

## **Treatment of Sarcoma Lung Metastases with Stereotactic Body Radiotherapy**

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### **Background:**

External beam radiotherapy (EBRT) significantly decreases local recurrence of extremity soft tissue sarcoma when employed as an adjuvant to surgical resection. The most common site of sarcoma metastasis is to the lung, and although surgical resection of pulmonary metastases can increase overall survival, many patients are poor candidates for metastasectomy for multiple host or tumor related reasons.

### **Question/Purpose:**

We sought to evaluate our institution's experience with the use stereotactic body radiotherapy (SBRT) for definitive ablative management of metastatic sarcoma sites within the lungs.

### **Patients/Methods:**

Image guided EBRT and the use of stereotactic body radiotherapy was used to treat 117 pulmonary metastases in 44 patients. The median age was 67 years (range 19--91). The predominant histology was undifferentiated pleomorphic sarcoma/malignant fibrous histiocytoma (22 patients) (Table 1). The median number of metastases treated per patient was two (range 1--7). Seventeen patients had prior thoracic surgery for metastatic disease, and chemotherapy was administered to 23 patients. The majority of patients (84%) received a total dose of 50Gy per metastatic lesion, most commonly in 10Gy (68%) and 5Gy (11%) fractions utilizing image guided SBRT technique. Patients were followed with serial computed tomography imaging of the chest.

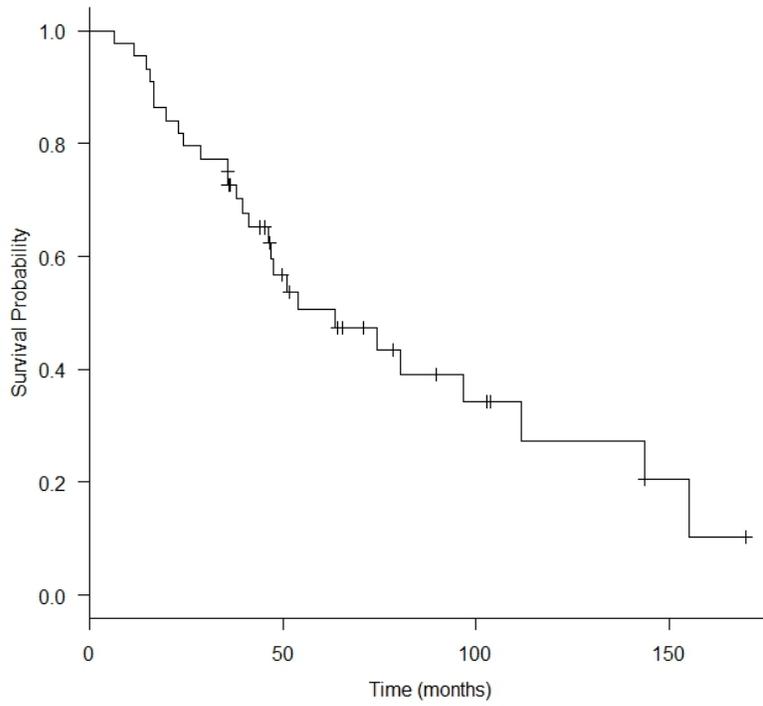
### **Results:**

The average interval follow up was 19.3 months (range 1.6--98.6 months). At the time of analysis, 27 patients had died (61%). Overall survival was 82% at two years and 50% at five years (Figure 1). Overall survival was not improved with chemotherapy (median survival 52.4 months with chemotherapy versus 74.3 months without, p value=0.161) (Figure 2). Four patients experienced progression of disease in metastatic sites treated with SBRT (Figure 3). Of 117 metastatic nodules treated, six showed failure of treatment (95% control rate). The four patients who failed SBRT ablation all showed progression to multiple bilateral metastatic nodules in an average of 4.5 months from the end of SBRT treatment. Side effects of SBRT included transient radiation pneumonitis (n=6), cough (n=3), rib fracture (n=1), chronic pain (n=1) dermatitis (n=1) and dyspnea (n=1).

