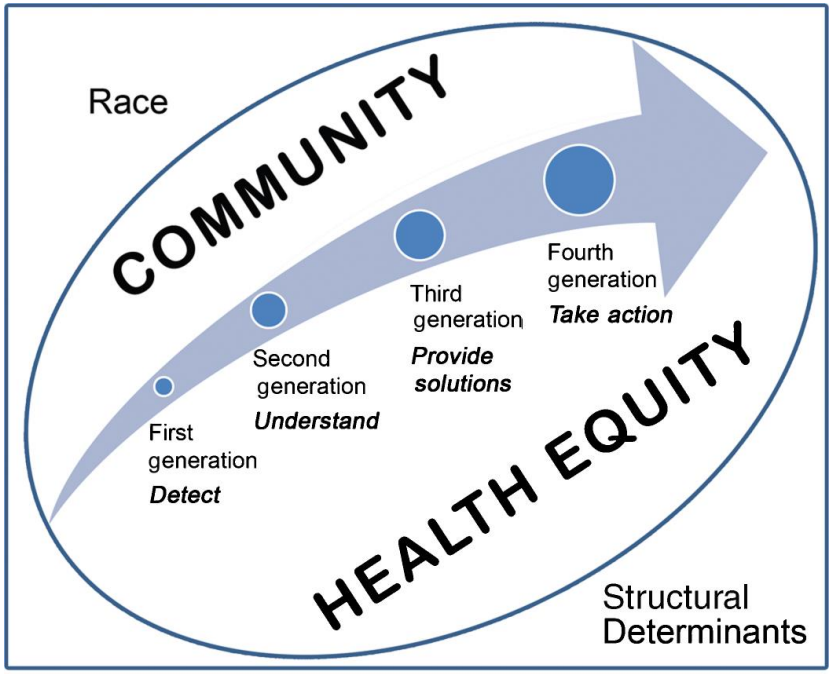
- Applying the 4th generation model for addressing health disparities requires
  - (1) a foundation of descriptive studies to characterize the problem
  - (2) explanative data
  - (3) interventional solutions and approaches
  - (4) public health praxis, infrastructure, and policy



Thomas SB, et al. 2011.
Annu. Rev. Public Health. 32:399–416

Conclusions

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- Health disparities and inequities exist in PCa RT:
  - Diagnostic/Staging work-up
  - Treatment Delay, Omission, and Type
  - Clinical outcomes
    - EXCEPT prospective Clinical Trials where equivalent and sometime better outcomes have been noted for certain demographic groups

- Community/Patient engagement and Quality metrics (e.g. monitoring time to treatment and technology utilization across demographics) may help mitigate disparities to achieve health equity in prostate RT

Thank You

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- Comments and Questions?

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EXTRA SLIDES

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Treatment Omission

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- 9771 patients with clinical N1M0 prostate cancer diagnosed from 1998 to 2012 using the National Cancer Database.
  - Multivariable logistic regression modeling identified patient-specific factors associated with reduced likelihood of receiving radiation or radical prostatectomy.

Muralidhar V(1), Mahal BA(1), et al. Disparities in the Receipt of Local Treatment of Node-positive Prostate Cancer.
Clin Genitourin Cancer. 2016 Oct 28. pii: S1558-7673(16)30320-2

CLINICAL Genitourinary Cancer
Prostate, Kidney, & Bladder

Treatment Omission

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- factors associated with reduced likelihood of local therapy for N1M0 patients included:
  - Race: black race vs white race
    - 44% vs 49%, AOR 0.76; P=.001
  - SES: bottom vs top income quartile
    - 45% vs 53%, AOR 0.69; P=.001
  - Age: age >66yo vs ≤66yo
    - 41% vs 55%, AOR 0.48; P<.001
  - Insurance: Medicaid or no insurance vs private insurance
    - 41% vs 49%, AOR 0.41; P<.001
  - Year of diagnosis before vs after 2005
    - 31% vs 62%, AOR 0.66; P<.001

Muralidhar V, Mahal BA, et al. Disparities in the Receipt of Local Treatment of Node-positive Prostate Cancer. Clin Genitourin Cancer. 2016 Oct 28.

