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# Surviving rectal cancer: examination of racial disparities surrounding access to care

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## ABSTRACT

**Background:** The aim of this study was to evaluate whether survival differences are attributable to disproportionate access to stage-specific rectal cancer treatment recommended by the National Comprehensive Care Network.

**Methods:** A retrospective analysis of the National Cancer Data Base between 1998 and 2006 was performed. A series of Kaplan-Meier survival analyses were used to compare 5-y survival among race cohorts. Propensity score matching was used to compare Caucasian and African American patients who received the same treatment by accounting for covariates.

**Results:** 5-y overall survival in African Americans was 50.7% versus 56.2% in Caucasians ( $P < 0.001$ ). In patients with stage I-III disease, 5-y survival was 58.7% in African Americans versus 63.1% in Caucasians ( $P < 0.001$ ). Analysis of patients receiving surgery for stage I-III disease, revealed a 61.1% 5-y survival in African Americans versus 65.8% in Caucasians ( $P < 0.001$ ). Propensity score matching did not eliminate the racial disparity. The median survival for Caucasian patients was 109.6 mo as compared to 85.8 mo for African Americans ( $P < 0.001$ ).

**Conclusions:** These data show that access to standard care appears to decrease but not eliminate the survival differences between African Americans and Caucasians with rectal cancer.

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## Introduction

African Americans have been shown to exhibit worse survival compared to Caucasians with rectal cancer.<sup>1</sup> This disparity is thought to be multifactorial. Some of the factors which have been hypothesized include the following: lower socioeconomic status, treatment inequalities, biological factors, lack of access to care, cultural differences, and comorbid disease. Previous studies have shown that African Americans tend to

be younger at the time of diagnosis and present with more advanced disease as compared to Caucasians.<sup>2</sup> Moreover, African Americans are less likely to receive National Comprehensive Care Network (NCCN) recommended stage-specific adjuvant therapy.<sup>3</sup>

There are other investigations that specifically address treatment-related racial disparities. In one Veterans Affairs Medical Center study, male patients diagnosed with colorectal cancer during 1989 were evaluated. In this equal access health

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care system, results suggested that equal treatment may eliminate the racial disparity in colorectal cancer survival.<sup>4</sup> A subsequent study performed at a single tertiary referral center noted no differences in overall survival and cancer-related mortality between African Americans and Caucasians with colorectal cancer that received identical treatment.<sup>5</sup> These studies combined both colon and rectal cancer patients' malignancies which have different surgical management and prognosis.<sup>6</sup>

Collectively, these findings provided the foundation for this study on a larger cohort of rectal cancer patients. We sought to provide a more contemporary, complete summary of the association between race and survival outcomes in rectal cancer. We hypothesized that a racial disparity still exists in survival of rectal cancer patients, and this disparity may be mitigated in the setting of equal access to treatment.

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## Materials and methods

### Data source

Data from the American College of Surgeons National Cancer Data Base (NCDB) rectal cancer participant user file was used for the years 1998-2006. The American Cancer Society and the Commission on Cancer of the American College of Surgeons created the NCDB to capture hospital registry data from Commission on Cancer accredited facilities. This is a nationwide, facility-based, clinical data set that captures approximately 70% of diagnosed cancers in the United States. The data set includes patient demographics, cancer stage, tumor pathology, treatment course, short-term surgical outcomes, and long-term survival. The year 2006 was chosen as the final year of analysis because the NCDB restricts survival analysis to patients who have reached 5 y of clinical follow-up. The main data set included records obtained during the years 1998-2010. To ensure 5-y survival data for all patients, 2006 was deemed the final year of analysis.

### Patient cohort

The NCDB was queried for patients diagnosed with rectal cancer based on International Classification of Diseases for Oncology, 3rd edition primary site and histology combinations (178,414 Caucasians; 18,385 African Americans). Patients with cancer of the rectosigmoid junction were excluded. Patients were dichotomized into African American or Caucasian. All other races were excluded. Demographics included: age at diagnosis (y), gender, primary insurance, income (median household income for patient zip code based on 2000 US Census data in quartiles), education (median percentage of adults in patient's zip code who did not graduate from high school based on 2000 US Census data in quartiles), tumor grade, tumor size, AJCC clinical stage, surgical procedure of the primary site, surgical approach, surgical margins, radiation therapy, chemotherapy, facility type, reason for not having surgery, 30-d mortality, and survival. A positive margin referred to any positive margin, either distal or circumferential. Access was defined as a patient receiving surgery when

indicated, with a negative resection margin, and NCCN guideline based utilization of chemotherapy and radiation.

### Statistical analysis

A series of Kaplan-Meier survival analyses were used to compare 5-y overall survival among race cohorts. These analyses assess racial differences in survival for all rectal cancer patients, those with surgically treatable cancer (stage I-III) and those with stage I-III disease who underwent surgery excluding local excision. The log rank test was used to examine the significance of the differences between the survival curves.<sup>7</sup> For each cohort, hazard ratios for overall mortality by race were calculated using multivariate Cox proportional hazards models and stratified on hospital ID number to account for patients clustering in hospitals.<sup>8</sup> Factors included in the multivariate model for stage I-IV and stage I-III groups were age at diagnosis, gender, race, primary insurance, income, education, facility type (Academic, Comprehensive Cancer Center, or Community Hospital), clinical stage, Charlson-Deyo (CD) score, and tumor grade. For patients with stage I-III disease that underwent surgery, additional factors included surgical procedure, circumferential margin status, and NCCN stage-specific receipt of chemotherapy and radiation. To compare a more homogeneous patient population, propensity score matching was performed on 7569 matched race pairs.<sup>9,10</sup> Factors in the propensity scores included the following: age at diagnosis, gender, race, primary insurance, income, education, facility type, clinical stage, CD score, surgical procedure, margin status, receipt of NCCN stage-specific recommended radiation therapy, NCCN stage-specific recommended neoadjuvant chemotherapy, and NCCN stage-specific recommended adjuvant chemotherapy. The number of patients able to be matched in the propensity score models was limited by the number of African Americans in the database. The data were analyzed using Stata 13.1 (StataCorp LP, College Station, TX, USA). Propensity score matching was performed using SAS 9.4 (Cary, NC, USA). This study was deemed exempt by our institution's internal review board. The data used in the study are derived from a deidentified NCDB file.

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## Results

### Patient demographics

There were a total of 178,414 Caucasians and 18,385 African Americans in the data set. African American patients were more likely to be under 50 y of age, uninsured, in the lowest income and education quartiles, and treated at an academic medical center (Table 1). Overall, 12.3% of African Americans as compared to 9.5% of Caucasians presented with stage IV disease ( $P < 0.001$ ).

### Survival analysis

For all patients diagnosed with rectal cancer stage I-IV, the 5-y overall survival in African Americans was 50.7% compared to 56.2% in Caucasians,  $P < 0.001$  (Fig. 1). Stage Specific survival is

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