UW Health
University of Wisconsin Hospital and Clinics

Division of Nuclear Medicine Procedure / Protocol
CSC and The American Center

Abscess/Infection Imaging Procedure
Includes 99mTc-WBC, 111-In WBC and Gallium-67

CPT CODE: 78805 Abscess Ltd
78806 Abscess WB
78807 Abscess SPECT

UPDATED: November 2015

Indications:

To identify the presence and/or location of acute abscesses or inflammation in:

- Non-pulmonary chest
- Intra-Abdominal
- Cardiovascular graft
- Musculoskeletal
- Prosthetic graft
- Inflammatory bowel disease
- Fever of unknown origin

Abscess imaging can be performed using the following isotopes:

- 99mTc-HMPAO labelled WBCs
- 111-In labeled WBCs
- Gallium 67
- 18FDG PET

The decision on which protocol will be used is dependent on the clinical indications. A NM physician will assess each request and specify the protocol to be used.

General guidelines for which isotope to use in abscess imaging are:

1. Children should be imaged using: 99mTc-WBCs
2. Spine imaging for osteomyelitis or discitis should be imaged with either: Gallium-67 or FDG PET
3. All patients with history of bone procedure or disruption (Ex. hip or knee prosthesis, history of previous fracture, diabetic foot, or Charcot joint) should be imaged using: 111In WBCs in addition to 99mTc Sulfur colloid bone marrow imaging. A 99mTc-MDP Three Phase Bone scan can be pursed after i-111 WBC imaging as clinically indicated.
4. Diabetic patients without Charcot Joint but with pain or ulcers (forefoot only) could be imaged using: 99mTc-WBCs. Discuss with faculty prior to protocoling.
5. Patients where osteomyelitis is suspected but have no history of bone procedure or disruption (Ex. osteomyelitis, fracture, orthopedic hardware, or Charcot foot) should first be imaged using: 99mTc-MDP as a Three Phase Bone Scan followed by 111 In WBC scan and 99mTc Sulfur Colloid Bone Marrow if indicated/positive.

Patient Prep:

Generally none

A total White Blood Cell (WBC) count result from within 1 week is need.
The total White Blood Cell (WBC) count should be greater than 5000.
Nuclear Medicine staff should be consulted for WBC counts in the 2500 to 5000 range. Gallium-67 or FDG-18 PET should be considered for these patients.

Gallium-67 cases involving abdominal imaging: if the patient has infrequent bowel movements (one or less per day), suggest Dulcolax and/or Mag Citrate bowel preparations at the time of injection.

Sedation: Sedation may be required for pediatric patients. Sedation is requested by the ordering physician via AFCH Pediatric Sedation Program.
General Anesthesia may be used in place AFCH Pediatric Sedation Program due to scheduling constraints or other medical indications.

Scheduling:

IN-111 WBC

- In-111 WBC imaging requires two days to complete. Indium-111 Oxine must be ordered by 1 PM the day prior to starting of the blood draw/labeling.
- The first appointment is a blood draw in the early morning (allow 15 minutes).The blood sample is then sent to an outsourced vendor for labeling of the white cells (WBCs) and typically takes 3-4 hours to complete. Check with radiopharmacy staff for approximate return time of the labelled cells as the outsource vendor only labels one patient blood sample at a time. Thus our position in the work queue can greatly affect the turnaround time.
- Upon return of the radioactive labelled white blood cells (WBC's) the patient is reinjected.
- Images are obtained at 18-24 hours for whole body, extremity and SPECT/CT imaging; allow 2 hours for imaging time.

In cases of suspected osteomyelitis a 99mTc MDP bone or 99mTc Sulfur colloid bone marrow scan maybe imaged concurrently with the IN-111 WBC scan.

- In the case of a Three Phase Bone scan (see protocol in skeletal section) the blood sample for In-111 WBC labelling must be drawn prior to injecting the 99mTc MDP.
- The purpose of adding a 99mTc Sulfur Colloid bone marrow scan is to serve as a template for normal marrow. Areas of infection have increased In-111 WBC uptake but with no increase in marrow, while those without infection but abnormal distribution or displaced marrow will have similar In-111 WBC and 99mTc Sulfur Colloid uptake.

99mTc-WBC

- This procedure should be scheduled at least 2 days after other 99mTc studies.
- The first appointment is a blood draw in the early morning (allow 15minutes).The blood sample is then sent to an outsource vendor for labeling of the white cells (WBCs) and typically takes 3-4 hours to complete. Check with radiopharmacy staff for approximate return time of the labelled cells as the outsource vendor only labels one patient blood sample at a time. Thus our position in the work queue can greatly affect the turnaround time.
- Upon return of the radioactive labelled blood white cells (WBC's) the patient is reinjected.
- Images are obtained at 1 hour post injection for early whole body images and 4 hours and possibly 24 hours for whole body, extremity and/or SPECT/CT imaging.

GALLIUM-67 Abscess

The Gallium 67 Citrate must be ordered at least one business day prior to injection. The first appointment (15 min) is an injection typically followed by 24 hour delay imaging (90min).Early views at 4 hours may be used in attempting to detect intraabdominal or inflammatory bowel disease. Also, 72 hour imaging delays may be done to assess for pulmonary activity in sarcoidosis, pneumoconiosis and other interstitial disease.