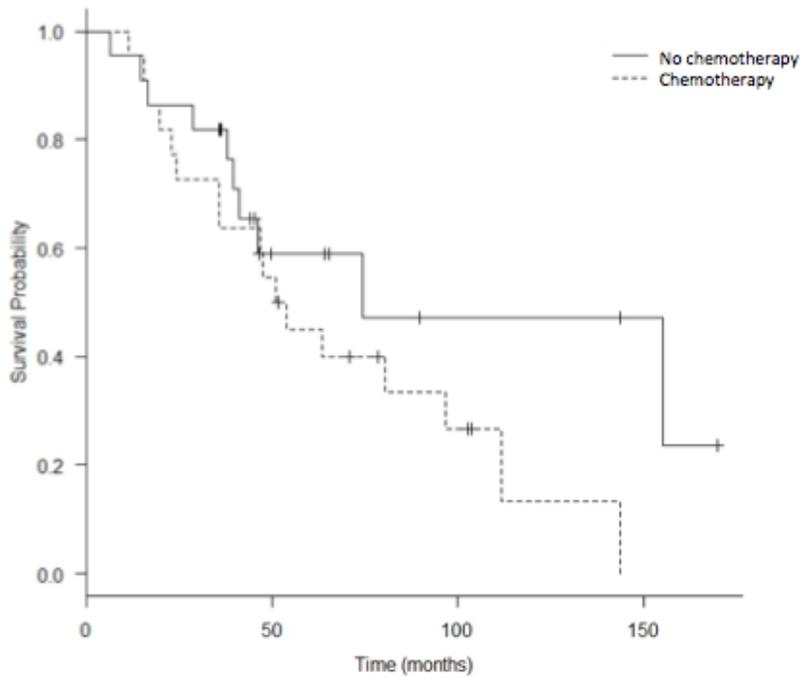
### **Conclusion:**

Stereotactic body radiotherapy is an effective and safe treatment for ablation of pulmonary metastasis from primary sarcoma. Further work is needed to evaluate the optimal role of SBRT relative to surgery or chemotherapy for treatment of oligometastatic sarcoma.

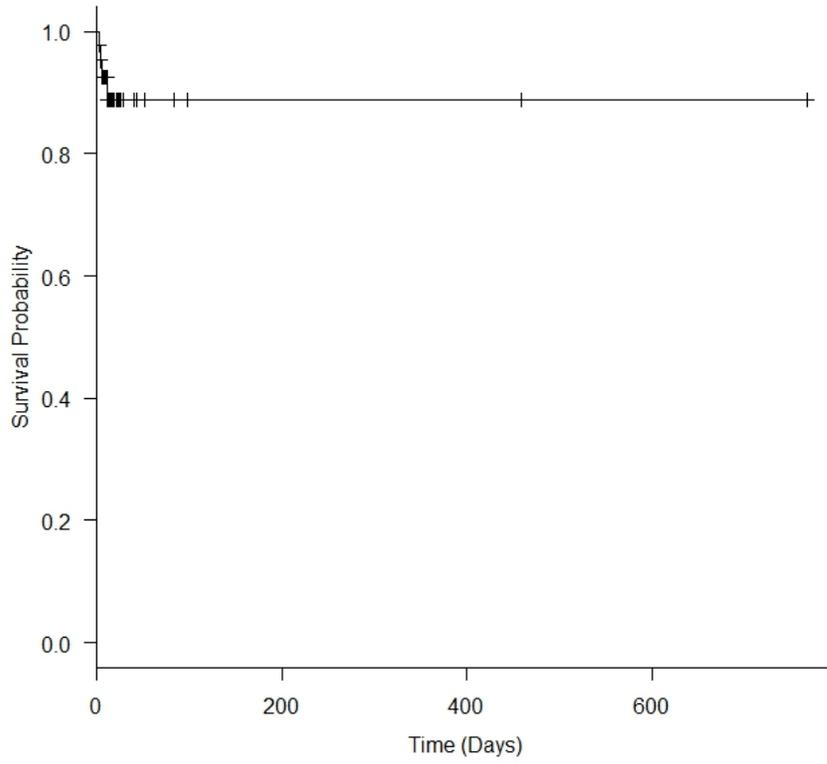
**Figure 1: Overall Survival**



**Figure 2: Overall survival in patients treated with and without chemotherapy**



**Figure 3:** Pulmonary control of sarcoma metastases with SBRT



<b>Table 1</b>		
<b>Patient Characteristics</b>		
No. Patients		44
No. Lesions Treated		117
Age (range)		67 (19-91)
Primary Tumor Histology		
	UPS/MFH	21
	Leiomyosarcoma	5
	Synovial Sarcoma	5
	Ewings	2
	Hemangiopericytoma	2
	Myxofibrosarcoma	2
	Spindle Cell Sarcoma	2
	Chondrosarcoma	1
	Clear cell chondrosarcoma	1
	Dedifferentiated chondrosarcoma	1
	Dedifferentiated liposarcoma	1
	Osteosarcoma	1
Primary Tumor Location		
	Extremity	36 (82%)
	Pelvis	4 (9%)
	Other	4 (9%)
Primary Tumor Grade		
	Low	4 (9%)
	Intermediate	7 (16%)
	High	33 (75%)
Prior Chemotherapy		
	Yes	23 (52%)
	No	21 (48%)
Prior Thoracic Surgery		
	Yes	17 (39%)
	No	27 (61%)
Extrathoracic disease		
	Yes	16 (36%)
	No	28 (64%)
Median number of mets treated (range)		2 (1-7)