Advances in Radiation Oncology (2016) 1, 325-332

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Diagnostic/ Staging

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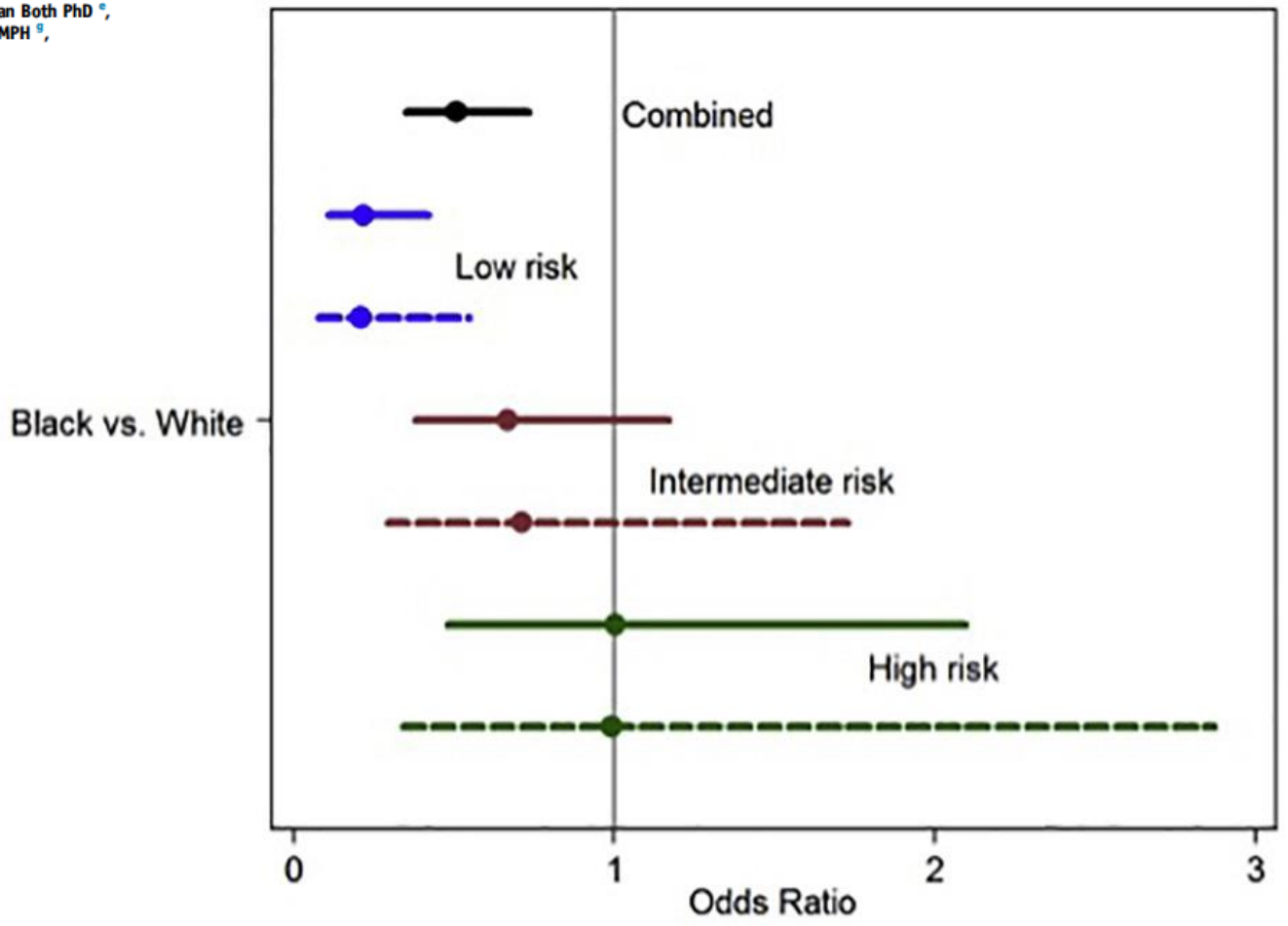
Scientific Article

Disparities in staging prostate magnetic resonance imaging utilization for nonmetastatic prostate cancer patients undergoing definitive radiation therapy

Ayobami Ajayi BA [a], Wei-Ting Hwang PhD [b], Neha Vapiwala MD [a], Mark Rosen MD PhD [c], Christina H. Chapman MD [d], Stefan Both PhD [e], Meera Shah BS [f], Xingmei Wang MS [b], Atu Agawu MD MPH [g], Peter Gabriel MD [a], John Christodouleas MD MPH [a], Zelig Tochner MD [a], Curtiland Deville MD [h,*]



Plot of adjusted* (dashed line) and unadjusted (solid line) odds ratios of prostate magnetic resonance imaging utilization for black vs white men from the multivariable analysis stratified by risk-group. *Adjusted for age, poverty, primary insurance type, distance, and clinical stage.

Clinical Outcomes: clinical trials

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TABLE 2. *Randomized trials reporting outcome after treatment for prostate cancer by race*

References	Stages	Treatment	No Disease Evidence/Survival Difference	Comments
Crawford et al[6]	American Urologic System D2	Leuprolide with or without flutamide	Not available/No	Race not significant when corrected for severity/extent of disease
Vogelzang et al[7]	American Urologic System D2	Goserlin vs. orchidectomy	Not available/No	Race not significant when corrected for severity/extent of disease
Smith et al[8]	Refractory metastatic	Systemic	No/No	Black men tended to do better than white men
Thompson et al[20]	American Urologic System D2	Orchiectomy with or without flutamide	Yes	Black men had worse outcome despite adjustment for other factors
Roach et al[5]	T1–T4	Radiotherapy with or without LH-RH drugs with or without flutamide	No/No	Race not significant when corrected for severity/extent of disease
Present series	Nx–1			

Comparable care was assumed because care was delivered on standardized protocols.

TABLE 3. *Contemporary retrospective prostate cancer radiotherapy studies comparing outcome by race*

References	Stages	Institution
Nautiyal et al[9]	T1–T3NXM0	University of Chicago
Zagars et al[10]	T1NxM0-T4NxM0	M. D. Anderson Cancer Center
Hart et al[11]	T1NxM0-T4NxM0	Wayne State University
Sohayda et al[12]	T1NxM0-T4NxM0	Cleveland Clinic
Preston et al[13]	T1NxM0-T4NxM0	Walter Reed Medical Center
Young et al[14]	T1NxM0-T4NxM0	University of California-San Francisco

Comparable care was assumed because the same type of treatment was delivered at the same institution, and there were no differences in no evidence of disease or survival data.