Follow-up of Malignant or Aggressive Musculoskeletal Tumors
EVIDENCE TABLE

Reference	Study Type	Patients/ Events	Study Objective (Purpose of Study)	Study Results	Study Quality
1. Lee AI, Zuckerman DS, Van den Abbeele AD, et al. Surveillance imaging of Hodgkin lymphoma patients in first remission: a clinical and economic analysis. *Cancer.* 2010;116(16):3835-3842.	Observational-Dx	192 adult patients	To assess the utility of surveillance PET/CT and CT scans for Hodgkin lymphoma patients in first remission.	16 events (12 recurrent Hodgkin lymphoma cases and 4 secondary malignancies) were detected during a median follow-up of 31 months. The PPV of surveillance PET/CT was 22.9% compared with 28.6% for CT (*P*=.73). Factors that were found to significantly improve the PPV of scans in detecting recurrent Hodgkin lymphoma included PET and CT concordance, involvement of a prior disease site, or the occurrence of a radiographic abnormality within 12 months. There were too few events to determine whether event detection by PET/CT vs CT or the presence of symptoms at the time of event detection affected overall outcomes. The cost to detect a single event was approximately $100,000. Radiation exposure to detect a single event was 146.6 millisieverts per patient for each of 9 patients.	3
2. Martin JM, Panzarella T, Zwahlen DR, Chung P, Warde P. Evidence-based guidelines for following stage 1 seminoma. *Cancer.* 2007;109(11):2248-2256.	Review/Other-Dx	706 abstracts	To formulate evidence-based guidelines for frequency and duration of follow-up in this group of patients and imaging protocols for different management strategies.	17 prospective studies with a total of 5,561 patients were identified. Actuarial data on relapse was available in 5,013 (90.1%) patients, and 92.9% of all relapses had location data reported. Annual hazard rates for relapse were determined.	4
3. Salama AK, de Rosa N, Scheri RP, et al. Hazard-rate analysis and patterns of recurrence in early stage melanoma: moving towards a rationally designed surveillance strategy. *PLoS One.* 2013;8(3):e57665.	Review/Other-Dx	11,615 patients	To identify patterns of metastatic recurrence, to determine the influence of metastatic site on survival, and to identify high-risk periods for recurrence.	Of 11,615 patients initially diagnosed without metastatic disease, 4,616 (40%) had at least 1 recurrence. Overall the risk of initial recurrence peaked at 12 months. The risk of initial recurrence at the local skin, distant skin, and nodes peaked at 8 months, and the risk at lung and other distant sites peaked at 24 months. Patients with a cutaneous or nodal recurrence had improved survival compared to other recurrence types.	4
4. Casali PG, Blay JY. Soft tissue sarcomas: ESMO Clinical Practice Guidelines for diagnosis, treatment and follow-up. *Ann Oncol.* 2010;21 Suppl 5:v198-203.	Review/Other-Dx	N/A	To provide recommendations on STSs.	No results stated in abstract.	4
5. Demetri GD, Antonia S, Benjamin RS, et al. Soft tissue sarcoma. *J Natl Compr Canc Netw.* 2010;8(6):630-674.	Review/Other-Dx	N/A	To provide guidelines on STSs.	No results stated in abstract.	4

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Reference	Study Type	Patients/ Events	Study Objective (Purpose of Study)	Study Results	Study Quality
6. Grimer R, Judson I, Peake D, Seddon B. Guidelines for the management of soft tissue sarcomas. *Sarcoma.* 2010;2010:506182.	Review/Other-Dx	N/A	To provide a guideline framework for the multidisciplinary care of patients with STSs.	No results stated in abstract.	4
7. Strauss SJ, McTiernan A, Whelan JS. Late relapse of osteosarcoma: implications for follow-up and screening. *Pediatr Blood Cancer.* 2004;43(6):692-697.	Review/Other-Dx	8 patients	Study the implications of osteosarcoma relapse greater than 5 years out.	5 patients died of disease with a median survival from the date of relapse of 17 months (2–68 months). Current data looking at long-term outcome of patients with osteosarcoma is limited. Reports of late relapse are rare as numbers are small, thus long-term surveillance of patients is essential. It is possible that sites of relapse are more unusual, and more extensive staging may be necessary when late relapse occurs.	4
8. Chou YS, Liu CY, Chen WM, et al. Follow-up after primary treatment of soft tissue sarcoma of extremities: impact of frequency of follow-up imaging on disease-specific survival. *J Surg Oncol.* 2012;106(2):155-161.	Observational-Dx	165 patients	To explore the impact of frequency of surveillance imaging on disease-specific survival in patients with extremity STS.	165 patients were assigned to 3 distinct risk groups according to tumor size (≤5 vs >5 cm), depth (superficial- vs deep-seated), grade (I vs II or III), and surgical margin (≥10 vs <10 mm). Data for 80 patients who relapsed were analyzed. Among 50 high-risk (with all 4 risk factors) relapsing patients, those in the more frequent surveillance group for either locoregional imaging or chest imaging had better overall disease-specific survival (locoregional imaging, median 44.07 vs 27.43 months, P=0.008; chest imaging, median 43.60 vs 36.93 months, P=0.036), post-locoregional disease-specific survival (median 27.20 vs 10.63 months, P=0.028) and post-distant metastasis disease-specific survival (median 13.20 vs 6.24 months, P=0.031).	3

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9. Felderhof JM, Creutzberg CL, Putter H, et al. Long-term clinical outcome of patients with soft tissue sarcomas treated with limb-sparing surgery and postoperative radiotherapy. *Acta Oncol.* 2013;52(4):745-752.	Observational-Tx	118 patients	To evaluate long-term local control, survival, radiation side effects and functional outcome after limb-sparing surgery followed by postoperative radiotherapy for STS.	Median follow-up was 93 months. Radiotherapy dose was 60 Gy in 92.4% of the patients; 5.1% received 66 Gy; 2.5% 50–56 Gy. Actuarial local recurrence rates at 5- and 10-years were 9% and 12%. 5- and 10-year OS rates were 69% and 51%. Acute radiation toxicities occurred in 91% of the patients; 19% were grade 3, 2% grade 4. Late radiation toxicities were reported in 71% of the patients: 50% grade 1, 18% grade 2, and 3% grade 3. Limb and joint function after treatment were good, 19% having mild limitation of motion, 1.5% moderate, and 2.5% severe limitations.	2
10. Sabolch A, Feng M, Griffith K, et al. Risk factors for local recurrence and metastasis in soft tissue sarcomas of the extremity. *Am J Clin Oncol.* 2012;35(2):151-157.	Observational-Tx	188 patients	To review treating STSs of the extremity to identify factors associated with local recurrence, metastasis, and OS, to identify patients who may benefit from intensification of therapy.	188 patients were included in the analysis. 25 (13%) and 46 (24%) experienced local and distant recurrence, respectively. Patients with high/intermediate-grade tumors [HR=5.63, 95% CI: 1.27–24.89, P=0.023] or with multifocally positive margins (HR=4.27, 95% CI: 1.20–15.24, P=0.026) were more likely to fail locally. Those with a preceding local recurrence (HR=8.58, 95% CI: 3.87–19.04, P<0.0001), high/intermediate-grade tumors (HR=5.68, 95% CI: 1.28–25.25, P=0.023), or no secondary re-excision (HR=2.5, 95% CI: 1.09–5.74, P=0.031) were more likely to develop metastasis. Patients with local recurrence (HR=3.6, 95% CI: 1.77–7.29, P<0.001), metastasis (HR=16.0, 95% CI: 7.93–32.31, P<0.0001), or without secondary re-excision (HR=3.2, 95% CI: 1.27–8.09, P=0.014) had decreased OS rate.	2

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11. Alamanda VK, Crosby SN, Archer KR, Song Y, Schwartz HS, Holt GE. Predictors and clinical significance of local recurrence in extremity soft tissue sarcoma. *Acta Oncol.* 2013;52(4):793-802.	Observational-Tx	278 patients	To evaluate patients treated for STS of the extremities between 2000 and 2006.	Patients who had a positive margin were 3.76 times more likely to develop local recurrence when compared to those with negative margins. This corresponds to a 38% risk of local recurrence if the margins were positive after 6 years vs 12% if the margins were negative. In patients who underwent a re-excision, the presence or absence of residual disease upon re-excision did not have any bearing on local recurrence (P=0.27). In comparing patients with and without local recurrence, there was no statistically significant difference in the rate and the proportion encountering distant metastasis and death due to sarcoma (P>0.05).	2
12. Haas RL, Delaney TF, O'Sullivan B, et al. Radiotherapy for management of extremity soft tissue sarcomas: why, when, and where? *Int J Radiat Oncol Biol Phys.* 2012;84(3):572-580.	Review/Other-Tx	N/A	A critical review to focus on published data on the indications for radiotherapy in patients with extremity soft tissue sarcomas and its role in local control, survival, and treatment complications.	These target volume delineation recommendations have been generated mainly from retrospective data and clinical practice and should be re-evaluated using the results from ongoing and future studies. In addition, account should always be taken of individual patient factors that can only be appreciated by the treating physician. These recommendations are intended as an aid to individual radiation oncologists to facilitate the process of treatment planning, recognizing that prospective validation would be desirable but difficult to achieve with this rare disease.	4
13. King DM, Hackbarth DA, Kirkpatrick A. Extremity soft tissue sarcoma resections: how wide do you need to be? *Clin Orthop Relat Res.* 2012;470(3):692-699.	Review/Other-Tx	117 patients	To determine whether a close resection margin for soft tissue sarcoma resulted in an increased incidence of locally recurrent disease and whether additional factors, including radiation therapy, outside biopsies, and tumor biology, affected the risk of local recurrence.	4/117 patients (3.4%) developed local recurrence. The incidence of local recurrence was similar in patients with <1-mm margins and >1-mm margins: 2/45 patients (4.4%) and 2/64 patients (3.1%), respectively. Due to the low number of local recurrences, quantitative margin extent and the other factors evaluated did not affect local recurrence.	4