	IN-111 WBC		99mTc-WBC	Ga-67
Radiopharmaceutical	0.2-0.6 mCi In-111 labeled WBC's Dose dependent on WBC count. This range is optimal in most cases, physician consultation on doses outside this range.		6-24 mCi 99mTc-WBC labeled with HMPAO (Ceretec)	5 mCi ± 20% Ga-67 Gallium Citrate
	Adjust dose for patient weight per NMIS or weight table			
Imaging Device: Camera Collimator	GE Infinia Hawkeye I, GE Infinia Hawkeye IV, GE MPS or GE Optima 640 MEGP		LEHR	MEGP
Data Acquisition: GE/User predefined protocol:	Abscess/ IN-111 WBC	Abscess/ IN111 WBC+ 99mTc Bone	99mTc-WBC Abscess	Ga-67 Abscess
Energy windows:	171 kev +/- 10% 245 kev +/- 10%	140 kev +/- 9% 245 kev +/- 10%	140 kev +/- 10%	93 kev +/- 13% 184 kev +/- 10% 300 kev +/- 10%
Acquisition Procedure:	Select the patient from the worklist			
Whole body images Matrix scan speed	256x1024 5 cm/minute		256x1024 8 cm/minute	256x1024 5 cm/minute
Static images Matrix imaging time	256*256 20 minutes/image		256*256 15 minutes/image	256*256 15 minutes/image
SPECT/CT images Matrix Time per stop Degrees/stop	128*128 30 seconds 3 degrees		128*128 20 seconds 3 degrees	128*128 20 seconds 3 degrees
Acquisition File Name	Time Delay and Body Part with orientation based on allowable space (i.e. 4hr Rt Ant Chest Lt)			
Imaging Procedure:				
	• For cases of fever of unknown origin supine whole body images are obtained at 18 to 24 hours after injection of IN-111 WBCs. • After the NM physician reviews the 111 In WBC images, patients requiring 99mTc-Sulfer Colloid imaging are injected with 10 mCi 99mTc-Sulfer Colloid and 30 minutes post injection a planar view and possible other projections are obtained using the 99mTc and 111-In windows. Images are acquired using a matrix of 256*256 for 15 minutes/image.			• For most Gallium abscess imaging whole body images are obtained at 24 hours. • For sarcoidosis the imaging area may be limited to the chest (check with NM staff).
	• Ask patient to void before test. • Ensure that draining ulcer dressing is changed just prior to imaging. • For osteomyelitis imaging of the affected area should be imaged to include orthogonal projections (e.g. for feet acquire plantar and lateral images) • SPECT/CT imaging of the affected area is performed at the discretion of the NM physicians.			

	IN-111 WBC	99mTc-WBC	Ga-67
Processing Procedure:			
Volumetric MI Filter / Power Slice Thickness	Butterworth cutoff 0.4 / 5 2 pixels/slice which equals 8.84 mm/slice		
SPECT/CT slices	Transaxial, Coronal, and Sagittal slices SPECT data should be displayed and screen captured in a 5*5 slice format. • File name format in front of the default Screen Capture is: *Delay time - Slice*		
Static images and whole body images	Displayed and saved as screen captures for all images • File name format in front of the default Screen Capture is: *Delay time - Scan type (WBC, SC etc)* • Annotated with orientation (right, left, ant, post etc) and type of Infection study and other pertinent information.		
PACS:	Send to PACS: raw data static images, all screen-cap files, reconstructed SPECT OSEM IRAC transaxial data, Hounsfield converted CT data and MIP files.		

Interpretation:

WBC + 99mTc-Sulfer Colloid Imaging: The WBC-marrow study is positive for infection when there is activity on the WBC image without corresponding activity on the marrow image; in other words, the images are spatially incongruent. When any other pattern is present, the study is negative for infection.

Gallium Imaging: Gallium-67 is positive for vertebral osteomyelitis is uptake is judged to be more than that seen on the corresponding 99mTc-MDP bone scan.

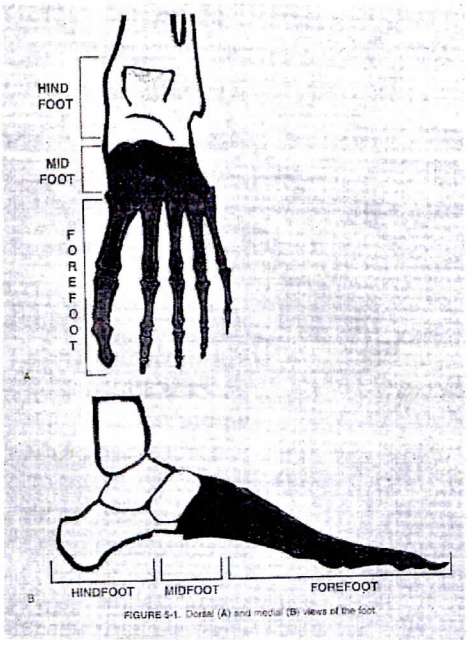

FIGURE 5-1. Dorsal (A) and medial (B) views of the foot.

Reviewed By:

Scott B. Perlman, MD, MS
Chief, Nuclear Medicine

Derek Fuerbringer, CNMT
Manager, Nuclear Medicine

Scott Knishka, RPh, BCNP
Radiopharmacist

Doug Fiers, CNMT
Nuclear Medicine Technologist

John Vetter, PhD, DABR
Medical Physicist