LABORATORY TESTS: SMALL BOWEL TRANSPLANT (CLIA-88)  
CPT CODE: 78299  
UPDATED: SEPTEMBER 2019

Indications: To determine rejection of a small bowel transplant. Rejection is indicated by a cumulative excretion of radiopharmaceutical in urine of > 2% @ 6 hours (2-4% nebulous, > 4% definitely abnormal). The study is performed post small intestine transplantation, routinely postoperatively and then every 7 days clinically indicated.

Patient Prep:  
- If a nasal jejunal tube (NJ-tube) or alternative nasal gastric tube (NG-tube) is required it must be inserted prior to the first appointment if not already in place.  
- NPO 2 hours before dose administration (first appointment) through 2 hours post dose administration.  
- A urinary catheter will need to be in place if the patient is unable to prevent contamination of the urine collection.

Scheduling and Sample Collection

RESTRICTIONS: Wait 8 half-lives or 48 hours after a prior nuclear medicine examination that used a 99mTc radiopharmaceutical; wait longer if the T-1/2 is longer than 99mTc before scheduling unless approved by NM Staff MD. If there was a previous NM exam, get a 10 cc urine sample for a 5 minute background count to be used for subtraction.

1. Insure a NJ tube insertion is scheduled if the patient does not already have one unless ordering MD requests oral administration.
2. Injection is through the NJ (or NG as a second choice) tube.  
   - If the 6-hour reading is to be called per order question, schedule the patient to arrive at 8:45AM for the injection through J-tube of Tc-DTPA. This may require the J-tube is inserted the day before.
   - If the 6-hour reading is not to be call the preferred injection time is before 3PM.
3. If the NJ tube was inserted for the study, injection could be done immediately post insertion based on the above requirements.
4. Instruct the floor that this a 24-hour urine collection at two timed set intervals noted below and to label each collection properly. Nuclear Medicine will pick up the collected urine.  
   a. The first interval is the next 6 hours (6 hours total).
   b. The second interval is 6 to 24 hours (18 hours total).

NOTE:  
- It is imperative that ALL urine is collected and labeled appropriately with the patients Name AND MR number OR Birth date.
- Any loss of sample must be noted on the report. The interpreting physician will determine if loss of sample nullifies the results.
- Urine specimen will be transported in leak proof container using universal protection procedure.

Radiopharmaceutical & Dose:  
Adult: Tc-99m-DTPA 500 µCi +/- 20% (400-600 µCi) in 10 ml  
Pediatric: 250 µCi +/- 20% (200-300 µCi) in 5 ml

No weight-based dosing scheme is applied to this test.
**Dose Prep:** Prepare a Tc-DTPA dilution containing about 1.0 mCi diluting with purified water to yield 50 µCi/ml at administration. Quality control results of the DTPA should be > 98% within 1 hour of dose calibration time.

1. Place 1 mCi DTPA (calibrated @ time of administration) in a centrifuge vial, or equivalent. Assay and note volume VDTPA.
2. Add purified water to make 50 µCi/ml @ administration time and mix well. Calculated V (H2O added)=[(Assay #1 @ admin time in mCi)/0.05 (mCi/ml)] - VDTPA(#1)
3. Dispense a patient dose in a syringe with a luer lock cap.
4. Make counting standard (~10.0 ml).
5. Use a pipette for all manipulations in lieu of a syringe; the accuracy of the test is dependent on accurate volume measurements.

**Standard Prep:**

1. Assay the counting std (S) and accurately pipette 500 µL into a 250 ml volumetric flask.
2. Add purified water to fill line of the flask. Mix well.
3. Dispense two 4 ml aliquots of the dilution for use as counting standards.
4. Label as standard and appropriate patient identifiers.

**Administration:**

1. Assay both dose (D) and dose (S) and record activity, date and time on Small Bowel Worksheet.
2. Transfer dose (D) to proper connecting syringe.
3. Insure the urine collection bag is emptied prior to injection.
4. Slowly administer the dose through J-tube (or alternate tube) with proper connecting syringe over 2 minutes and rinse with normal saline 10 ml (adult) or 5 ml (pediatric) to ensure quantitative administration of dose. The J-tube is then clamped or capped off for 6 hours. Retain both syringes and assay the residual activity and record on Small bowel worksheet. If more than 10 µCi (2%) remains, subtract this amount from administered activity and calculate the actual volume this actual administered activity represents. If the tube needs or has been removed earlier than 6 hours, note time on worksheet. No other steps are needed.

