

## Safety and Efficacy of Stereotactic Body Radiation Therapy for Pulmonary Metastases from High-Grade Sarcomas

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### Abstract

**Purpose:** Patients with high-grade sarcomas (HGS) frequently develop metastatic disease, thus limiting their long-term survival. Lung metastases (LM) have historically been treated with surgical resection (metastasectomy) along with systemic therapy in order to prolong survival. A potentially less morbid and as efficacious option for controlling LM could be stereotactic body radiation therapy (SBRT). We evaluated the local tumor control (LC), overall survival as well as pulmonary and esophageal toxicities from our institutional experience utilizing SBRT. **Materials and Methods:** The cohort consists of 16 consecutive patients with LM from HGS that were treated with linear accelerator-based SBRT between 2009 and 2011 at our institution. 4D CT simulations were performed for all patients to assess tumor motion and generate an internal target volume (ITV). Stereoscopic and volumetric-based image-guidance was employed prior to each fraction. Respiratory gating was not employed. Routine radiographic (CT and/or PET-CT) and clinical follow-up was performed. Local failure for a treated lesion was defined as CT progression on 2 consecutive scans. Radiation pneumonitis (RP) and radiation esophagitis (RE) were scored on basis of Grade 0-1 (asymptomatic or no treatment) vs. Grades 2-5 using Common Toxicity Criteria (CTC) version 3.0. **Results:** All 16 patients received chemotherapy and a subset (38%) also underwent prior pulmonary metastatectomy. The median age of this cohort was 55 (12-85) and median follow-up time was 8.1 months (range: 0.8-28.1). A total of 25 lesions (76% soft tissue sarcoma, 24% bone sarcoma) were treated and evaluable for this analysis (up to 3 lesions were treated in a given session). Most common histologies were leiomyosarcoma (28%), synovial sarcoma (20%) and osteosarcoma (16%). Six of the 25 lesions were centrally located (within or touching a 2 cm zone around major airways). Median SBRT prescription dose was 54 Gy (36-54) in 3-4 fractions (majority received 54 Gy in 3 fractions), prescribed to the 95% isodose line. Median PTV volume was 9.2 cm<sup>3</sup> (1.8-84.9). At one year, there was one local failure (LC = 96%) in this cohort. All patients were alive at the time of this analysis. No patients experienced G2-4 RP, and no patients experienced RE. **Conclusions** Our single institutional experience suggests that stereotactic body radiation therapy for pulmonary metastases from high-grade sarcoma

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provides excellent local control with negligible toxicity. SBRT is less invasive than surgery and is an attractive alternative for patients with high operative risk. Longer follow-up time is needed. A phase II feasibility study is planned to prospectively validate these findings.



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