Renogram

Special Instructions	If the patient has a nephrostomy tube in place, consult with the radiologist about whether the nephrostomy should be clamped prior to the examination (often, but not always, nephrostomy tubes should be clamped). The tube needs to be clamped at the point where it exits from the patient (not at the bag).
	To be performed at UNMH and SRMC.

Radiopharmaceutical: Tc-99m MAG-3 or Tc-99m DTPA

Pharmaceutical: Captopril (if captopril renogram)
Furosemide (Lasix) (if diuretic renogram). May substitute bumetanide if furosemide is unavailable.

Dose (Adult/Pediatric): Refer to Nuclear Medicine Dose Chart

Route of Administration: Intravenous bolus injection of radiopharmaceutical
Oral administration of captopril capsule (if needed)
Slow intravenous administration of diuretic over 1-2 min (if needed)

Patient Preparation: Please ensure the following:
- Patient should be **well hydrated**.
- If captopril renogram, patient should take captopril tablet orally 1 hour prior to the start of imaging.
- Have patient void before imaging.

Equipment Setup: Collimator:

    Orbiter: LEAP

    SPECT-CT/ E-CAM / Evo / Symbia E: High resolution

Computer set up:
- 64 x 64 matrix for all images
- ZOOM 1.0 (higher for pediatric patients)

    Flow:

        Native kidneys:
- 1 sec/image for 60 sec

        Transplant kidneys:
- 1 sec/image for 60 sec

    Function:
- 60 sec/image for 30 minutes

    Post Void:
- Choose post-void protocol
- 64 x 64 matrix
- 1.45 ZOOM

- 2 min image

SPECT-CT images (if necessary):
- High resolution collimator
- 128 x 128 matrix
- 1.0 ZOOM
- 180 degrees, CW (clockwise)
- 64 steps, 15 sec/step
- Noncircular, continuous

Patient Positioning:

Native kidneys:
- Posterior, usually supine. Generally top of field of view will be 2-3 finger widths above the xiphoid process.
- Try to position with bladder in the field of view.

Transplant kidney:
- Anterior, usually supine (kidney will be in the pelvis). Include transplant kidney and bladder

Post-void:
- Upright if possible. If patient is unable to void, attempt to position upright to allow kidneys to drain prior to this image.

Procedure:

- If diuretic renogram, the diuretic should be administered intravenously at 15 minutes into acquisition.
- If the study is performed for a urinary leak, show images to the radiologist to determine whether additional images (such as laterals, delayed images or SPECT-CT) are required. **If no leak is seen initially, delays are often necessary – consult with radiologist about the timing.**

Processing:

- For all cameras, confirm that split function is calculated at 2-3 minutes
- Position background near kidneys while avoiding liver/spleen

E-CAM, SPECT-CT, Evo, Symbia E: Automatic workflow
- Draw regions of interest around kidney(s) to generate the curves two ways:
  1) include entire kidney (as seen on the 2-3 minute interval) – to accurately evaluate the 2-3 minute split function.
  2) exclude any renal pelvis (as seen on the summed image over the 0-30 minute study) – to assess washout from the renal parenchyma.

SPECT-CT (if performed):
- Follow automatic processing workflow
- Process CT in soft tissue (B30) and bone (B60) algorithm
- Should have attenuation corrected and non-attenuation corrected SPECT tomo files
- Produce SPECT-CT fused axial data set

Orbiter:
- Select clearance raw data – planar processing – renal – renogram – follow prompts –
  - Without diuretic – detailed kidney results (adjust starting and ending to 2-3 mins – lightbox store – done.
  - Without diuretic – modify kidney curves – check display diuretic time – enter time of diuretic inj – adjust starting and ending to 2-3 mins – ok – make lightbox of detailed kidney results.

To Process lightboxes:
- Select clearance raw data
- Edit flow from function via planar processing tool (sum images 2 to 1)
- Display flow on display A
  - change zoom to 3
  - change format option 5
  - label and lightbox under options

Please note: ALL dialog boxes need to be behind screen to be captured

- Sum clearance images 2 - 1 under planar processing activity
- Merge with post void/upright - Display A
- Format option 5
- Please note all dialog boxes need to be behind screen to be captured.

Items Required For Complete Study:

- Raw data: Flow/Function/Post-void
- Lightboxes/savescreens:
  - Flow:
    - 2 sec/image
    - 30 images displayed 5x6, label 'Posterior (or Anterior, if appropriate) Flow, 2 secs/frame
  - Function:
    - 2 min/image labeled 'Posterior (or Anterior, if appropriate) Function, 2 min/frame, marked if Lasix was administered and at what time.
- Renogram curve with entire kidney included (at 2-3 min interval) for ROI to determine split function
- Renogram curve excluding pelvis (averaged over entire scan) for ROI to determine washout.

- <u>SPECT-CT (if performed):</u>
  - Attenuation Corrected and Non Attenuation Corrected Tomo Reconstructions, CT (B30 and B60) to PACS and Leonardo, labeled by region imaged; Fused axial data set to PACS only.
- Transfer of all digital images to PACS
- Complete the examination in RIS