We examined the role of total body magnetic resonance imaging (TB-MRI)-governed involved compartment irradiation (ICI) and high-dose chemotherapy (HDC), followed by stem cell rescue (SCR) in patients with high-risk Ewing tumors (ETs) with multiple primary bone metastases (high-risk ET-MBM). Eleven patients with high-risk ET-MBM receiving initial assessment of involved bones by TB-MRI were registered from 1995 to 2000 (group A). In all, 6 patients out of 11 had additional lung disease at initial diagnosis; all had multifocal bone disease with more than three bones involved. After systemic induction with etoposide, vincristine, adriamycin (doxorubicin), ifosfamide, and actinomycin D (EVAIA) or VAIA chemotherapy, ICI of all sites positive by TB-MRI was administered, followed by HDC and SCR. A second group matched for observation period and consisting of 26 patients with more than three involved bones at diagnosis was treated with the European Intergroup Cooperative Ewing Sarcoma Study-92 (EICESS-92) protocol (group B). These patients did not receive TB-MRI and consequently did not receive TB-MRI-governed ICI, or HDC and SCR. Survival in group A
vs group B was 45 vs 8% at 5 years and 27 vs 8% at 10 years after diagnosis (log rank and Breslow: P<0.005). We conclude that TB-MRI-governed ICI followed by HDC and SCR in ET-MBM is feasible and warrants further evaluation in prospective studies.