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14. Bedi M, King DM, Charlson J, et al. Multimodality Management of Metastatic Patients With Soft Tissue Sarcomas May Prolong Survival. *Am J Clin Oncol.* 2012.	Observational-Tx	182 patients	To identify metastatic survival rates and identify prognostic variables that predict for these outcomes.	Median follow-up was 3.1 years. Median metastatic survival was 24.2 months. Median metastatic survival in those undergoing multimodality therapies was 40 vs 22 months in those receiving single modality treatments. In single predictor Cox models, age, stage, number of lung metastases, location of metastases, and primary disease were significant for metastatic survival. On multivariate analysis, number of pulmonary metastases, histology, stage, and location of primary disease predicted for metastatic survival. Patients who had pulmonary-only disease had improved metastatic survival vs those that had extrapulmonary with or without pulmonary metastatic disease (38 vs 15 months). Patients who had ≤5 pulmonary metastasis had improved metastatic survival vs those that had >5 pulmonary lesions (55 vs 22 months).	2
15. Kaifi JT, Gusani NJ, Deshaies I, et al. Indications and approach to surgical resection of lung metastases. *J Surg Oncol.* 2010;102(2):187-195.	Review/Other-Tx	N/A	To review indications and approach to surgical resection of lung metastases.	Pulmonary metastasectomy is a curative option for selected patients with cancer spread to the lungs. Complete surgical removal of pulmonary metastases can improve survival and is recommended under certain criteria. Specific issues that require consideration in a multidisciplinary setting when planning pulmonary metastasectomy include: adherence to established indications for resection, the surgical strategy including the use of minimally invasive techniques, pulmonary parenchyma preservation, and the role of lymphadenectomy.	4

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Reference	Study Type	Patients/ Events	Study Objective (Purpose of Study)	Study Results	Study Quality
16. Salah S, Fayoumi S, Alibraheem A, et al. The influence of pulmonary metastasectomy on survival in osteosarcoma and soft-tissue sarcomas: a retrospective analysis of survival outcomes, hospitalizations and requirements of home oxygen therapy. *Interact Cardiovasc Thorac Surg.* 2013;17(2):296-302.	Observational-Tx	71 patients	To compare these modalities for the subset of patients with resectable metastases.	71 patients (32 with osteosarcoma and 39 with nonosteosarcoma) were eligible. PFS was superior in patients who belonged to Group A compared with Groups B and C (8.0, 4.3 and 2.2 months, respectively, P=0.0002). Furthermore, OS was superior in patients who belonged to Group A compared with Groups B and C (39.6, 20.0 and 7.8 months, respectively, P<0.0001). A subanalysis for osteosarcoma patients showed superior PFS and OS for Group A vs B (median PFS 21.6 and 3.65 months, respectively, P=0.011 and median OS 34.0 and 12.4 months, respectively, P=0.0044). For nonosteosarcoma patients, there were no such significant survival differences between Groups A and B. Overall, patients who belonged to Group A had significantly lower mean percentage of their follow-up time spent admitted at hospital, and a trend towards lower requirements for home oxygen therapy.	2
17. Miller BJ, Carmody Soni EE, Reith JD, Gibbs CP, Scarborough MT. CT scans for pulmonary surveillance may be overused in lower-grade sarcoma. *Iowa Orthop J.* 2012;32:28-34.	Review/Other-Dx	83 patients	To determined risk factors for pulmonary metastasis to aid in the hypothetical implementation of selective CT scans.	8 patients had pulmonary metastasis. A protocol based on selective CT scans for high-risk patients would have identified 7 out of 8 lesions. The incremental cost-effectiveness ratio for routine CT scans was $731,400.	4
18. Shikada Y, Yano T, Maruyama R, Takenoyama M, Maehara Y. Effective utilization of chest X-ray for follow-up of metastatic lung tumor due to soft tissue sarcoma. *Ann Thorac Cardiovasc Surg.* 2013;19(2):103-106.	Review/Other-Dx	18 patients	To elucidate the current status of diagnostic measures for the follow-up of lung metastasis due to STS and the efficacy of CXR.	The follow-up interval when using CT after STS surgery was 3.5 months. Time from STS surgery to lung metastasis was 34.3 months. Tumor size of lung metastasis was 15 mm, and the detection rate by CXR was 66.7%. The time from detection to surgery for lung metastasis was 4.8 months, the number of CT scans was 3.1, and the interval was markedly shortened to 1.6 months.	4

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19. Cho HS, Park IH, Jeong WJ, Han I, Kim HS. Prognostic value of computed tomography for monitoring pulmonary metastases in soft tissue sarcoma patients after surgical management: a retrospective cohort study. *Ann Surg Oncol.* 2011;18(12):3392-3398.	Observational-Dx	176 patients	To evaluate the prognostic value of CT of the chest in STS patients after surgery.	The overall 5- and 10-year survival rates of 176 patients were 75.6% and 70.3%, respectively. The 5-year survival estimates of 96 patients who were included in the plain radiograph cohort and 80 patients in the chest CT cohort were 74.2% and 76.6%, respectively (P=0.70). 54 patients (30.7%) had pulmonary metastasis. Of the 54 patients, 26 belonged to the plain radiograph cohort and 28 patients belonged to the chest CT cohort. Pulmonary metastasis of chest CT cohort had the tendencies of unilaterality, a smaller number of patients, and management with metastasectomy other than palliative management. The 2- and 4-year survival rates after detection of pulmonary metastasis were 20.1% and 0% in the plain radiograph cohort and 47.4% and 31.6% in the chest CT cohort (P<0.05).	3
20. Singnurkar A, Solomon SB, Gonen M, Larson SM, Schoder H. 18F-FDG PET/CT for the prediction and detection of local recurrence after radiofrequency ablation of malignant lung lesions. *J Nucl Med.* 2010;51(12):1833-1840.	Observational-Dx	68 consecutive patients	To investigate the utility of FDG-PET/CT for response assessment in radiofrequency ablation-treated lung lesions and for the detection and prediction of local recurrence.	Before radiofrequency ablation, factors predicting greater local recurrence-free survival included initial lesion size <3 cm (P=0.01) and SUV <8 (P=0.02), although the latter was not an independent predictor in multivariate analysis. Treated metastases recurred less often than treated primary lung cancers (P=0.03). Important post-radiofrequency ablation factors that related to reduced recurrence-free survival included an unfavorable uptake pattern (P<0.01), post-radiofrequency ablation SUV (P<0.01), and an increase in SUV over time after ablation (P=0.05).	4
21. Costelloe CM, Kundra V, Ma J, et al. Fast Dixon whole-body MRI for detecting distant cancer metastasis: a preliminary clinical study. *J Magn Reson Imaging.* 2012;35(2):399-408.	Observational-Dx	29 patients	To evaluate the feasibility of fast Dixon WB-MRI for detecting bone and liver metastasis in clinical patients and to compare its performance with skeletal scintigraphy for detecting bone metastases using reference imaging with >1 year follow-up as the gold standard.	The sensitivity of WB-MRI and skeletal scintigraphy in detecting bone metastases was 70.8% and 59.6% (P=0.003), respectively; specificity was 89.1% and 98.7% (P<0.0001). WB-MRI detected all livers with metastases (n = 8). One focal nodular hyperplasia was classified as a metastasis on WB-MRI.	2

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22. Frat A, Agildere M, Gencoglu A, et al. Value of whole-body turbo short tau inversion recovery magnetic resonance imaging with panoramic table for detecting bone metastases: comparison with 99MTc-methylene diphosphonate scintigraphy. *J Comput Assist Tomogr.* 2006;30(1):151-156.	Observational-Dx	26 cancer patients: 9 of whom manifested bone metastasis <12 months	To assess the efficacy and reliability of whole-body turbo short tau inversion recovery MRI for detecting skeletal metastasis and to compare the results with those of bone scintigraphy.	WB-MRI showed 29 metastases (94%) in the total 208 skeletal sites investigated in the 26 patients. Bone scintigraphy revealed metastases in 16 (52%) of the 208 sites. WB-MRI is also advantageous in that it reveals extraskeletal organ and soft-tissue metastases.	3
23. Schmidt GP, Schoenberg SO, Schmid R, et al. Screening for bone metastases: whole-body MRI using a 32-channel system versus dual-modality PET-CT. *Eur Radiol.* 2007;17(4):939-949.	Observational-Dx	30	Prospective, blinded study to evaluate the diagnostic accuracy of WB-MRI compared with combined FDG-PET/CT for screening for bone metastases.	Sensitivity: WB-MRI 94%, PET/CT 78%. Specificity: WB-MRI 76%, PET/CT 80% Diagnostic accuracy: WB-MRI 91%, PET/CT 78%. WB-MRI revealed 10 additional bone metastases due to the larger field of view.	2
24. Erly WK, Oh ES, Outwater EK. The utility of in-phase/opposed-phase imaging in differentiating malignancy from acute benign compression fractures of the spine. *AJNR Am J Neuroradiol.* 2006;27(6):1183-1188.	Observational-Dx	21 patients	To assess whether in-phase/opposed-phase imaging of the spine can differentiate these 2 entities.	21 patients had 49 vertebral lesions, consisting of 20 malignant and 29 benign fractures. There was a significant difference ($P<.001$, Student t test) in the mean signal intensity ratio for the benign lesions (mean, 0.58; SD, 0.02) compared with the malignant lesions (mean, 0.98; SD, 0.095). If a signal intensity ratio of 0.80 as a cutoff is chosen, with >0.8 defined as malignant and <0.8 defined as a benign result, in-phase/opposed-phase imaging correctly identified 19/20 malignant lesions and 26/29 benign lesions (sensitivity, 0.95; specificity, 0.89).	3
25. Swartz PG, Roberts CC. Radiological reasoning: bone marrow changes on MRI. *AJR Am J Roentgenol.* 2009;193(3 Suppl):S1-4, Quiz S5-9.	Review/Other-Dx	1 case	To discuss the MRI assessment of bone marrow in the context of a complex clinical case.	The case shows a false-positive result of opposed-phase imaging of bone marrow, which was a postinflammatory cause resulting in marrow fibrosis that mimicked neoplastic marrow infiltration and necessitated biopsy for definitive diagnosis.	4

