

Survival Varies by Race within Primary Osseous Spinal Neoplasms: Results from the Surveillance, Epidemiology, and End Results (SEER) Database

Debraj Mukherjee MD, MPH; Judy Kong; Frank L. Acosta MD; John C. Liu MD; Miriam Nuno PhD; Chirag G. Patil MD MS
Department of Neurosurgery, Cedars-Sinai Medical Center



Introduction

Primary osseous spinal neoplasms are aggressive tumors associated with poor outcomes. However, it remains unknown whether a patient's race is associated with overall survival, as in other primary malignancies.

Learning Objectives

By the conclusion of this session, participants should be able to:

1. Detail the varying survival patterns of patients with primary osseous spinal neoplasms.
2. Describe the complex relationship between tumor type and race upon median and overall survival in patients with chondrosarcoma, chordoma, Ewing sarcoma, and osteosarcoma.
3. Explore some of the mechanisms thought to explain the greater survival seen in multiple minorities groups with varying forms of primary osseous spinal neoplasms, relative to Caucasians.

Methods

The SEER registry (1973-2005) was queried to identify histologically confirmed cases of chondrosarcoma, chordoma, Ewing sarcoma, or osteosarcoma. Race was classified as Caucasian, African-American, Native American, or Asian. The association of race with survival was assessed by Chi-square tests, Kaplan-Meier estimates, and log-rank tests (p-value <0.05 considered statistically significant).

Table 1

Patient Characteristic	Chondrosarcoma	Choroma	Ewing	Osteosarcoma
n	579	414	469	430
Mean Age in Yrs	50.83	59.92	19.22	48.29
Standard Deviation in Yrs	19.14	17.01	10.76	23.84
Median Age in Yrs	50	62	17	51
Females: n(%)	211 (36%)	154 (37%)	168 (36%)	194 (45%)
Race				
White: n(%)	517 (89%)	375 (91%)	434 (92%)	360 (83%)
Black: n(%)	32 (6%)	8 (2%)	12 (3%)	41 (10%)
Native American: n(%)	2 (0.4%)	2 (0.5%)	6 (1.3%)	1 (0.3%)
Asian: n(%)	23 (4%)	26 (6%)	16 (3%)	27 (6%)
decade of diagnosis				
1970s: n(%)	71 (12%)	41 (10%)	50 (11%)	56 (13%)
1980s: n(%)	99 (17%)	79 (19%)	85 (18%)	85 (20%)
1990s: n(%)	165 (29%)	128 (31%)	147(31%)	116 (27%)
2000s: n(%)	164 (28%)	118 (29%)	120 (26%)	110 (26%)
Primary Site				
Spine: n(%)	116 (20%)	195 (47%)	123(26%)	107 (25%)
Pelvis: n(%)	463 (80%)	219 (52%)	346 (74%)	323 (75%)
Surgical Data Available				
Biopsy/No Surgery: n(%)	20 (3%)	16 (4%)	59 (13%)	45 (10%)
Surgery: n(%)	156 (27%)	114 (28%)	68 (15%)	72 (17%)
Radiation Therapy: n(%)	126 (22%)	185 (44%)	295 (63%)	141 (33%)
Median Survival (Months)	37	49.5	26	10.5

Demographics of 1892 patients with primary osseous spinal neoplasms from within the SEER database

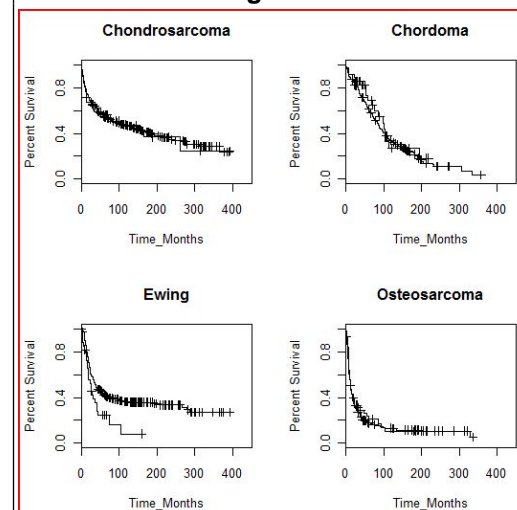
Results

1892 patients were identified (579 chondrosarcomas; 414 chordomas; 469 Ewing sarcomas; 430 osteosarcomas). Median survival was histology specific (chondrosarcoma 37 months; chordoma 50 months, Ewing's sarcoma 26 months; osteosarcoma 11 months). Caucasians, African-Americans, Asians, and Native Americans accounted for 88.8%, 4.9%, 4.9%, 0.6% of all patients, respectively.

Median survival varied by tumor type and race. Chondrosarcoma median survival ranged from 1 month (Native Americans) to 262 months (African-Americans), chordoma median survival ranged from 23 months (Native Americans) to 104 months (African-Americans), Ewing sarcoma median survival ranged from 23 months (Asians) to 41 months (Native Americans), and osteosarcoma median survival ranged from 4 months (Native Americans) to 13 months (African-Americans).

Chi-square testing demonstrated race was significantly associated with survival only within the Ewing sarcoma subset (p=0.048). Similarly, Kaplan-Meier estimates and log-rank testing of 5-year survival only demonstrated a significant association between race and survival within the Ewing sarcoma subset (p=0.041).

Figure 1



Variable survival among Caucasians (stippled line) vs. minorities (straight line) in those with primary osseous spinal neoplasms

Conclusions

Variation exists in the survival patterns of patients with subtypes of primary osseous spinal neoplasms. These differences appear to track along racial lines, most significantly within the Ewing sarcoma subset. Interestingly, some minority groups had significantly better survival than Caucasians, while other minorities consistently had worse survival than Caucasian counterparts. Further investigation is necessary to determine the mechanisms underlying these significant differences in patient survival.