UW Health
University of Wisconsin Hospital and Clinics

# Division of Nuclear Medicine Procedure / Protocol

**DMSA Kidney Imaging**
**KIDNEY STATIC with PINHOLE IMAGES (DMSA) – Younger than 12 yrs** **CPT CODE: 78700 (Static)**
**& KIDNEY SPECT WITH DMSA** **78710 (SPECT)**
**Based on RIVUR (Randomized Intervention for CHILDREN with VesicoUreteral Reflux < 6 yrs)**
**UPDATED: JANUARY 2014**

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

**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 pyelonephyritis are younger than 12 years of age. Sedation may be an issue.

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

DMSA is not stocked, so arrange for radiopharmacy to check availability of RP before scheduling as their supply is unreliable.

**Radiopharmaceutical & Dose:**

- DMSA has short shelf life and must be injected within 4 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 yrs** - GE MPS gamma camera with both a low energy high-resolution collimator and a pinhole collimator using a 4mm insert for Static imaging.
- **12 yrs and older** - GE MPS gamma camera with the low energy high-resolution collimator for the static views only, or any GE Infinia Hawkeye camera with the low energy high-resolution collimator for SPECT and static view. The same camera does not have to be used for static and SPECT.

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

**Younger than 12 yrs**:

- 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 Obl, and RT Post Obl 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.

**12 yrs and Older**:

- Static Views – Each static view is taken at 750kct or 10 minutes whichever comes first. The views include Posterior, LPO, and RPO.
- SPECT imaging parameters are 128 x 128 matrix, Zoom: 1.0 for adults, adjust if necessary for small child, 30 30-second stops at 6° using body contour and 180° for each head for 360° total.
- A nuclear medicine staff or resident physician should be consulted to determine if additional images are needed.

**STATIC Data Analysis:**

Differential renal function should be calculated on the posterior image 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: Use Interactive Reconstruction

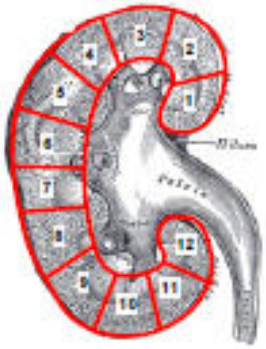
**SPECT Display:** Set to 3 pixels for display.
Display: Sag, Coronal, and Transverse view (1 view per screen cap page)
3 plane/page NOT needed

**PACS:** Static: Send screen cap and raw data
SPECT: Send 3 each (cor, trans, sag) and the rotating 3D images.

**Interpretation:** **Standard UW**: If tracer is seen in a region thought possibly to be a tumor then it is unlikely to represent renal cancer. 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).

**RIVUR Standard**: Cortical defects (dysfunction) will be defined as focal or diffuse decreased uptake with or without volume loss. Using criteria established by Majd, et al. defects with preserved contour (without volume loss) will be classified as acute pyelonephritis and those with obvious volume loss/cortical thinning will be classified as cortical scar. The cortical defects will be assessed semi-quantitively by dividing the renal cortex into 12 equal segments. The location and number of renal parenchymal segments affected will be determined and the extent of the renal abnormality will be graded as outlined in Figure 1. These evaluations will be made by two reference nuclear medicine investigators on the Imaging Studies Reading and Classification Committee.

**Figure 1**



| Grade | Description |
|---|---|
| 0 | No kidney segments affected |
| 1 | 1-2 kidney segments affected |
| 2 | 3-4 kidney segments affected |
| 3 | ≥4 kidney segments affected |
| 4 | Global atrophy characterized by a diffusely scarred and shrunken kidney. |

Grading system for characterizing extent of renal scarring

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