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26. Zajick DC, Jr., Morrison WB, Schweitzer ME, Parellada JA, Carrino JA. Benign and malignant processes: normal values and differentiation with chemical shift MR imaging in vertebral marrow. *Radiology.* 2005;237(2):590-596.	Observational-Dx	75 patients	To establish retrospectively a range of values for signal intensity change in normal vertebral marrow by using chemical shift MRI and to assess the use of this technique in differentiating benign from malignant marrow abnormalities.	A substantial decrease in signal intensity was noted for all normal vertebrae (mean, 58.5%) and for benign lesions, including endplate degeneration (mean, 52.2%), Schmorl nodes with edema (mean, 58.0%), hemangiomas (mean, 49.4%), and benign fractures (mean, 49.3%). Metastases exhibited either a minimal decrease or an increase in signal intensity (mean, 2.8%). Although there was some overlap in the range of signal intensity values among malignant lesions, benign lesions, and normal marrow, the differences in signal intensity loss for normal marrow and benign and malignant lesions were significant ($P<.01$ for all pairwise comparisons after adjusting for multiplicity).	3
27. Brenner W, Bohuslavizki KH, Eary JF. PET imaging of osteosarcoma. *J Nucl Med.* 2003;44(6):930-942.	Review/Other-Dx	N/A	Literature review to ascertain clinical usefulness of FDG-PET in diagnosis, staging and follow-up of osteosarcoma.	Overall the review is comprehensive and addresses several areas of possible clinical utility: Tumor grading: not high utility as there is overlap of SUV and tumor grades. Staging: not as strong as CT for detection of pulmonary metastasis and may fail to detect bone metastasis. Baseline maximum SUV is a significant predictor of OS. Can be helpful as problem solving tool in evaluation of CT findings and location of unsuspected areas of metastatic disease. However, other metastases may be seen by PET in regions not included on chest CT or local site evaluation. Response to therapy: serial SUV values pre- and post-adjuvant chemotherapy may have prognostic value in chemo response, but imperfect at distinguishing a good response (>90% necrosis) and a poor response in 16%–27% of cases. Local tumor recurrence: strong utility for PET given limb salvage surgery and frequent susceptibility artifact on MRI as well as post-operative change being confused for recurrence on MRI. Follow-up: utility as a problem solver in pulmonary masses seen on CT.	4

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28. Johnson GR, Zhuang H, Khan J, Chiang SB, Alavi A. Roles of positron emission tomography with fluorine-18-deoxyglucose in the detection of local recurrent and distant metastatic sarcoma. *Clin Nucl Med.* 2003;28(10):815-820.	Observational-Dx	28 patients: 33 FDG-PET scans, 29 CT scans, and 8 MRI scans	Retrospective study to assess potential role of FDG-PET in detection of local recurrence and distant metastases.	FDG-PET identified all 25 cases of recurrent metastatic disease (mean SUV of 5.0) and excluded recurrence of all 8 (mean SUV <1). Although the article never stated sensitivities and specificities that would be 100/100. MRI: (n=8) not calculated but with numbers provided: sensitivity 83%; specificity 0%. CT (n=29) not calculated but with numbers provided: sensitivity 82%; specificity 71%. Only 7 recurrences were biopsy proven, the others were confirmed on clinical and imaging follow-up (many were treated without biopsy).	3
29. Ito S, Kato K, Ikeda M, et al. Comparison of 18F-FDG PET and bone scintigraphy in detection of bone metastases of thyroid cancer. *J Nucl Med.* 2007;48(6):889-895.	Observational-Dx	47	Patients were examined with both modalities in order to compare the efficacies of FDG-PET and Tc-99m-bone scintigraphy for the detection of bone metastases in patients with differentiated thyroid carcinoma.	The specificity and the overall accuracy of FDG-PET for the diagnosis of bone metastases in patients with differentiated thyroid carcinoma are higher than those of Tc-99m bone scintigraphy, whereas the difference in the sensitivities of both modalities is not statistically significant. In comparison with Tc-99m bone scintigraphy, FDG-PET is superior because of its lower incidence of false-positive results in the detection of bone metastases of differentiated thyroid carcinoma.	3
30. Papathanassiou D, Bruna-Muraille C, Jouannaud C, Gagneux-Lemoussu L, Eschard JP, Liehn JC. Single-photon emission computed tomography combined with computed tomography (SPECT/CT) in bone diseases. *Joint Bone Spine.* 2009;76(5):474-480.	Review/Other-Dx	N/A	To review role of SPECT combined with CT in evaluation of bone diseases.	Hybrid SPECT/CT improves diagnostic confidence when interpreting equivocal planar images, improves average specificity compared to radionuclide bone scanning, and probably also improves sensitivity (to a lesser extent). More specifically, SPECT/CT is useful for detecting metastases of osteophilic malignancies, most notably at the spine. However, the exact role for SPECT/CT relative to MRI and CT in patients evaluated for bone metastases is still under investigation.	4

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31. Fuglo HM, Maretty-Nielsen K, Hovgaard D, Keller JO, Safwat AA, Petersen MM. Metastatic pattern, local relapse, and survival of patients with myxoid liposarcoma: a retrospective study of 45 patients. *Sarcoma.* 2013;2013:548628.	Review/Other-Tx	45 patients	To assess the metastatic pattern of the histological subtype myxoid liposarcoma with no or few round cells.	7 patients had distant metastases during the observation period. 2 patients had metastases at the time of diagnosis, while metastases occurred within 2.5 years in 4 patients, and in 1 patient 11.9 years after primary diagnosis. All metastases occurred at extrapulmonary sites. The first local relapse occurred within 3 years after surgery in 6 patients, in 1 patient after 4.0 years, and in 1 patient 7.7 years after surgery. The 5- and 10-year OS was 80% and 69%, respectively. Both the 5- and 10-year distant metastases-free survival was, respectively, 86%. The 5- and 10-year local relapse-free survival was, respectively, 83% and 80%.	4
32. Schwab JH, Boland P, Guo T, et al. Skeletal metastases in myxoid liposarcoma: an unusual pattern of distant spread. *Ann Surg Oncol.* 2007;14(4):1507-1514.	Observational-Dx	230 patients	Prospective study to examine the incidence of osseous metastases in a well annotated sarcoma database and correlate this endpoint with clinicopathologic and molecular findings.	From the time of first metastasis, the 5 year median survival was 16%. The majority (78%) of myxoid liposarcoma patients developing bone metastases had a histologic high grade primary tumor. The median OS for the high grade tumors was 55 months, as compared to 105 months for low grade cases. 11 (84%) of 13 cases tested by reverse transcriptase polymerase chain reaction demonstrated a type II TLS-CHOP fusion transcript. Findings suggest that myxoid liposarcoma has a high incidence of osseous metastases, with predilection to spine, and often associated with the most common type of TLS-CHOP transcript. Screening should include images of the spine in high-risk myxoid liposarcoma patients to exclude spinal metastases.	3

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33. Conill C, Setoain X, Colomo L, et al. Diagnostic efficacy of bone scintigraphy, magnetic resonance imaging, and positron emission tomography in bone metastases of myxoid liposarcoma. *J Magn Reson Imaging.* 2008;27(3):625-628.	Review/Other-Dx	1 case	To report an unusual case of bone metastases not detected by bone scan and neither by FDG-PET and successfully identified with MRI in a patient with metachronic myxoid liposarcoma.	Histopathological examination of the primary tumor evidenced a tumor with unfavorable prognostic markers, and the biopsy of an iliac bone lesion confirmed the diagnosis of metastatic disease. On histological grounds, the tumor showed features of a more differentiated neoplasm without foci of round cells or necrosis in the latter. MRI allowed the identification of disseminated disease compared to CT and PET scans. Thus, because of the heterogeneous histological features of myxoid liposarcoma and the biological behavior of the disease, a combined approach of FDG-PET/CT and MRI, may allow a more accurate staging of soft tissue sarcomas.	4
34. Sakamoto A, Fukutoku Y, Matsumoto Y, Harimaya K, Oda Y, Iwamoto Y. Myxoid liposarcoma with negative features on bone scan and [18F]-2-fluoro-2-deoxy-D-glucose-positron emission tomography. *World J Surg Oncol.* 2012;10:214.	Review/Other-Dx	1 case	To report the case of a man with myxoid liposarcoma with multiple vertebral metastases.	Both bone scans and FDG-PET can be negative in cases of vertebral metastasis that arise from myxoid liposarcoma, even when extraskeletal extensions are present. Similarly, even a fractured vertebra may not always be visible on FDG-PET.	4
35. Schwab JH, Healey JH. FDG-PET Lacks Sufficient Sensitivity to Detect Myxoid Liposarcoma Spinal Metastases Detected by MRI. *Sarcoma.* 2007;2007:36785.	Review/Other-Dx	1 case	To document a case of myxoid liposarcoma in which PET scan was less sensitive than MRI in detecting spinal metastasis.	The FDG-PET scan was obtained 1 week prior to the MRI, and it did not show increased glucose uptake in the spine. Her MRI did show increased signal intensity in her lumbar spine. CT needle biopsy confirmed the lesion to be metastatic myxoid liposarcoma.	4

