UW Health
University of Wisconsin Hospital and Clinics

Division of Nuclear Medicine Procedure / Protocol
University Hospital

RUSSELL 2-POINT GFR PROTOCOL (CLIA-88) **CPT CODE: 78725**
UPDATED: AUGUST 2017

Indications: Evaluation and follow up of renal side effects of chemotherapy or nephrotoxic drugs (e.g. cyclosporin).

Evaluation and follow up of renal function in chronic glomerulopathies (e.g. hemolytic uremic syndrome).

Assessment of renal function in a potential kidney donor and/or a patient with a misleading serum creatinine result.

Contra-indications: Patient receiving intravenous hyperhydration will have an altered GFR result.

Patients with ascites, oedema or other expanded body space will have an over estimated GFR result.

Patient Prep: No caffeine products from 10 pm the night prior to procedure.

Adult and Pediatric patients: Should have a light breakfast, low in protein (e.g. oatmeal with fruit, fruit smoothie…) the morning of the procedure.

Infants: May continue with normal feeding schedule.

Adults: The patient needs to drink four 8 ounce glass of clear liquid (water, apple juice…) 1 hour prior to appointment time.

Infant and Pediatrics: Schedule AFCH Campground for IV placement and IV hydration.

Scheduling: Required: patient's current height and weight.

Health Link allows for maximum of two patients to be scheduled per day.

Radiopharmaceutical & Dose:

3 mCi ± 20% (2.4-3.6 mCi) Tc-99m-DTPA in 1.0 ml. Dose will be adjusted for patient weight per NMIS/nomogram. Two equal doses (within ± 5%) are required - one for injection and one for a counting standard. If multiple patients are done the same day, the same standard can be used for all of them. The purity of the Tc-DTPA must be > 98% as determined by ITLC chromatography within two hours of injection. Doses should be drawn within two hours of injection.

Procedure:

A. Placement of 20 gauge angiocatheter is preferred but may use gauge that allows blood withdraw without hemolysis of sample to occur.

B. Count patient and standard dose in dose calibrator prior to injection. Record activity and time of measurements.

Note: This recorded time will equal Time 0 for this procedure.

C. Inject Tc99m DTPA and flush the syringe with normal saline 3 times. Record mid-point time of injection.

D. Assay Tc99m DTPA patient syringe and all removable parts (e.g.3-way stopcock) and record residual activity and assay time. Do not remove I.V. until all samples (60&180 minute) are drawn.

Note: Must use same dose calibrator for all measurements.

E. Draw the blood samples into two 4ml (Adult or Pediatric) or 2ml (Infant) Lavender top vacuette at 60 and 180 minutes post injection. These timing points occur at mid-point of the blood sample draw. The time that the mid-point is reached must be accurately noted for each sample.

Gently invert the blood sample after draw to ensure adequate mixing of blood with the anticoagulant.

Note: Prior to the 60 and 180 minute blood samples draw a waste sample to prevent dilution of sample from line fluids.

Adult blood sample total volume: 8 ml

Pediatric blood sample total volume: 5 ml

Infant blood sample volume: check with physician or patient nurse concerning maximum amount of blood that can be drawn.

F. Each tube must be labeled with the patient name or MR number or birth date and sample time point in the presence of the patient.

G. Standard dilution samples. All tubes used must be labeled with the patient name or MR number or birth date.

H. Processed plasma samples. All tubes used must be labeled with the patient name or MR number or birth date and sample time point.

I. Samples are counted Multi-Wiper TM using the ABSGFR protocol #6. This program counts all 8 samples for 2 minutes simultaneously.

J. Document all work on GFR Worksheet.

K. Blood Processing:

Immediately centrifuge drawn blood samples in Ultra-8S fixed angle centrifuge set at 3300 rpms for 15 minutes.

The plasma should not have any red color, indicating lysis of RBC's. If the plasma is red, draw another sample and record time of new blood collection.

Pipette a 1.0 ml plasma aliquot from each separated blood sample into Centrifree ultra filtration devices for centrifuging.

Place all plasma samples in Ulta-8S fixed angle centrifuge set at 3300 g for 30 minutes.

Retrieve the Centrifree apparatus. Remove the filtrate cup containing the clear, colorless ultrafiltrate. Pipette accurately 100 µl from each cup into scintillation tubes for counting. Cap tube, label, and save for counting.

NOTE: A swinging bucket head centrifuge results in inadequate ultrafiltration.

L. Standard Preparation (Note 1): A serial dilution is used for making the 1:10,000 counting standard.

Carefully inject the standard into a 100 ml volumetric flask(A) containing 50-75 ml sterile water.

Rinse the syringe 3x with sterile water. Add water to the 100 ml fill mark on the volumetric flask (A), mix thoroughly and label 1:100.

Assay the syringe again including the needle. If more than 2% remains, rinse again and re-assay.

Record residual activity and assay time on worksheet.

Note: Must use same dose calibrator for all measurements.

Accurately pipette 1.0 ml of this 1:100 dilution into a second 100 ml volumetric flask(A) labeled 1:10,000 dilution which contains 50-75 ml sterile water, add water to the 100 ml fill mark on the volumetric flask(A), and mix thoroughly.

Accurately pipette 100 µl of this 1:10,000 dilution into each of two counting tubes. Cap the tubes, label, and save for counting.

M. Counting Procedure: Counting device used is the Multi-Wiper Multi-Well Nuclear Medicine Counter with the following processing protocol, ABSGFR (protocol 6) under the Wipe Set Library (protocol 1). This protocol uses an isotope setting of 140 KeV ± 20% window.

