UW Health
University of Wisconsin Hospital and Clinics

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

KIDNEY FLOW / FUNCTION (NO DIURETIC) **CPT CODE: 78707**
UPDATED: MAY 2018

Indications: This is the routine right (%) versus left (%) renal function study. Indications include: renal transplant, renal function, vascular, renal, and collecting system diseases of many etiologies.

Patient Prep: Patients who had IV contrast CT or MRI will need to wait until the next day for a nuclear medicine renogram.

Pt does not have to be NPO unless required for sedation.

Pediatric patients pre-scan prep: Check In, IV and Foley placement (if needed) and pre-scan hydration prep takes place at the AFCH Diagnostic and Therapy Campground or Sedation Center.

Patient current height and weight is available in Health Link on the Doc Flowsheet tab.

ADULT & PEDS > 11 YRS: The patient should be well hydrated at the time of the study. This means 500 ml (16 oz) of fluid in the preceding 2 hours before start of exam. Have patient empty urinary bladder prior to start of exam. Provide IV access.

For patients **not** given oral hydration instructions, administer 250 ml normal saline IV over 30 minutes. Begin 15 minutes prior to radiopharmaceutical and continues 15 minutes post-injection of the radiopharmaceutical.

PEDIATRIC < 11 YRS: For pediatric patients, IV hydration (normal saline) is required to be delivered at 10 ml/kg over 30 minutes. Begin 15 minutes prior to radiopharmaceutical and continue 15 minutes post injection of radiopharmaceutical. Then maintain IV infusion at rate of 8 ml/kg/hr. Hydration will be started 15 minutes prior to scheduled appointment time in Peds Day Treatment or Peds Sedate.

Sedation: Sedation may be required for some infants or toddlers. Sedation is requested by the ordering physician via Peds Sedate Clinic. On rare occasions, General Anesthesia may be used in place of Peds Sedate Clinic due to scheduling constraints.

Scheduling: One hour of imaging time + 30 minutes processing time. Remind patients of the requirement to drink 2 glasses/cups of fluid, 2 hours prior to the exam, at time of scheduling.

For inpatients, ask if the patient has a urinary catheter. If yes, verify if the output volume is being measured and/or being saved.

Radiopharmaceutical & Dose:

1. Adult: Prescribed 8 mCi ± 20% (8-12 mCi) Tc-99m-MAG3. Adjust dose for patient weight per NMIS or weight table makes the range 4-12 mCi ±20%.
2. Pediatric dose adjusted <18 years based off adult dose.

Imaging Device: GE with LEHR collimator, MPS or Infinia or Optima.

Data Acquisition: Use predefined protocol GatesRenal.

Acquisition Procedure:

A. Create patient.
B. Acquisition protocol: GatesRenal
C. This protocol will set up acquisition files:
   1. Pre syringe: Acquire syringe in holder for 3 seconds, 128 x 128 matrix
   2. Preinj: Acquire one-minute pre-injection picture, 128 x 128 matrix
   3. Renaflwt: Renal Flow, 240 frames at 1 sec/frame followed by 26 frames at 1min/frame
   4. Post syringe: Acquire syringe and stopcock in holder for 3 seconds, 128 x 128 matrix
   5. Injsite: Acquire injection site image, 15 second image, 128 x 128 matrix
   6. Post Tc : Post void image, 300 seconds, 128 x 128 matrix

Imaging Procedure:

Place the IV and then have the patient void prior or empty the catheter bag prior to positioning.

Lay the patient in the supine position with the gamma camera beneath the pallet for native kidneys and above the pallet for renal tx scan. Insure the kidneys, ureters, bladder and/or drainage bag are in the field of view (FOV) for they are required regions of interest (ROI) for analysis. Position so kidneys are at top of FOV. If a renal transplant patient is scheduled on (or can be moved to) a dual head camera, please also obtain posterior images. When handing the case off to the reading room let them know if you acquired the posterior images or not. The posterior images will not be processed nor sent to PACS unless specifically requested by the day's interpreter.

Nephrostomy tube and catheters

Check the order question for clamping the nephrostomy tube for the scan. If the order question is not present (not answered) the tube will not be clamped.

Do not clamp the urinary catheter if patients present with one.

Rapidly inject Tc-99m MAG3 agent as a bolus, with a 10 cc saline flush. Start the computer at the time of injection, using predefined study.

Important, if you have clipped off the kidneys or clipped off the bladder with space above the kidneys

- Stop and store the current acquisition at 4 minutes (initial 1 sec/frame acquisition)
- You will set up additional dynamic acquisition at 1 minute per frame for 26 minutes.
- Reposition so the kidneys are at the top of FOV with as much bladder as possible for the rest of the images.
- If patient has a catheter, measure the quantity of urine in the bag. If patient does not have a catheter, have him/her get up to void; measure output. Get them back on the table in as close to the same position and take a post void image.

When image acquisition is complete get the patient up and sitting or lying comfortable on the imaging pallet. Complete all post process processing and present the case to the reading room before the patient leaves.

Variation: If requested this exam can be performed in an upright position being sure to secure the patient and chair for motion.

Processing Procedure:

If there was patient motion during the scan, do Motion Correction on RENALFLWT

Process using GE **Renal Analysis** first
Enter appropriate data in the dialog box

*** For pediatric pts: Set pediatric state to "Yes" for pts under 6 years**

Draw ROIs for kidneys, bladder, and aorta

Select proceed
Screen-cap Renogram Processing Screen that appears next.

- Select Camera Based Clearance.
- **Confirm or re-draw** injection site ROI

- Select Review icon
  - Select Renogram QC
  - Select Function QC
    - **Screen-cap** Function QC screen
    - Select **Back**

- Select Dynamic Image Review
  - Annotate if the patient was catheterized.
  - **Screen-cap** Dynamic Image Review screen

- Select Renogram Review.
  - **Screen-cap** Renogram Review screen

Save and Exit protocol

Select **Renal Uptake** protocol from USER applications
Enter data in dialog box (Enter zeros since urine output is not measured. Do not leave fields blank.)
Adjust brightness of display images
Screen-cap uptake screen
Exit

NOTE - Adjusting display windows must be done in this order:
Set the current or all intensity option for the window leveling tool to "all".
Adjust the 5-min flow images and post-void image to desired brightness, same intensity setting. Set the current or all option to "Current" and adjust the 5 sec flow images to desired brightness

Optional Processing:

Upper and lower poles of right or left kidney per physician request to differentiate the kidney's upper and lower poles.

Repeat processing steps using right kidney ROI as upper pole and left kidney ROI as lower pole.
Be sure to **appropriately annotate** all save screens: Rt ROI = upper pole; Lt ROI = lower pole
Annotate appropriately if drawing the ureters.

PACS: Send to PACS: 1) 1 sec/frame raw data (first 4 minutes), 2) Reframed 1 min/frame of the entire study, 3) Post Void (raw), 4) all Screen Caps noted above.

Interpretation: Posterior imaging in a renal transplant patient may be available if the scan was performed on a dual head camera. Post processing must be requested.

Comments: A Nuclear Medicine staff or resident physician should be consulted to determine if additional views are indicated.

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3. Society of Nuclear Medicine Procedure Guidelines