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Reference	Study Type	Patients/ Events	Study Objective (Purpose of Study)	Study Results	Study Quality
36. Sheah K, Ouellette HA, Torriani M, Nielsen GP, Kattapuram S, Bredella MA. Metastatic myxoid liposarcomas: imaging and histopathologic findings. *Skeletal Radiol.* 2008;37(3):251-258.	Review/Other-Dx	12 patients	To describe the imaging and histopathologic characteristics of metastatic myxoid liposarcomas.	There were 23 histologically proven metastases in 12 patients. Based on imaging criteria, there were 41 metastases. The mean time from the diagnosis of primary tumor to the first metastasis was 4.4 years. 67% of patients had bone and soft tissue metastases, 33% had pulmonary metastases, 33% had liver metastases, 25% had intra-abdominal, and 16% retroperitoneal metastases. CT demonstrated well-defined lobulated masses with soft tissue attenuation in all cases, without macroscopic fat component. In cases of osseous metastases, CT showed mixed lytic and sclerotic foci, with bone destruction in advanced cases. MRI demonstrated fluid-like signal intensity with mild heterogeneous enhancement in cases of soft tissue metastases. In osseous metastases, MRI showed avid heterogeneous enhancement. FDG-PET showed no significant FDG uptake for all metastases. MRI was the most useful imaging modality for osseous and soft tissue metastases.	4
37. Jha P, Frolich AM, McCarville B, et al. Unusual association of alveolar rhabdomyosarcoma with pancreatic metastasis: emerging role of PET-CT in tumor staging. *Pediatr Radiol.* 2010;40(8):1380-1386.	Review/Other-Dx	8 patients	To assess the occurrence of pancreatic metastases in alveolar rhabdomyosarcomas, increase awareness of this association and reassess current staging protocols.	Pancreatic metastases occurred in 8 patients with alveolar rhabdomyosarcomas. 4 of these presented at diagnosis and 4 with disease recurrence. In recurrent disease, the duration between the diagnosis of the primary tumor and pancreatic metastases varied from 8 months to 6 years (mean +/- SD: 2.38 +/- 2.49 years). In all patients who received PET scans, pancreatic metastases showed a marked FDG-uptake, but had variable detectability with CT. Pancreatic metastases were not associated with certain primary tumor locations or presence of other metastases, mandating an evaluation of the pancreas in all cases of alveolar rhabdomyosarcomas.	4

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Reference	Study Type	Patients/ Events	Study Objective (Purpose of Study)	Study Results	Study Quality
38. Nishida Y, Tsukushi S, Urakawa H, et al. High incidence of regional and in-transit lymph node metastasis in patients with alveolar rhabdomyosarcoma. *Int J Clin Oncol.* 2014;19(3):536-543.	Review/Other-Dx	44 patients	To investigate the patterns of regional and distant metastasis in patients with rhabdomyosarcomas, particularly lymphatic route metastasis, and clarify the clinical factors that affect the pattern of metastasis.	Of the 3 cases of local relapse, 2 were alveolar type and 1 was unknown. The 3 cases of in-transit metastasis were all alveolar type. Patients with alveolar type had a significantly high propensity for lymph node metastasis (P=0.027). Excluding the pleomorphic type, alveolar type was still a significant factor for lymph node metastasis (P=0.017).	4
39. Moreau LC, Turcotte R, Ferguson P, et al. Myxoid\round cell liposarcoma (MRCLS) revisited: an analysis of 418 primarily managed cases. *Ann Surg Oncol.* 2012;19(4):1081-1088.	Observational-Tx	418 cases	To evaluate oncologic outcomes and to provide guidelines for the management of primary myxoid liposarcoma and round cell liposarcoma.	Study included 418 cases (myxoid liposarcoma: 311 patients and round cell liposarcoma: 107; >5% round cell) with a median age of 45 years and a median follow-up of 5.2 years. Median tumor size was 10 cm, and 81% were deep and 90% were in lower limb. The majority of patients underwent surgical resection and radiotherapy, with a small percentage (6%) receiving chemotherapy. The overall 10-year local control rate was 93% with no differences between myxoid liposarcoma and round cell liposarcoma. Radiotherapy was significant in preventing local relapse and reducing tumor diameter (median=18%) and improving microscopic margin status, but did not impact survival. Radiotherapy and the margin status were independent predictors of local recurrence. The 5- and 10-year metastatic-free survivals were 84% and 77% respectively for myxoid liposarcoma and 69% and 46% for round cell liposarcoma. The initial site of metastasis was found in multiple locations (34%) and bone involvement was frequent (40%) with predilection for spine (79%). Round cell percent (>5%) and tumor diameter (>10 cm) correlated with increased risk for metastasis and death.	2
40. Ho L, Youngworth H, Henderson R, Seto J. Extraosseous myxoid chondrosarcoma with pulmonary and nodal metastases on FDG PET-CT. *Clin Nucl Med.* 2009;34(1):18-19.	Review/Other-Dx	N/A	No abstract available.	No abstract available.	4

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Reference	Study Type	Patients/ Events	Study Objective (Purpose of Study)	Study Results	Study Quality
41. Bancroft LW. Postoperative tumor imaging. *Semin Musculoskelet Radiol.* 2011;15(4):425-438.	Review/Other-Dx	N/A	To review postoperative tumor imaging in patients.	Accurately interpreting the imaging findings in patients with prior musculoskeletal tumors can be difficult. Because most patients have anatomical changes related to surgery in addition to postradiation and postchemotherapy changes, the radiologist must systematically and critically evaluate all available radiographs, sonograms, CT, MRI, and PET/CT scans to best differentiate normal post-treatment changes from residual or recurrent musculoskeletal tumor. Comparison with presurgical and postsurgical imaging is very important to detect subtle nodular tumor recurrence. Because postoperative fluid collections are relatively common, the radiologist must be vigilant for any nodular-enhancing foci that are actually residual or recurrent tumor.	4
42. Garner HW, Kransdorf MJ, Peterson JJ. Posttherapy imaging of musculoskeletal neoplasms. *Radiol Clin North Am.* 2011;49(6):1307-1323, vii.	Review/Other-Dx	N/A	To present a systematic approach to post-therapy MRI, emphasizing fundamental concepts and discussing potentially confounding post-treatment changes.	MRI is currently the preferred modality for the evaluation of local recurrence, which can be readily differentiated from post-treatment change in most cases. Chest CT is the most widely used and available modality for lung metastatic surveillance, with higher sensitivity for small pulmonary metastases compared with PET/CT. However, PET/CT is gaining attention as an accurate method for both local and metastatic surveillance, and in the future may be incorporated into the standard follow-up protocol of patients with musculoskeletal tumors.	4

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Reference	Study Type	Patients/ Events	Study Objective (Purpose of Study)	Study Results	Study Quality
43. Hwang S, Panicek DM. The evolution of musculoskeletal tumor imaging. *Radiol Clin North Am.* 2009;47(3):435-453.	Review/Other-Dx	N/A	To review the evolution of musculoskeletal tumor imaging by modality and suggests possible directions for future developments.	Since the discovery of the X-ray, there have been substantial advances in musculoskeletal tumor imaging as radiography, nuclear medicine, angiography, US, CT, and MRI and the requisite computer technology have been developed. These imaging modalities provide invaluable information about musculoskeletal tumors to surgeons and medical oncologists at all-time points along the continuum of patient care, from tumor detection and diagnosis to post-treatment surveillance. Despite the many technological advances, however, limitations of current imaging modalities persist. Advanced MRI techniques and molecular imaging hold substantial promise for further improvements in musculoskeletal tumor imaging.	4
44. James SL, Davies AM. Post-operative imaging of soft tissue sarcomas. *Cancer Imaging.* 2008;8:8-18.	Review/Other-Dx	N/A	To review the imaging interpretation of postoperative follow-up of soft tissue tumors.	STSs are rare. However, when they are encountered they have a relatively high incidence of local recurrence and metastatic disease. Monitoring these patients in the postoperative period is challenging in view of the spectrum of imaging findings that can be observed. MRI is the modality of choice for follow-up of the surgical field, however, a number of other modalities can be useful in specific instances to confirm or exclude tumor recurrence. The imaging modalities for the detection and diagnosis of local recurrence and metastatic disease have been discussed and a practical follow-up strategy for these patients suggested.	4
45. Garner HW, Kransdorf MJ, Bancroft LW, Peterson JJ, Berquist TH, Murphey MD. Benign and malignant soft-tissue tumors: posttreatment MR imaging. *Radiographics.* 2009;29(1):119-134.	Review/Other-Dx	N/A	To provide a framework for the evaluation of patients who have undergone resection of soft-tissue tumors, describe the appearance of post-treatment changes on MRI, and explain how to differentiate post-treatment changes from recurrent tumor.	MRI remains the modality of choice for evaluation of the postoperative bed after treatment of a soft-tissue tumor.	4

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Reference	Study Type	Patients/ Events	Study Objective (Purpose of Study)	Study Results	Study Quality
46. Watts AC, Teoh K, Evans T, Beggs I, Robb J, Porter D. MRI surveillance after resection for primary musculoskeletal sarcoma. *J Bone Joint Surg Br.* 2008;90(4):484-487.	Review/Other-Dx	47 patients	To report the experience of 1 treatment center with routine surveillance MRI following excision of musculoskeletal sarcoma.	The primary outcome was local tumor recurrence detected on either surveillance MRI in asymptomatic patients, or interval MRI in patients with clinical concern. A total of 47 patients had a diagnosis of STS and 10 of a primary bone tumor. A total of 13 patients (22%) had local recurrence. 9 patients were identified on a surveillance scan, and 4 by interval scans. The cost of surveillance is estimated to be £4414 per recurrence detected if low-grade tumors with clear resection margins are excluded. Surveillance scanning has a role in the early detection of local recurrence of bone and STS.	4

