

Bone Scan Three Phase

Updated

9/8/2024

- **Indications**

- To assess primary benign and malignant osseous lesions, occult or stress fractures, osteomyelitis, avascular necrosis, arthritides, complex regional pain syndrome, bone infarction, bone graft viability, unexplained bone pain, further evaluation of osseous abnormalities incidentally found on other imaging exams, prosthetic hardware complications and heterotopic ossification.

- **Radiopharmaceutical:**

- 25.0 mCi Tc-99m MDP (methyl diphosphonate) administered IV

- **Patient Preparation:**

- No specific preparation prior to radionuclide administration.
- Hydrate the patient after radionuclide administration. Instruct the patient to hydrate for a day following the exam.
- Have the patient empty his/her bladder immediately prior to imaging. Instruct the patient to void frequently for a day following the exam.

- **Conflicting Examinations/Medications:**

- No Nuclear Medicine exams within the previous 24 hrs (if the FOV will be affected by the prior exam).
- No barium GI exams within the previous 48 hrs (if the FOV will be affected by the prior exam).

- **Pregnancy/Lactation:**

- Pregnancy testing is only needed in potentially pregnant patients who state they could be pregnant. See Pregnant, Potentially Pregnant and Lactating Patients policy for specifics.
- Breast feeding mothers should discard breast milk for 4-24 hrs following Tc-99m MDP administration.

- **Imaging Technique:**

- Collimator - LEHR or LEAP
- Photopeak - 140 keV 20% window for Tc-99m
- Image Preset Counts
 - Dynamic Images - 4 secs/image for 2 mins (30 images)
 - Blood Pool Images
 - ✓ Torso/Pelvis - 300k counts/image or 5 mins/image
 - ✓ Skull/Extremities - 150-200k counts/image or 5 mins/image
 - Delay Phase Images
 - ✓ Torso/Pelvis - 750k counts/image or 5 mins/image
 - ✓ Skull/Extremities - 500k counts/image or 5 mins/image
- Matrix Size - 64 x 64 (flow), 256 x 256 (blood pool and delay)
- Zoom - 1.23 (E-Cam), 1.0 (Discovery NM630)
- Patient Positioning - supine

- **Images/Views:**

- Flow Images
 - Begin imaging immediately after radionuclide administration.
 - Obtain anterior and posterior images for 2 mins.
- Blood Pool Images
 - Obtain anterior and posterior images at 5 mins and 10 mins.
- Delay Phase Images
 - Begin imaging 3-4 hrs after radionuclide administration.
 - Obtain anterior, posterior, oblique and lateral static images as applicable to the anatomy of interest.
- Check with the Radiologist before discharging the patient to see if any additional imaging is needed.
- Use XR Addl Films w/ Nuclear Med Study for any radiographs requested by the Radiologist. Sign the order for the radiographs back to whomever ordered the bone scan.

• **Notes:**

- Uptake on bone scans reflects osteoblastic activity. Bone scans have limited sensitivity in the assessment of osteolytic lesions.
- An increase in the uptake intensity or the number of abnormalities may indicate disease progression or flare response (due to increased osteoblastic activity during repair).
- Increased uptake associated with healed fractures can persist for up to 2 years (even longer in presence of internal fixation hardware).
- Persistent delayed phase uptake about an arthroplasty can be present for up to 12 months (uncemented) or up to 24 months (cemented).
- Persistent focal delayed uptake about the greater trochanter or the tip of a femoral arthroplasty component suggests loosening (100% sensitive 77% specific).
- Generalized delayed uptake about a prosthesis suggests infection.
- The absence of increased blood flow and blood pool activity at location of concern makes osteomyelitis unlikely.
- Focal increased soft tissue uptake can be caused by localized infection or inflammation, trauma, infarction and soft tissue metastasis (particularly from mucinous primary lesions).
- Medications that interfere with uptake include aluminum-containing compounds, corticosteroids, iron, methotrexate, nifedipine (Procardia), hematopoietic growth factors (Epogen, Neupogen, Neulasta), androgen deprivation therapy, estrogens, bisphosphonates, medications that interfere with osteoblastic function, nephrotoxic chemotherapy and amino caproic acid.

	Blood Flow	Blood Pool	Delayed
osteomyelitis	regional or focal ↑	regional or focal ↑	focal ↑
treated osteomyelitis	normal or slight ↑	normal or slight ↑	focal ↑
aseptic loosening	normal or slight ↑	normal or slight ↑	periprosthetic ↑
cellulitis	regional ↑	regional ↑	normal or diffuse ↑
acute fracture	regional or focal ↑	regional or focal ↑	focal ↑
stress fracture	regional or focal ↑	regional or focal ↑	focal ↑
healing fracture	normal or slight ↑	normal or slight ↑	focal ↑
degenerative changes	normal or slight ↑	normal or slight ↑	articular ↑
diabetic osteoarthropathy	regional or focal ↑	regional or focal ↑	articular ↑
complex regional pain syndrome	diffuse ↑	diffuse ↑	juxta-articular ↑