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Race and Outcomes of Autologous Hematopoietic Cell Transplantation for Multiple Myeloma

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Blacks are twice as likely to develop and die from multiple myeloma (MM), and are less likely to receive an autologous hematopoietic-cell transplant (AHCT) for MM compared to Whites. The influence of race on outcomes of AHCT for MM is not well described. We compared the probability of overall survival (OS), progression-free survival (PFS), disease progression, and nonrelapse mortality (NRM) among Black (N = 303) and White (N = 1892) recipients of AHCT for MM, who were reported to the Center for International Blood and Marrow Transplant Research (CIBMTR) from 1995 to 2005. The Black cohort was more likely to be female, and had better Karnofsky performance scores, but lower hemoglobin and albumin levels at diagnosis. Black recipients were younger and more likely to be transplanted later in their disease course. Disease stage and treatment characteristics prior to AHCT were similar between the 2 groups. Black and White recipients had similar probabilities of 5-year OS (52% versus 47%, $P = .19$) and PFS (19% versus 21%, $P = .64$) as well as cumulative incidences of disease progression (72% versus 72%, $P = .97$) and NRM (9% versus 8%, $P = .52$). In multivariate analyses, race was not associated with any of these endpoints. Black recipients of AHCT for MM have similar outcomes compared to Whites, suggesting that the reasons underlying lower rates of AHCT in Blacks need to be studied further to ensure equal access to effective therapy.

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BACKGROUND

Multiple myeloma (MM) remains an incurable disease, although prognosis has improved in the past decade [1,2]. It is the most common hematologic malignancy among Blacks, and is the only hematologic malignancy that is more frequent in this racial group compared with Whites. In the United States, MM and its precursor disease monoclonal gammopathy of undetermined significance (MGUS) are twice as common in Blacks (annual incidence of 14.4/100,000 in men and 9.8/100,000 in women compared with 6.6/100,000 in White men and 4.1/100,000 in White women) [1,3-7]. Proposed factors to explain the increased incidence among Blacks include socioeconomic factors, greater exposure to hazardous materials, genetic predisposition, greater degree of background antigenic stimulation, and a greater prevalence of obesity [8-10]. Mortality rates from MM in the United States are twice as high for Blacks compared to Whites (8.3/100,000 for men and 6.0/100,000 for women compared to 4.3/100,000 and 2.8/100,000 for White men and women, respectively) [11].

Socioeconomic factors that may have an impact on access to cancer therapy and therapeutic choices include place of residence, distance from care centers, unemployment, availability and quality of health insurance, poor nutrition, exposure to infectious agents, lower educational level, and annual income [12,13]. Prior comparisons have drawn conflicting conclusions on treatment outcomes among Blacks compared with White patients with MM. Savage et al. [13,14] found that Black patients had shorter survival times following similar therapy for MM. Presentation at later stages of disease, socioeconomic factors, or differential access to care were thought to explain this disparity. Other investigators have suggested that these disparities in outcomes are primarily because of biological characteristics [15,16].

Randomized clinical trials support the use of autologous hematopoietic-cell transplant (AHCT) as a standard therapy for MM [17,18]. We have previously shown that Blacks are less likely to receive AHCT for MM compared with their age- and sex-matched White counterparts [19]. In the current study, we compared outcomes between Black and White patients receiving AHCT for MM to determine if disparate post transplant outcomes validate lower AHCT use in Blacks.

PATIENTS AND METHODS

The Center for International Blood and Marrow Transplant Research (CIBMTR) consists of a voluntary working group of more than 450 transplant centers worldwide. Centers contribute detailed data on consecutive allogeneic and autologous transplants to a statistical center at either the Medical College of Wisconsin in Milwaukee or the National Marrow Donor Program (NMDP) Coordinating Center in Minneapolis. Subjects are followed longitudinally, with yearly follow-up. Computerized checks for errors, physicians' review of submitted data, and on-site audits of participating centers ensure data quality. Observational studies conducted by the CIBMTR are done with a waiver of informed consent and in compliance with HIPAA regulations as determined by the Institutional Review Board and the Privacy Officer of the Medical College of Wisconsin.

Patients

The study included 2195 (303 Black and 1892 White) adult (aged ≥18 years) recipients of AHCT for MM who were transplanted between January 1995 and June 2005 (Table 1). Only recipients of peripheral blood (PB) AHCT were included in this study; patients who had received planned tandem AHCT (N = 582) were excluded. Centers obtained information about patient race and then reported it to the CIBMTR.

Statistical Methods

Patient-, disease-, and treatment-related factors were compared between the Black and White cohorts, using a chi-square test for categorical and a Kruskal-Wallis test for continuous variables. Outcomes analyzed included nonrelapse mortality (NRM), relapse/progression, progression-free survival (PFS), and overall survival (OS). NRM was defined as death occurring in the absence of relapse or progression of MM following AHCT. Relapse/progression was defined according to standard criteria [20]. Chemotherapy sensitivity was defined as achievement of a partial or complete response (PR, CR) to pretransplant therapy. PFS was defined as survival without disease progression or relapse. Patients alive and with no evidence of disease progression or relapse were censored at the time of last follow-up. The survival interval variable was defined as time from the date of transplant to the date of death or last contact and summarized by a survival curve. Probabilities of OS and PFS were calculated using the Kaplan-Meier estimator [21,22]. NRM and relapse/progression were calculated using cumulative incidence estimates. The log-rank test was used for univariate comparisons.

Multivariate Cox proportional hazards regression was used to examine the outcomes between Black and White patient cohorts and to identify risk factors associated with outcomes [23]. A stepwise forward selection multivariate model was built to identify covariates that influenced outcomes. Any covariate with a value of $P < .05$ was considered significant. The proportionality assumption for Cox regression was tested by adding a time-dependent covariate for each risk factor and each outcome. Tests indicated that all variables met the proportional hazards