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Reference	Study Type	Patients/ Events	Study Objective (Purpose of Study)	Study Results	Study Quality
47. Shapeero LG, Poffyn B, De Visschere PJ, et al. Complications of bone tumors after multimodal therapy. *Eur J Radiol.* 2011;77(1):51-67.	Review/Other-Tx	80 patients	To define and compare the complications of bone tumors after resection, extracorporeal irradiation and re-implantation, with or without radiotherapy.	DCE-MRI differentiated the rapidly enhancing recurrences, residual tumors and metastases from the slowly enhancing inflammation, and the nonenhancing seromas and fibrosis. Recurrences, metastases (mainly to lung and bone), and seromas were greater than twice as frequent in patients after resection than after extracorporeal irradiation and re-implantation. Although 11.3% of post-resection patients had residual tumor, no extracorporeal irradiation and re-implantation-treated patient had residual tumor. In contrast, after extracorporeal irradiation and re-implantation, infection was almost 3 times as frequent and aseptic loosening twice as frequent as compared with the post-resection patients. Bones treated with external beam radiotherapy and/or extracorporeal irradiation and re-implantation showed increased prevalence of fractures and osteoporosis. In addition, muscle inflammation was more common in the externally irradiated patient as compared with the patient who did not receive this therapy. However, another soft tissue complication, heterotopic ossification, was rare in the patient after external beam radiotherapy, but 25.6% of patients after resection and 40.9% after extracorporeal irradiation and re-implantation showed heterotopic ossification. Unusual complications after resection or extracorporeal irradiation and re-implantation involved adjacent nerves with partial denervation, amputation neuroma, or entrapment (secondary to recurrence or fibrosis) after resection or extracorporeal irradiation and re-implantation with or without external beam radiotherapy. One patient developed a posterior tibial artery pseudoaneurysm after extracorporeal irradiation and re-implantation.	4

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Reference	Study Type	Patients/ Events	Study Objective (Purpose of Study)	Study Results	Study Quality
48. Costa FM, Canella C, Gasparetto E. Advanced magnetic resonance imaging techniques in the evaluation of musculoskeletal tumors. *Radiol Clin North Am.* 2011;49(6):1325-1358, vii-viii.	Review/Other-Dx	N/A	To discuss each advanced MRI technique with regard to the clinical applications of tumor detection and characterization, differentiation of benign from malignant tumors and tumor tissue from nontumor tissue, and assessment of treatment response.	These advanced MRI techniques, together with conventional MRI, the clinical history of the patient, and other imaging methods, are important tools for analyzing and diagnosing musculoskeletal tumors, avoiding unnecessary biopsies, facilitating early and efficient treatment, and consequently enhancing patient outcomes.	4
49. Fayad LM, Jacobs MA, Wang X, Carrino JA, Bluemke DA. Musculoskeletal tumors: how to use anatomic, functional, and metabolic MR techniques. *Radiology.* 2012;265(2):340-356.	Review/Other-Dx	N/A	To discuss a multiparametric approach to the evaluation of musculoskeletal tumors, with a focus on the utility and potential added value of various pulse sequences in helping establish a diagnosis, assess pretreatment extent, and evaluate a tumor in the post-treatment setting for recurrence and treatment response.	Although the function of MRI in the evaluation of musculoskeletal tumors has traditionally been to help identify the extent of disease prior to treatment, its role continues to evolve as new techniques emerge. Conventional pulse sequences remain heavily used and useful, but with the advent of chemical shift imaging, diffusion-weighted imaging, perfusion imaging and MR spectroscopy, additional quantitative metrics have become available that may help expand the role of MRI to include detection, characterization, and reliable assessment of treatment response.	4
50. Jaovisidha S, Traiporndeeprasert P, Chitrapazt N, et al. Dynamic contrasted MR imaging in differentiation of recurrent malignant soft tissue tumor from posttreatment changes. *J Med Assoc Thai.* 2011;94(9):1127-1133.	Observational-Dx	30 patients	To investigate DCE-MRI in term of differentiation recurrent malignant soft tissue tumor from post-treatment changes.	35 DCE-MRI studies were performed in 30 patients, which included 14 males and 16 females with an age range from 12 to 71 years (median 45.81 year). 13 were with recurrence and 22 were with post-treatment changes. The steepest slope ratios were ranged from 0.66 to 29.15. The lesions with the steepest slope ratio >9.28 were all benign at follow up of at least 2 months, whereas those with steepest slope ratio <1.05 were all recurrent tumors proven by biopsy or surgery. Overlapping occurred when the steepest slope ratios >1.05 but <9.28 in which the recurrence was 42.31%. The chance of having recurrence rather than post-treatment changes was approximately 2 and 5 times in patients with the ratio of 5.07 and 1.55, with the specificity of 54.55% and 90.91%, respectively.	2

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Reference	Study Type	Patients/ Events	Study Objective (Purpose of Study)	Study Results	Study Quality
51. Kransdorf MJ, Murphy MD. Imaging of soft tissue tumors. In: Kransdorf MJ, Murphy MD, eds. *Imaging of soft tissue tumors.* 2nd ed. Philadelphia, PA: Lippincott Williams & Wilkins; 2006:38-79.	Review/Other-Dx	N/A	Book chapter.	N/A	4
52. Vanel D, et al. Post treatment assessment of soft tissue tumors. In: DeSchepper AM, Vanhoenacker F, Gielen J, Parizel PM, eds. *Imaging of Soft Tissue Tumors.* 3rd ed. Berlin Heidelberg: Springer Verlag; 2006.	Review/Other-Dx	N/A	Book chapter.	N/A	4
53. Verdegaal SH, Brouwers HF, van Zwet EW, Hogendoorn PC, Taminiau AH. Low-grade chondrosarcoma of long bones treated with intralesional curettage followed by application of phenol, ethanol, and bone-grafting. *J Bone Joint Surg Am.* 2012;94(13):1201-1207.	Observational-Tx	85 patients	To assess the clinical and oncological outcomes after intralesional curettage, application of phenol and ethanol, and bone-grafting in 85 patients treated between 1994 and 2005.	Of the 85 patients, 11 underwent repeat surgery because a lesion was suspected on the basis of the Gd-MRI studies during follow-up. Of these 11, 5 had a histologically proven local recurrence (a recurrence rate of 5.9% [95% CI, 0.9% to 10.9%]), and all were grade-I chondrosarcomas. General complications consisted of 1 superficial infection and 2 femoral fractures within 6 weeks after surgery.	2
54. Costelloe CM, Kumar R, Yasko AW, et al. Imaging characteristics of locally recurrent tumors of bone. *AJR Am J Roentgenol.* 2007;188(3):855-863.	Review/Other-Dx	N/A	To identify recurrent tumor of bone utilizing radiography, CT, and MRI.	Radiography is frequently used to identify recurrence of treated bone tumors through findings such as osteolysis, cortical reactions, and characteristic matrix mineralization. CT can help evaluate the character of osseous and calcific abnormalities. Comparison with prior radiographs can be crucial for differentiation between postoperative alterations of bone and subtle signs of recurrence. MRI can identify soft-tissue masses and is useful for imaging patients with metallic hardware when it is optimized to decrease artifacts.	4

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Reference	Study Type	Patients/ Events	Study Objective (Purpose of Study)	Study Results	Study Quality
55. Dobbs MD, Lowas SR, Hernanz-Schulman M, Holt GE, Yu C, Kan JH. Impact of abdominopelvic CT on Ewing sarcoma management. *Acad Radiol.* 2010;17(10):1288-1291.	Observational-Dx	108 patients	To evaluate whether abdominopelvic CT examinations alter oncologic management and therefore patient outcomes.	65 of the 108 patients (60%) underwent 342 abdominopelvic CT examinations during a mean follow-up period of 8.9 years. During this time period, only 1 of the 65 patients (1.5%) who underwent abdominopelvic CT was discovered to have abdominal metastatic disease. There was no significant difference in the incidence of metastatic disease to the skeleton or chest between the groups without and with abdominopelvic CT (*P*=.10). There were 26 pelvic and lumbosacral primaries (24%) and 82 limb primaries (76%). Subgroup analysis performed on the 82 patients with limb primaries without (n = 36) and with (n = 46) abdominopelvic CT showed no significant differences in metastatic incidence to the skeleton or chest (*P*=.14).	3
56. Ehrhart N, Kraft S, Conover D, Rosier RN, Schwarz EM. Quantification of massive allograft healing with dynamic contrast enhanced-MRI and cone beam-CT: a pilot study. *Clin Orthop Relat Res.* 2008;466(8):1897-1904.	Review/Other-Dx	N/A	To show the utility of DCE-MRI to quantify vascularity after femoral osteotomy in a canine femur model and cone beam CT to quantify bone volume in a patient after composite prosthetic-allograft reconstructive surgery.	DCE-MRI is a feasible approach to quantitatively assess the revascularization of cortical bone following osteotomy. Conversely, cone beam CT is a feasible approach to quantitatively assess massive allograft bone volume adjacent to metal implants, but intravenous contrast enhancement cannot be used to quantify vascularity with this approach.	4
57. Fayad LM, Bluemke DA, Fishman EK. Musculoskeletal imaging with computed tomography and magnetic resonance imaging: when is computed tomography the study of choice? *Curr Probl Diagn Radiol.* 2005;34(6):220-237.	Review/Other-Dx	N/A	To discuss the indications for imaging the musculoskeletal system by CT, emphasizing MDCT technique, and provide numerous examples that highlight the utility of CT in the evaluation of musculoskeletal pathology.	Though there has been much focus on MRI of the musculoskeletal system, indications for MDCT of the musculoskeletal system are numerous. Examples have been shown above that highlight the utility of MDCT in the management of musculoskeletal pathology and the importance of volume-rendered 3D CT imaging in musculoskeletal applications is underscored.	4

