

Evidence Discussion (ONC 31.5)

Bone Metastases

Bone scan supplemented by plain Xray is the generally the first-line modality for patients with current or history of malignancy who have new bone pain, rising tumor markers or elevated alkaline phosphatase. Bone scan is 79-86% sensitive and 81-88% specific for metastatic lesions (Yang 2011, Qu 2012). Bone scan allows rapid whole-skeletal evaluation, to ensure additional bony disease is not missed by focusing on a single site of cross sectional imaging. MRI is a useful problem-solving tool if there is continued suspicion for bony metastatic disease with a negative bone scan (DiPrimio 2023, Yang 2011). Soft tissue disease is not visible on bone scan, thus MRI is supported when a soft tissue component is suspect to avoid understaging and undertreatment (ACR 2024, DiPrimio 2023). MRI is also the most specific study to supplement plain xray to differentiate Paget disease of bone from neoplastic disease (Lombardi 2022).

MRI is more accurate than CT or bone scan for the evaluation of malignant vertebral compression fractures and additionally can assess for cord compression, edema or leptomeningeal disease (Liu 2017). Patients with known stage IV cancer with new back pain or any signs of neurologic compromise may be immediately evaluated by MRI of the whole spine without or without and with contrast (ACR 2024, Liu 2017). MRI is also indicated for suspected leptomeningeal disease (ACR 2024, Liu 2017). CT has the lower accuracy than MRI or bone scan in this setting, and is only supported when MRI is contraindicated (Liu 2017). New leptomeningeal disease should prompt an MRI of the brain for complete neuroaxis imaging. While there is not a clear consensus on the frequency of imaging for spinal metastatic disease, in alignment with standard observation of metastatic disease, eviCore guidelines allow for Q3 month imaging for 1 year, and every 2 cycles of treatment for patients on active treatment with leptomeningeal disease.

Where imaging is suspicious for bony metastatic disease and a workup for multiple myeloma is negative, CT chest, abdomen and pelvis with contrast are supported to look for a primary malignancy (Karsell 1982, Piccoli 2015).

The sensitivity and specificity of FDG PET-CT for bony metastatic disease varies with the malignancy. For example, for breast cancer, PET may be more sensitive (96% vs 76% for bone scan), but may be less specific (92% vs 95% for bone scan). However for some cancers sensitivity of PET is as low as 56 percent (Liu 2017, Qu 201). Given this variability, PET-CT is supported as a problem-solving tool when both bone scan and MRI or CT are inconclusive. NaF PET is considered investigational due to varying sensitivity and specificity (Zhang-Yin 2023, Ahmed 2022).

References

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