**Counting/Measuring:**

Record on the Small Bowel worksheet the total volume of each collect sample in a clean graduated type-A cylinder.

**Background prep**
Pipette two 4ml aliquots of H2O in scintillation tubes and label as background using proper patient identifiers. Use these same tubes for both samples.

**Measuring, 0-6 hr Sample (6-hr collection)**
1. Mix well and pipette two 4ml aliquots in scintillation tubes.
2. Label appropriately as 0-6 hr sample with two patient identifiers.

**Measuring, 6-24 hr Sample (18-hr collection)**
1. Mix well and pipette two 4ml aliquots in scintillation tubes.
2. Label appropriately as 6-18 hr sample with two patient identifiers.

**Counting**

- **6-hour collection (when separate reading requested)**
  1. At 6 hours, place samples in gamma counter in order of, 2 bkgd; 2, 0-6 urine; 2, 6-18 urine; 2 std.
  2. Count on program #7 for 5 minutes in Multi-wiper Well Counter.

- **6 and 18-hour collections**
  1. At 24 hours, place samples in gamma counter in order of,2 bkg; 2, 0-6 urine; 2, 6-18 urine; 2 std.
  2. Count on program #7 for 5 minutes in Multi-wiper Well Counter.
Data: Use the Small Bowel Worksheet on the J drive under Nuclear Medicine folder. Print and scan completed datasheet into PACS.

Interpretation: Normally < 1% of the administered dose is excreted in the first 6 hours and < 2% total at 24 hours. For transplant rejection, > 2% excretion is suggestive in the first 6 hours, > 5% for 24 hours.

** Again, loss of samples may invalidate the procedure please note on final hard copy**

ACCURACY VERIFICATION: Two times per year two testing personnel will perform the test on a split patient sample when samples are available. The volume of this procedure could be less than 2 patients per year. Results will be reviewed and approved as acceptable by the Nuclear Medicine Service Chief. A copy will be given to the Point of Care Testing Coordinator.

Reviewed By:

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Radiopharmacist
### PATIENT INFORMATION:

Name ___________________________ MR# __________________ Date __________________

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<th>? (Date)</th>
<th>ACTIVITY</th>
<th>TIME</th>
<th>CORRECTED ACT</th>
<th>VOLUME ml</th>
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<td>? (       )</td>
<td>? (   )</td>
<td><em>Error</em></td>
<td>? (       )</td>
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<td>? (       )</td>
<td>? (   )</td>
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<tr>
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<tr>
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<tr>
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<tr>
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<td>? (      )</td>
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<tr>
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<tr>
<td>STD DIL #2</td>
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<td>? (       )</td>
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<tr>
<td>TOTAL 24 HR URINE</td>
<td>From Excel wrkst</td>
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Processed __________________________________________
Reviewed __________________________________________
Discrepancies ______________________________________
Dose assay and time _______ time _______ μCi = D  
Std. assay and time _______ time _______ μCi = S  
Volume of dose _______ ml = Vd  
Bkg Count #1 ______ cpm  
Bkg Count #2 ______ cpm  Mean bkg ______ = A  
Urine Count #1 ______ cpm  
Urine Count #2 ______ cpm  Mean urine ______ = B  
Std Count #1 ______ cpm  
Std Count #2 ______ cpm  Mean Std ______ = C  

Urine Collection time = T_U = __________ hrs  
Counting time = T_C = __________ min  

Total urine volume = _______ ml = V_u  

CALCULATIONS  
1. Decay correct std to same time as dose _______ μCi = S*  

2. Decay correct urines (B) and stds (C) for counting time:  
   B* = _______ cpm  C* = _______ cpm  

3. Calculate % administered dose in urine  
   \[
   \frac{\text{Total cts urine}}{\text{Total cts dose}} \times 100 =
   \]
   \[
   = \frac{(B^* - A)(V_u)(S^*)}{V_d(C^* - A)(D)} \times 0.2
   \]

4. Repeat for 6-24 hr collection and add to this value to get total.  

Note: The Excel spreadsheet was built from this worksheet