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Reference	Study Type	Patients/ Events	Study Objective (Purpose of Study)	Study Results	Study Quality
58. Lee MJ, Kim S, Lee SA, et al. Overcoming artifacts from metallic orthopedic implants at high-field-strength MR imaging and multi-detector CT. *Radiographics*. 2007;27(3):791-803.	Review/Other-Dx	N/A	To survey the factors that affect metal implant–related artifacts and review the theories and techniques of artifact reduction at 3.0-T MRI and MDCT.	At MRI and MDCT, artifacts arising from metallic orthopedic hardware are an obstacle to obtaining optimal images. Although various techniques for reducing such artifacts have been developed and corroborated by previous researchers, a new era of more powerful MRI and MDCT modalities has renewed the importance of a systematic consideration of methods for artifact reduction. Knowledge of the factors that contribute to artifacts, of related theories, and of artifact reduction techniques has become mandatory for radiologists. Factors that affect artifacts on MRI include the composition of the metallic hardware, the orientation of the hardware in relation to the direction of the main magnetic field, the strength of the magnetic field, the pulse sequence type, and other MRI parameters (mainly voxel size, which is determined by the field of view, image matrix, section thickness, and echo train length). At MDCT, the factors that affect artifacts include the composition of the hardware, orientation of the hardware, acquisition parameters (peak voltage, tube charge, collimation, and acquired section thickness), and reconstruction parameters (reconstructed section thickness, reconstruction algorithm used, and whether an extended CT scale was used).	4

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Reference	Study Type	Patients/ Events	Study Objective (Purpose of Study)	Study Results	Study Quality
59. Shapiro L, Harish M, Hargreaves B, Staroswiecki E, Gold G. Advances in musculoskeletal MRI: technical considerations. *J Magn Reson Imaging.* 2012;36(4):775-787.	Review/Other-Dx	N/A	To review technical advances in hardware and software of musculoskeletal MRI along with their clinical applications.	MRI has long been established as the preferred modality for evaluating almost every joint of the musculoskeletal system. Despite its success, advancements and developments are both welcomed and necessary as they continue to revolutionize the field of musculoskeletal imaging. Most of these improvements are extremely beneficial, everything considered, but often require modifications in order to optimize their advantages. Much promising research to resolve outstanding technical considerations is being done in order to allow each new imaging technique to reach its full clinical potential. Advancements in both software and hardware technology have and continue to contribute to the increased indication of MRI in clinical musculoskeletal imaging.	4
60. Meyer JS, Nadel HR, Marina N, et al. Imaging guidelines for children with Ewing sarcoma and osteosarcoma: a report from the Children's Oncology Group Bone Tumor Committee. *Pediatr Blood Cancer.* 2008;51(2):163-170.	Review/Other-Dx	N/A	To present imaging guidelines developed by a multidisciplinary group from the Children's Oncology Group Bone Tumor Committee.	No results stated in abstract.	4

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Reference	Study Type	Patients/ Events	Study Objective (Purpose of Study)	Study Results	Study Quality
61. Kleis M, Daldrup-Link H, Matthay K, et al. Diagnostic value of PET/CT for the staging and restaging of pediatric tumors. *Eur J Nucl Med Mol Imaging.* 2009;36(1):23-36.	Observational-Dx	43 patients	To compare the diagnostic value of FDG-PET/CT vs FDG-PET and CT alone for staging and restaging of pediatric solid tumors.	The sensitivities for the detection of solid primary tumors using integrated FDG-PET/CT (95%), FDG-PET alone (73%), and CT alone (93%) were not significantly different ($P>0.05$). 17 patients showed a total of 153 distant metastases. Integrated PET/CT had a significantly higher sensitivity for the detection of these metastases (91%) than PET alone (37%; $P<0.05$), but not CT alone (83%; $P>0.05$). When lesions with a diameter of <0.5 cm were excluded, PET/CT (89%) showed a significantly higher specificity compared to PET (45%; $P<0.05$) and CT (55%; $P<0.05$). In a sub-analysis of pulmonary metastases, the values for sensitivity and specificity were 90%, 14%, 82% and 63%, 78%, 65%, respectively, for integrated PET/CT, stand-alone PET, and stand-alone CT. For the detection of regional lymph node metastases, FDG-PET/CT, FDG-PET alone, and CT alone were diagnostically correct in 83%, 61%, and 42%. A sub-analysis focusing on the ability of PET/CT, PET, and CT to detect osseous metastases showed no statistically significant difference between the 3 imaging modalities ($P>0.05$).	3
62. Al-Ibraheem A, Buck AK, Benz MR, et al. (18) F-fluorodeoxyglucose positron emission tomography/computed tomography for the detection of recurrent bone and soft tissue sarcoma. *Cancer.* 2013;119(6):1227-1234.	Observational-Dx	43 patients	To present a clinical study on the diagnostic accuracy and incremental value of integrated FDG-PET/CT in patients with a history of sarcoma who have clinically suspected disease recurrence.	FDG-PET/CT had greater sensitivity and specificity compared with contrast-enhanced CT alone (94% and 92% vs 78% and 67%, respectively), resulting in significantly greater accuracy (93% vs 73%; $P=.03$). FDG-PET/CT was particularly superior regarding detection of local recurrence or soft tissue lesions (sensitivity and specificity: 83% and 100% vs 50% and 100%, respectively) or bone metastases (100% and 100% vs 85% and 88%, respectively).	2

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Reference	Study Type	Patients/ Events	Study Objective (Purpose of Study)	Study Results	Study Quality
63. Ricard F, Cimarelli S, Deshayes E, Mognetti T, Thiesse P, Giammarile F. Additional Benefit of F-18 FDG PET/CT in the staging and follow-up of pediatric rhabdomyosarcoma. *Clin Nucl Med.* 2011;36(8):672-677.	Observational-Dx	13 patients	To evaluate FDG-PET/CT as an adjunct to conventional imaging in the staging and follow-up of pediatric rhabdomyosarcoma.	At staging, FDG-PET/CT revealed 1 rhabdomyosarcoma of the prostate missed by conventional imaging, and found 19 true-positive lymph node territories in 4 patients and 11 bone metastases in 3 patients, vs 12 and 3, respectively, with conventional imaging. Conversely, FDG-PET/CT was less sensitive for detecting infracentimetric lung nodules in 1 patient. On the whole analysis, FDG-PET/CT modified lymph node staging in 4/13 patients, bone involvement in 2 patients, and led to treatment alteration in 2 children.	2
64. Iagaru A, Chawla S, Menendez L, Conti PS. 18F-FDG PET and PET/CT for detection of pulmonary metastases from musculoskeletal sarcomas. *Nucl Med Commun.* 2006;27(10):795-802.	Observational-Dx	106 (52 men and 54 women)	Retrospective study to determine the accuracy of PET and PET/CT in the detection of pulmonary metastases from musculoskeletal sarcomas.	PET: sensitivity and specificity were 68.3% (95% CI: 53–80.4) and 98.4% (95% CI: 91.8–99.7) CT; sensitivity and specificity were 95.1% (95% CI: 83.8–98.6) and 92.3% (95% CI: 83.2–96.7). Pulmonary metastases were seen in 40 patients. CT identified 17 lesions >1.0 cm, while PET identified 13 of them (76.5%). Chest CT is more sensitive than PET in detecting pulmonary metastases from osseous and STSs.	3
65. Nakamoto Y, Cohade C, Tatsumi M, Hammoud D, Wahl RL. CT appearance of bone metastases detected with FDG PET as part of the same PET/CT examination. *Radiology.* 2005;237(2):627-634.	Observational-Dx	55 patients 179 lesions	To retrospectively evaluate lesion findings CT performed as part of a combined PET/CT in patients suspected of having metastatic bone lesions-lesions that were detected with FDG-PET as part of the same examination, and to correlate the CT and FDG-PET findings.	CT images obtained as part of PET/CT scanning were useful in yielding the precise location of bone lesions and thus helping avoid misdiagnosis of bone metastasis; however, CT revealed morphologic changes in only half of the lesions assigned a grade of 3 or 4 at PET.	2
66. Taira AV, Herfkens RJ, Gambhir SS, Quon A. Detection of bone metastases: assessment of integrated FDG PET/CT imaging. *Radiology.* 2007;243(1):204-211.	Observational-Dx	59 patients 113 lesions	To retrospectively evaluate the PPV of FDG-PET/CT in the identification of malignant bone lesions when the PET and CT findings are discordant and concordant.	PET/CT has a very high PPV for bone metastases (98%) when the findings at PET and CT are concordant; however, in lesions with discordant PET and CT findings at the integrated examination, PPV is markedly diminished.	3