N. Place the sample tubes in the counting tray as follows: slots 1& 2 Background, slots 3 & 4 Standard, slots 5 & 6 60 minute plasma sample and slots 7 & 8 180 minute plasma samples. Record the start time of counting of samples on the ABS GFR worksheet.

O. Computer Processing:

1. Xeleris: ABSGFR
2. GFR is calculated by the Russell 2-Point Method.
3. The results are normalized to 1.73 m^2 body surface area using the formula

$$BSA\ (cm) = [wt\ (kg)]^{0.425} \times [ht\ (cm)]^{0.725} \times 71.84.$$

Data Analysis: Xeleris: AbsGFR.

Interpretation: Normal GFR is 125 ml/min/1.73 m^2.

Verifications:

Accuracy

Semi-annually all performing technologists will run a split patient sample. Results will be reviewed and approved as acceptable by the Chief of Nuclear Medicine. It is stored in the protocol manual as a reference for this protocol.

Documentation

All blood collection tubes are labeled with two patient identifiers in the presence of the patient and documented on the **ABSOLUTE GFR BLOOD DRAW VERIFICATION form.**

All counting tubes are labeled with two patient identifiers and documented on the **ABSOLUTE GFR / SMALL BOWEL LABEL VERIFICATION (PT IDENTIFIER) S/P PROCEDURE** form.

UW Health
University of Wisconsin Hospital and Clinics

Division of Nuclear Medicine Procedure / Protocol
University Hospital

Nuclear Medicine Absolute GFR Worksheet

University of Wisconsin Hospital & Clinics
600 Highland Ave
Madison, Wi 53792

WORKSHEET: ABSOLUTE GFR (CLIA-88) **UPDATED: MARCH 2017**

PATIENT INFORMATION:

Name _____

MR# _____

Date _____

Age _____

Height (cm) _____

Weight (kg.) _____

RADIOPHARMACEUTICAL T99m DTPA:

Inventory Control # _____

% Tag _____

DTPA IN DOSE CALIBRATOR:

Patient (mCi) _____

Standard (mCi) _____

Time of Injection (SWT) _____

Time of Post Injection

Dose in Dose Calibrator (SWT) _____

Post Injection

In Dose Calibrator (mCi) _____

STANDARD DILUTION:

Time of Standard in Dose Calibrator (SWT) _____

Rinse (mCi) _____

BLOOD SAMPLES:

Draw 60-Minute Sample (SWT) _____

Draw 180-Minute Sample (SWT) _____

Samples Counted in Gamma (SWT) _____

Processed _____

Reviewed _____

Discrepancies _____

PROCESSING PROTOCOL: XELERIS ABSGFR

UW Health
University of Wisconsin Hospital and Clinics

Division of Nuclear Medicine Procedure / Protocol
University Hospital

WORKSHEET: ABSOLUTE GFR BLOOD DRAW VERIFICATION **UPDATED: MARCH 2017**

PROCEDURE	PT NAME	PT ID NUMBER	PT ACCESSION #	Initial Sample Labeled and Verified in the Presence of the Patient (designee)			
					60 Min	Y	N
					180 Min	Y	N
					60 Min	Y	N
					180 Min	Y	N
					60 Min	Y	N
					180 Min	Y	N
					60 Min	Y	N
					180 Min	Y	N
					60 Min	Y	N
					180 Min	Y	N
					60 Min	Y	N
					180 Min	Y	N
					60 Min	Y	N
					180 Min	Y	N
					60 Min	Y	N
					180 Min	Y	N
					60 Min	Y	N
					180 Min	Y	N
					60 Min	Y	N
					180 Min	Y	N

UW Health
University of Wisconsin
Hospital and Clinics

Division of Nuclear Medicine Procedure / Protocol
University Hospital

WORKSHEET: ABSOLUTE GFR / SMALL BOWEL LABEL VERIFICATION (PT IDENTIFIER) S/P PROCEDURE
UPDATED: MARCH 2017

PROCEDURE	PT NAME	PT ID NUMBER	PT ACCESSION #	Number of Patient Samples Labeled (signed by designee)	
					______ of 12 GFR ______ of 6 sm bowel
					______ of 12 GFR ______ of 6 sm bowel
					______ of 12 GFR ______ of 6 sm bowel
					______ of 12 GFR ______ of 6 sm bowel
					______ of 12 GFR ______ of 6 sm bowel
					______ of 12 GFR ______ of 6 sm bowel
					______ of 12 GFR ______ of 6 sm bowel
					______ of 12 GFR ______ of 6 sm bowel
					______ of 12 GFR ______ of 6 sm bowel
					______ of 12 GFR ______ of 6 sm bowel

Notes

1) Flasks used for the serial dilution must meet Class A Glass Standards.
2) Reagent Safety: The only reagent is 99mTc-DTPA injection (DRAXIMAGE); it has been evaluated for risks including
   - Acute toxicity risk have been tested and none were found
   - Carcinogenic potential in the State of California
   - Reproductive toxicity testing has not been performed.

Reviewed By: Updated By: Rosalie R Hovey

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

Diane H. Norback, MD
CLIA Director

John Vetter, PhD, DABR
Medical Physicist

Derek Fuerbringer, CNMT
Manager, Nuclear Medicine

Elizabeth Urban
Point of Care Testing Coordinator

Scott Knishka, RPh, BCNP
Radiopharmacist