Bone Marrow Scintigraphy

**Primary Indications:** The most common indication for bone marrow scintigraphy is for correlation with leukocyte scintigraphy in patients with potential osseous infections (e.g., infected joint prosthesis, differentiation of osteomyelitis from bone infarcts in patients with sickle cell anemia). A less common indication is to evaluate the distribution of bone marrow in hematologic diseases such as myelofibrosis. The test can be used to detect focal marrow replacement; any focal marrow-replacing process such as tumor, infarct or abscess that is of sufficient size will result in a discrete area of reduced bone marrow tracer uptake.

**Rationale:** The reticuloendothelial cells in the bone marrow preferentially phagocytize small colloids.

**Interfering Conditions:** Bone scintigraphy 36 hours or less prior to bone marrow scintigraphy will likely render the bone marrow study unsatisfactorily due to the residual Tc-99m activity in the bone.

**Precautions:** None

**Radiopharmaceutical:** Tc-99m millipore-filtered sulfur colloid. Preparation of this radiopharmaceutical involves millipore filtration of the Tc-99m sulfur colloid through a 0.22 μm filter.

**Adult Dosage:** 10 mCi

**Pediatric Dosage:** 140 μCi/kg (minimum 1.0 mCi; maximum 10 mCi)

**Radiation Dosimetry:** Adult (10 mCi): critical organ (spleen) 2.9 rem; effective dose 0.36 rem
Infant (1 year; 1.0 mCi): critical organ (spleen): 1.7 rem; effective dose 0.2 rem.

**Route of Administration:** Intravenous

**Patient Scheduling:** Requests for bone marrow imaging should be directed to the attending nuclear medicine physician or a nuclear medicine resident. The physician should obtain the relevant clinical history and determine whether it is appropriate to perform this examination. If bone marrow scintigraphy is to be done in conjunction with leukocyte scintigraphy, the physician should schedule labeling with radiopharmacy staff. All required scheduling information should be entered on the “Scheduling Form for Miscellaneous Studies Needing Radiopharmacy Notification”.

**Patient Preparation:** None
Equipment Setup: Gamma Camera: Whole-body, LFOV, SPECT or SPECT/CT depending on the clinical setting.
Collimator: Low-energy general-purpose for Tc-99m imaging only.
Medium-energy for combined Tc-99m and In-111 imaging.
Energy Window: Tc-99m imaging only: 140 keV with 20% window for Tc-99m
Combined Tc-99m and In-111 imaging: 140 keV with 10% window for Tc-99m; 172 keV with 10% window and 247 keV with 20% window for In-111.

Patient Positioning: Usually supine

Procedure: Imaging will be performed 30-60 minutes after tracer administration. Unless directed otherwise by the nuclear medicine physician, imaging is the same as for the bone scintigraphy except that 500K counts should be collected for the initial posterior or pelvic image. Because of the concentration of activity in the liver and spleen, those organs should be excluded from the field of view as much as possible and shielded when imaging the lower thoracic and upper lumbar spines.

Suspected Osteomyelitis of a Shoulder, Hip, Knee, or ankle: Use a LFOV camera with a medium-energy collimator. Perform combined In-111 leukocyte and Tc-99m mini-sulphur colloid spot imaging in multiple projections as directed by physician. The combined images should be obtained using dual-isotope acquisition (Either Dual-Isotope or Concurrent Imaging) 15-21 hours after the injection of the In-111 leukocytes and 30 minutes after the injection of the Tc-99m millipore-filtered sulfur colloid).

<table>
<thead>
<tr>
<th>View</th>
<th>Digital Acquisition</th>
<th>Film Display (If Applicable)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spot images</td>
<td>256 x 256 matrix, word mode; 500K for initial pelvic image, with subsequent images obtained for the same time (for Tc-99m imaging only). When combined Tc-99m and In-111 dual-isotope acquisition is performed, all spot views should be obtained for 10 minutes</td>
<td>Spot image format</td>
</tr>
<tr>
<td>Whole-body images</td>
<td>256 x 1024 matrix, word mode; 30-min acquisition (6 cm/min)</td>
<td>Dual-intensity display</td>
</tr>
<tr>
<td>SPECT</td>
<td>See “SPECT Acquisition and Filtering Guidelines”</td>
<td>To be filmed by physician</td>
</tr>
</tbody>
</table>
SPECT/CT See “SPECT/CT Acquisition and Filtering Guidelines”

Items Required for Complete Study
1. Limited examination: planar images of areas of interest in projections directed by physician.
2. If applicable, SPECT: reconstruction and filtering of digital data.
3. If applicable, SPECT/CT: reconstruction and filtering of digital data.
4. All images transferred to the archival computer.

Images must be reviewed by a nuclear medicine physician before the patient leaves the department.