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Reference	Study Type	Patients/ Events	Study Objective (Purpose of Study)	Study Results	Study Quality
67. Costelloe CM, Macapinlac HA, Madewell JE, et al. 18F-FDG PET/CT as an indicator of progression-free and overall survival in osteosarcoma. *J Nucl Med.* 2009;50(3):340-347.	Observational-Dx	31 patients	To retrospectively evaluate whether maximum SUV, total lesion glycolysis, or change therein using FDG-PET/CT performed before and after initial chemotherapy were indicators of patient outcome.	High SUV(max) before and after chemotherapy (P=0.008 and P=0.009, respectively) was associated with worse PFS. The cut point for SUV(max) before chemotherapy was >15 g/mL (P=0.015), and after chemotherapy it was >5 g/mL (P=0.006), as measured at our institution and using lean body mass. Increase in total lesion glycolysis after chemotherapy was associated with worse PFS (P=0.016). High SUV(max) after chemotherapy was associated with poor OS (P=0.035). The cut point was above the median of 3.3 g/mL* (P=0.043). High total lesion glycolysis before chemotherapy was associated with poor OS (P=0.021). Good OS and PFS was associated with a tumor necrosis >90% (P=0.018 and 0.08, respectively). A tumor necrosis >90% was most strongly associated with a decrease in SUV(max) (P=0.015).	4
68. Chawla SC, Federman N, Zhang D, et al. Estimated cumulative radiation dose from PET/CT in children with malignancies: a 5-year retrospective review. *Pediatr Radiol.* 2010;40(5):681-686.	Review/Other-Dx	78 patients	To estimate the cumulative radiation dose from PET/CT studies to children with malignancy and to compare with the data in literature.	The average number of PET/CT studies was 3.2 per child (range: 1 to 14 studies). The average effective dose of an individual CT study was 20.3 mSv (range: 2.7 to 54.2), of PET study was 4.6 mSv (range: 0.4 to 7.7) and of PET/CT study was 24.8 mSv (range: 6.2 to 60.7). The average cumulative radiation dose per patient from CT studies was 64.4 mSv (range: 2.7 to 326), from PET studies was 14.5 mSv (range: 2.8 to 73) and from PET/CT studies was 78.9 mSv (range: 6.2 to 399).	4

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Reference	Study Type	Patients/ Events	Study Objective (Purpose of Study)	Study Results	Study Quality
69. Huang B, Law MW, Khong PL. Whole-body PET/CT scanning: estimation of radiation dose and cancer risk. *Radiology.* 2009;251(1):166-174.	Review/Other-Dx	N/A	To estimate the radiation dose from whole-body FDG-PET/CT studies and to evaluate the induced cancer risk to U.S. and Hong Kong populations.	Effective doses with protocols A, B, and C, respectively, were 13.45, 24.79, and 31.91 mSv for female patients and 13.65, 24.80, and 32.18 mSv for male patients. The lifetime attributable risk of cancer incidence associated with the dose was higher in the Hong Kong population than in the U.S. population. For 20-year-old U.S. women, lifetime attributable risks of cancer incidence were between 0.231% and 0.514%, and for 20-year-old U.S. men, lifetime attributable risks of cancer incidence were between 0.163% and 0.323%; lifetime attributable risks were 5.5%–20.9% higher for the Hong Kong population. The induced cancer risks decreased when age at exposure increased.	4
70. Iagaru A, Mittra E, Mosci C, et al. Combined 18F-fluoride and 18F-FDG PET/CT scanning for evaluation of malignancy: results of an international multicenter trial. *J Nucl Med.* 2013;54(2):176-183.	Observational-Dx	115 patients	To prospectively evaluate combined 18F-fluoride/FDG as a single PET/CT examination for evaluation of cancer patients and compare it with separate 18F-fluoride PET/CT and FDG-PET/CT scans.	18F-fluoride/FDG-PET/CT allowed for accurate interpretation of radiotracer uptake outside the skeleton, with findings similar to those of FDG-PET/CT. In 19 participants, skeletal disease was more extensive on 18F-fluoride PET/CT and 18F-fluoride/FDG-PET/CT than on FDG-PET/CT. In another 29 participants, 18F-fluoride PET/CT and 18F-fluoride/FDG-PET/CT showed osseous metastases where FDG-PET/CT was negative. The extent of skeletal lesions was similar in 18 participants on all 3 scans.	2
71. Drzezga A, Souvatzoglou M, Eiber M, et al. First clinical experience with integrated whole-body PET/MR: comparison to PET/CT in patients with oncologic diagnoses. *J Nucl Med.* 2012;53(6):845-855.	Observational-Dx	32 patients	To evaluate the comparability of clinical performance between conventional PET/CT and PET/MR in patients with oncologic diseases.	Simultaneous PET/MR acquisition was feasible with high quality in short acquisition time (≤20 min). No significant difference was found between the numbers of suspicious lesions (n = 80) or lesion-positive patients (n = 20) detected with PET/MR or PET/CT. Anatomic allocation of PET/MR findings by means of the Dixon MRI sequence was comparable to allocation of PET/CT findings by means of low-dose CT. Quantitative evaluation revealed a high correlation between mean SUVs measured with PET/MR and PET/CT in lesions (rho = 0.93) and background tissue (rho = 0.92).	3

Follow-up of Malignant or Aggressive Musculoskeletal Tumors
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Reference	Study Type	Patients/ Events	Study Objective (Purpose of Study)	Study Results	Study Quality
72. Gronchi A, Lo Vullo S, Colombo C, et al. Extremity soft tissue sarcoma in a series of patients treated at a single institution: local control directly impacts survival. *Ann Surg.* 2010;251(3):506-511.	Review/Other-Tx	997 patients	To improve understanding of what is adequate in local treatment of extremity STSs, to maximize the ratio between local control, limb preservation and prognosis.	5- and 10-year mortality estimates (95% CI) were 0.29 (0.20–0.38) and 0.38 (0.28–0.49) in R1 cases, and 0.16 (0.13–0.19) and 0.19 (0.16-0.23) in R0 cases (P=0.0003). Size, grade, depth, and histologic subtype were also significant predictor of mortality. Significant determinants for local relapse were surgical margins, radiation therapy, and histologic subtype. In the subset of R1 resections trends towards a better local control for R1 negative cases and histology other than myxofibrosarcoma were identified. Significant determinants for distant metastases were size, grade and histologic subtype of the tumor but not surgical margins.	4
73. Novais EN, Demiralp B, Alderete J, Larson MC, Rose PS, Sim FH. Do surgical margin and local recurrence influence survival in soft tissue sarcomas? *Clin Orthop Relat Res.* 2010;468(11):3003-3011.	Observational-Tx	248 patients	To explore the impact of microscopic margin on local recurrence, metastasis, and OS in patients with intermediate- to high-grade STSs of the extremities.	The 5-year cumulative incidence of local recurrence was 4.1%. Patients who presented with positive margins or a margin of ≤2 mm had a worse survival than patients who had margins of >2 mm and wide margins (5-year survival, 47% vs 70% and 72%). In addition to surgical margin, developing metastasis, tumor response of <90% necrosis, high histopathologic grade, high AJCC stage (stage III), increasing age, and male gender were associated with decreased OS. Local recurrence independently predicted decreased OS.	2

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Reference	Study Type	Patients/ Events	Study Objective (Purpose of Study)	Study Results	Study Quality
74. Salas S, Stoeckle E, Collin F, et al. Superficial soft tissue sarcomas (S-STS): a study of 367 patients from the French Sarcoma Group (FSG) database. *Eur J Cancer*. 2009;45(12):2091-2102.	Observational-Tx	367 patients	To describe the clinical characteristics of a large series of superficial-STS (n=367) from the French Sarcoma Group (GSF-GETO) database and analyze the prognostic factors affecting outcome.	The median age was 59 years. 58% of patients were female. Tumor locations were as follows: extremities, 55%; trunk wall, 35.4%; head and neck, 8% and unknown, 1.6%. Median tumor size was 3.0 cm. The most frequent tumor types were unclassified sarcoma (24.3%) and leiomyosarcoma (22.3%). 33% of cases were grade 3. Median follow-up was 6.18 years. The 5-year OS, metastasis-free survival and local recurrence-free survival rates were 80.9%, 80.7% and 74.7%, respectively. Multivariate analysis retained histological type and wide resection for predicting local recurrence-free survival and histological type and grade as prognostic factors of metastasis-free survival. The factors influencing OS were age, histological type, grade and wide resection. STS with early invasion into but not through the underlying fascia had a significantly poorer metastasis-free survival than with strict superficial-STS.	2
75. Parsons HM, Habermann EB, Tuttle TM, Al-Refaie WB. Conditional survival of extremity soft-tissue sarcoma: results beyond the staging system. *Cancer*. 2011;117(5):1055-1060.	Observational-Tx	6,215 patients	To assess determinants of survival in adults surgically treated for nonmetastatic extremity-STS, conditional on specific survival periods.	At the time of diagnosis, age, tumor, and treatment factors predicted sarcoma-specific survival. Although older age significantly predicted worse sarcoma-specific survival for all age groups at diagnosis (HR 3.78 for age >81 vs 18-35; $P<.05$ for all), the effect of age became nonsignificant as survival time increased, except for the oldest group (>80 years). Tumor size, grade, and histologic subtypes continued to be important predictors of sarcoma-specific survival for all periods of conditional survival. Persons who underwent limb amputation were at 3 times the risk of mortality for all conditional survival periods.	2
76. Binitie O, Tejiram S, Conway S, Cheong D, Temple HT, Letson GD. Adult soft tissue sarcoma local recurrence after adjuvant treatment without resection of core needle biopsy tract. *Clin Orthop Relat Res*. 2013;471(3):891-898.	Observational-Tx	59 adult patients	To determine the rates of recurrence and metastases in patients with stage III extremity sarcomas, who underwent wide local resection without excision of the needle tract and also received adjuvant treatment.	The local recurrence rate was 9%. 15 patients (25%) developed metastasis after diagnosis. 7 of the 59 patients (12%) had microscopic positive margins at resection.	2

