

## Division of Nuclear Medicine Procedure / Protocol University Hospital and The American Center

DMSA Kidney Imaging: STATIC & SPECT/CT

CPT CODE: 78700 (Static)  
78830(SPECT)

UPDATED: JUNE 2021

**Indications:** This test is to determine the presence of normal functioning renal tissue. Use static pinhole protocol for children and adults. Additional SPECT images may be requested after planars. Usual indications include:

1. Pyelonephritis
2. Check for renal infarcts in patients with a vascular disease, UTI or pyuria
3. DMSA renal scans will be used to determine the presence of and/or worsening of cortical defects and assess the severity of renal disease
4. Dromedary hump vs. renal cancer

**Patient Prep:** No prep prior to the appointment, but the patient will be asked to drink liquids between injection and scan. Most patients with acute pyelonephritis are younger than 12 years of age. Sedation may be an issue. Patients must be more than 1-month post-acute pyelonephritis for assessment of renal scarring.

**Scheduling:** **Younger than 12 years** - Allow 150 minutes of camera time.  
**12 years and older** - Allow 75 minutes of camera time.

Due to short shelf life and being a custom compound kit, DMSA is not stocked. Outpatients should be scheduled a minimum of 3 business days out and scheduling will notify the Nuclear Pharmacy of the scheduled appointment. For inpatients, Nuclear Medicine will check with the Nuclear Pharmacy to verify availability or timing of availability of the kit before scheduling.

**Radiopharmaceutical:**

- 99m Tc DMSA has short shelf life and must be injected within 2 hours of preparation.
- **Pediatric** - 50 µCi/kg of Tc-99m-DMSA with a minimum of 0.5 mCi.
- **Adult** - Standard dose is 3.0 mCi of 99mTc DMSA adjusted per NMIS or nomogram.

**Imaging Device:** **Younger than 12 years** - GE MPS gamma camera with both a low energy high-resolution collimator and a pinhole collimator using 4mm insert for static imaging. SPECT can be considered if the patient is adult sized.

**12 years and older** - GE MPS, any GE Infinia Hawkeye or Optima camera with the low energy high-resolution collimator for the static imaging. Any GE Infinia Hawkeye or Optima camera with the low energy high resolution collimator for SPECT. By interpreter request SPECT/CT could be performed. The same camera does not have to be used for static and SPECT (or SPECT/CT).

**Imaging Procedure:** All imaging is acquired 1.5-3 hours post injection.

**Younger than 12 years:**

- Posterior static image with the LEHR collimator of the kidneys is to be obtained for 500K. The image is to be zoomed to fill 2/3 of the field of view with a 256 x 256 matrix.
- Pinhole images of the kidneys are also to be obtained in the Posterior, LT Post Oblique, and RT Posterior Oblique for 150K. The images are to be zoomed to fill 2/3 of the field of view with a 256 x 256 matrix. Both kidneys are to be included in each view.
- The patient should be instructed not to talk, to reduce respiratory excursion. If motion is present, the image must be repeated.
- A nuclear medicine staff or resident physician should be consulted to determine if additional images are needed. Additional images may include SPECT.

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### 12 years and Older:

- Posterior, Lt Posterior Oblique and Rt Posterior Oblique static images with the LEHR collimator of the kidneys is to be obtained for 750K or 10 minutes, whichever comes first. A zoom of 1 with a 256 x 256 matrix.
- A nuclear medicine staff or resident physician should be consulted to determine if additional images are needed.

### All patients:

- If requested: SPECT/CT imaging parameters are 128 x 128 matrix, Zoom: 1.0 for adults, adjust if necessary for small child, 30-second/stop at 6° (60 stops/detector) using body contour and 180° for each head for 360° total.

### **STATIC Data Analysis:**

Differential renal function should be calculated on the posterior image (standard planar not pinhole) by background subtracted number of counts in each kidney as percentage of total number of counts in both kidneys using the GE DMSA processing protocol.

Note: The patient height and weight are needed for processing.

### **STATIC Display:**

Display the three static images, Posterior, LPO, and RPO. Annotate orientation and screen cap in B/W mode.

### **SPECT Data Analysis:**

Recon: Volumetric single and multiple bed position for all Infinia and the Optima.

### **SPECT Display:**

Set to 3 pixels (8/84 mm)/slice for display. Display: Sag, Coronal, and Transverse view (1 view per screen cap page) 3 plane/page NOT needed.

### **PACS:**

Static: Send screen cap and raw data  
SPECT: Send 3 each (cor, trans, sag), the rotating 3D images (MIP) and all raw emission (and transmission if SPECT/CT) data.

### **Interpretation:**

**Standard UW:** In patients with pyelonephritis segmental regions of decreased tracer accumulation is seen. These have been described as oval (early) extending to but not through full cortex; round or wedge shaped, with evidence of swelling ± cortical rim of activity; or as wedge shaped defects with kidney shrunken in region (scar). While these latter are often multiple, renal infarcts are more likely to be single (although similar in appearance to renal scans). If tracer is seen in a region thought possibly to be a tumor then it is unlikely to represent renal cancer.

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