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Reference	Study Type	Patients/ Events	Study Objective (Purpose of Study)	Study Results	Study Quality
77. Patel SR, Zagars GK, Pisters PW. The follow-up of adult soft-tissue sarcomas. *Semin Oncol.* 2003;30(3):413-416.	Review/Other-Dx	N/A	Data on standard practice is presented based on the consensus of a group of experienced specialists and retrospective analysis of large databases.	Suggested strategies: Patients with low-risk STSs who have undergone curative therapy could be followed with a history, physical examination, and CXR at 3- to 4-month intervals for 2 years, 4- to 6-month intervals for 2 years and yearly thereafter. Cross-sectional imaging should be individualized based on the reliability of physical examination and suspicion for deep-seated recurrence. Patients with nonextremity sites frequently require cross-sectional imaging for routine follow-up. Patients with a very low-risk of recurrence could stop surveillance after 5 to 10 years as clinically appropriate. Patients with high-risk STSs could be followed with a history, physical examination, laboratory tests, CXR, and a cross-sectional imaging of choice every 3 months for 2 years, every 4 months for 2 years, every 6 months for the 5th year, and yearly thereafter. The cost effectiveness of many of these tests and their impact on survival remains unknown.	4

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Reference	Study Type	Patients/ Events	Study Objective (Purpose of Study)	Study Results	Study Quality
78. Mavrogenis AF, Lesensky J, Romagnoli C, Alberghini M, Letson GD, Ruggieri P. Atypical lipomatous tumors/well-differentiated liposarcomas: clinical outcome of 67 patients. *Orthopedics.* 2011;34(12):e893-898.	Observational-Tx	67 patients	To evaluate the long-term clinical behavior and proper treatment and follow-up strategy for these tumors.	For 67 of these patients, complete data and 2-year minimum follow-up were available and were included in the study; 47 patients (group A) had primary surgical treatment at our institution and 20 patients (group B) were referred after ≥1 local recurrences. Mean follow-up was 81 months (range, 24–229 months). The local recurrence rate of primary atypical lipomatous tumors/well-differentiated liposarcomas was 10.6% (5/47 group A patients). The local re-recurrence rate of the recurrent atypical lipomatous tumors/well-differentiated liposarcomas was 52% (13/67 group A and B patients). Recurrences developed as late as 140 months after diagnosis and treatment. The rate of dedifferentiation at recurrences was 4% (1/25 group A and B patients with recurrent tumors). No patients developed metastases. Atypical lipomatous tumors/well-differentiated liposarcomas are associated with an increased rate of local re-recurrence and low risk of dedifferentiation at recurrences. Long-term follow-up is recommended for early diagnosis and treatment of local recurrences.	2

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Reference	Study Type	Patients/ Events	Study Objective (Purpose of Study)	Study Results	Study Quality
79. Nakamura T, Grimer RJ, Carter SR, et al. Outcome of soft-tissue sarcoma patients who were alive and event-free more than five years after initial treatment. *Bone Joint J.* 2013;95-B(8):1139-1143.	Observational-Tx	1,912 patients	To evaluate the risk of late relapse and further outcome in patients with STSs who were alive and event-free more than 5 years after initial treatment.	Of these 1,912 patients, 603 were alive and event-free more than 5 years after initial treatment and we retrospectively reviewed them. The mean age of this group was 48 years (4 to 94) and 340 were men. The mean follow-up was 106 months (60 to 336). Of the original cohort, 582 (97%) were alive at final follow-up. The disease-specific survival was 96.4% (95% CI: 94.4 to 98.3) at 10 years and 92.9% (95% CI: 89 to 96.8) at 15 years. The rate of late relapse was 6.3% (38/603). The 10- and 15-year event-free rates were 93.2% (95% CI: 90.8 to 95.7) and 86.1% (95% CI: 80.2 to 92.1), respectively. Multivariate analysis showed that tumor size and tumor grade remained independent predictors of events. In spite of further treatment, 19/38 patients died of sarcoma. The 3- and 5-year survival rates after the late relapse were 56.2% (95% CI: 39.5 to 73.3) and 43.2% (95% CI: 24.7 to 61.7), respectively, with a median survival time of 46 months.	2

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Reference	Study Type	Patients/ Events	Study Objective (Purpose of Study)	Study Results	Study Quality
80. Kolovich GG, Wooldridge AN, Christy JM, Crist MK, Mayerson JL, Scharschmidt TJ. A retrospective statistical analysis of high-grade soft tissue sarcomas. *Med Oncol.* 2012;29(2):1335-1344.	Review/Other-Dx	129 patients	To use data to examine variables and determine the best predictors of survival time and develop a Cox Survival Analysis model for predicting post-surgical survival time for high-grade sarcoma patients from the time of surgical excision.	Data were collected from 129 patients surgically treated for high-grade extremity STSs during 2002-2010. The primary endpoint was death related to high-grade STS. 13 variables were investigated: age, gender, race, tumor size, margin status, location, estimated blood loss, operative blood transfusions, preoperative metastatic disease, preoperative radiation, postoperative radiation, preoperative chemotherapy, and postoperative chemotherapy. A Cox Survival Analysis model was created to determine the best predictors of survival time. Tumor size and the presence of presurgical metastasis were statistically significant predictors of OS. Patients with a tumor >8 cm in any cross section had a 3.15 times greater chance of death. Presence of presurgical metastasis carried a 3.47 greater chance of death. The remaining variables did not predict patient outcomes in a statistically significant manner. The HRs calculated added new data and can be used to more effectively guide patients in prognosis and treatment regimens.	4
81. Krieg AH, Hefti F, Speth BM, et al. Synovial sarcomas usually metastasize after >5 years: a multicenter retrospective analysis with minimum follow-up of 10 years for survivors. *Ann Oncol.* 2011;22(2):458-467.	Observational-Tx	62 patients	To investigate the extent to which individual clinical tumor specific factors as well as surgical approach affect the outcome of patients with synovial sarcomas with at least 10-year follow-up.	Mean age at diagnosis was 35.4 years (range 6–82 years). OS was 38.7%. The 5-year survival was 74.2%; 10-year survival was 61.2%; and 15-year survival was 46.5%. 15 patients (24%) died of disease after 10 years of follow-up. Local recurrence occurred after a mean of 3.6 years (range 0.5–14.9 years) and metastases at a mean of 5.7 years (range 0.5–16.3 years). Only 4 patients were treated technically correctly with a planned biopsy followed by a wide resection or amputation. Factors associated with significantly worse prognosis included larger tumor size, metastases at the time of diagnosis, high-grade histology, trunk-related disease, and lack of wide resection as primary surgical treatment.	2

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Reference	Study Type	Patients/ Events	Study Objective (Purpose of Study)	Study Results	Study Quality
82. Northam M, de Campos RO, Ramalho M, et al. Bone metastases: evaluation of acuity of lesions using dynamic gadolinium-chelate enhancement, preliminary results. *J Magn Reson Imaging.* 2011;34(1):120-127.	Observational-Dx	62 patients	To evaluate whether enhancement on serial DCE-MRI can determine the acuity of bone metastases.	The mean percentage enhancement of the bone metastases classified as acute/active, subacute, and chronic in the hepatic arterial dominant phase, early hepatic venous phase and interstitial phase were respectively: 134%, 107%, 99%; 87%, 86%, 87%; and 39%, 65%, 73%. In the hepatic arterial dominant phase, acute/active lesions enhanced significantly more than both subacute (1.53-fold) and chronic (3.4-fold) lesions ($P<0.01$). Time intensity curves were significantly different between these three entities as well.	3
83. Cheney MD, Giraud C, Goldberg SI, et al. MRI surveillance following treatment of extremity soft tissue sarcoma. *J Surg Oncol.* 2014;109(6):593-596.	Observational-Dx	168 patients	To investigate the utility of surveillance nuclear MRI for detection of asymptomatic local recurrences.	After a median follow-up of 4.7 years (range: 0.6–10.5) 11 (6.5%; 11/168) patients developed local recurrences. 502 MRIs were obtained, 429 (85.5%; 429/502) for surveillance and 73 (14.5%; 73/502) as clinically indicated. 114 patients underwent ≥1 surveillance MRI. The median surveillance MRI interval was 6.4 months (range 1.4–68.9). Surveillance MRI detected an asymptomatic local recurrence in 1 (0.9%; 1/114) patient with a complex reconstruction.	3

Evidence Table Key

Study Quality Category Definitions

- *Category 1* The study is well-designed and accounts for common biases.
- *Category 2* The study is moderately well-designed and accounts for most common biases.
- *Category 3* There are important study design limitations.
- *Category 4* The study is not useful as primary evidence. The article may not be a clinical study or the study design is invalid, or conclusions are based on expert consensus. For example:
  a) the study does not meet the criteria for or is not a hypothesis-based clinical study (e.g., a book chapter or case report or case series description);
  b) the study may synthesize and draw conclusions about several studies such as a literature review article or book chapter but is not primary evidence;
  c) the study is an expert opinion or consensus document.
- M = Meta-analysis

Dx = Diagnostic

Tx = Treatment

Abbreviations Key

CI = Confidence interval

CT = Computed tomography

CXR = Chest radiograph

DCE-MRI = Dynamic contrast-enhanced magnetic resonance imaging

FDG-PET = Fluorine-18-2-fluoro-2-deoxy-D-glucose-positron emission tomography

HR = Hazard ratio

MDCT = Multidetector computed tomography

MRI = Magnetic resonance imaging

OS = Overall survival

PFS = Progression-free survival

PPV = Positive predictive value

SD = Standard deviation

SPECT = Single-photon emission computed tomography

STS = Soft tissue sarcoma

SUV = Standard uptake value

US = Ultrasound

WB-MRI = Whole body magnetic resonance imaging