Overview

Metaiodobenzylguanidine (MIBG) is an analog of norepinephrine and is taken up by the adrenergic nervous system of tissues that are derived from the neural crest. The Neuroectodermal/Norepinephrine Study is used primarily to image tumors that arise from the neural crest.

Indications

Identification and localization of tumors of neuroectodermal tissues (1):
1. Benign and malignant, intraadrenal and extraadrenal pheochromocytomas (2,3).
2. Neuroblastomas (4,5).
3. Carcinoid tumors (6).
4. Medullary thyroid tumors (7).
5. Paragangliomas (8).
6. Chemodectomas (9).
7. Evaluation of myocardial norepinephrine receptors (10).

*Exams ordered for indications which are not listed above need to be discussed with the Nuclear Medicine Physician.

Examination Time

Initially: 1 hour for administration of Lugols and 15 minutes for injection of the radiopharmaceutical.

Delayed images at 24 hours: 30 minutes for standard planar images. (Additional delayed images may be necessary.)

If SPECT is to be performed this will take an additional 30-60 minutes.

Patient Instructions / Scheduling

Consider Octreoscan as an alternative. Consult nuclear medicine physician before scheduling patient.

1. Instruction to Patients:
a. The Nuclear Medicine physician must review the records or speak with the referring physician prior to scheduling to confirm the indications for I-123 MIBG scintigraphy. Also, patient’s sensitivity to iodine must be known.

b. The patient will be given Lugols solution to drink 1 hour prior to radiotracer injection.

c. Females of child-bearing age should be notified that if there is any chance that they are pregnant, the test should not be initiated.

d. Notify the patient that on Day 1 he/she will receive an injection and that imaging will be performed at 24 hours, with possible SPECT imaging after this. There may be additional imaging sessions scheduled, depending upon the findings. Be sure they understand that the imaging will require 1-2 hours of time.

e. There are certain medications and substances that will interfere with the uptake of I-123 MIBG (see attached). The patient should therefore bring in a complete list of all medications currently being used. Ideally, the patient or the referring physician could be questioned over the phone prior to scheduling.

Lab / Imaging Correlation

Request from the referring physician's office, if available, the results of plasma concentrations of metanephrines, norepinephrine, epinephrine, or urinary assays of vanillylmandelic acid (VMA), metanephrines, and catecholamines. The nuclear medicine physician may require these before proceeding.

Computerized tomography, ultrasonography, and/or MRI of the abdomen probably has been performed recently. Please be sure that the images and/or reports are available to the nuclear medicine physician. If the patient has neuroblastoma, a bone scan should be obtained initially. This will be determined on the initial visit of the patient.

Patient Preparation

Drugs to be avoided prior to study (trade names in parenthesis) (2,11-13):

1. Tricyclic antidepressants and related drugs - should avoid for at least 1 week prior to the study:
   a) amitriptyline & derivatives (Elavil, Endep, Etrafon, Triavil, Amitril, Emitrip, Enovil).
b) amoxapin (Asendin).
c) loxapin.
d) doxepin (Adapin, Sinequan).
e) imipramine & derivatives (Tofranil, Imavate, Janimine, Presamine, SK-Pramine, Tipramine).

2. Anti-hypertensives - should avoid for at least 1 week prior to the study:
   a) labetalol (Normodyne, Trandate).
   b) calcium channel blockers.
   c) reserpine (Serpasil, Sandril).

3. Sympathetic-amines - should avoid for at least 1 week prior to the study:
   a) pseudoephedrine (Halofed, Sudafed, Sudrin, others).
   b) phenylpropanaline HCL (Propagest, Sucrets Cold Decongestant, Entex, others).
   c) phenylephrine HCL (Neo-Synephrine, Alconefrin, Rhinail, others).
   d) ephedrine.

4. Cocaine - should avoid at all times and for at least 1 week prior to the study.

Before scanning, thyroidal uptake of free (unbound) radioiodine is blocked by administration of Lugols 100mg p.o. 1 hour prior to radiotracer injection.
Alternative: SSKI (0.3 ml = 300 mg po TID) with milk or food (total 8 days), starting one day before I-123 MIBG injection and six days after injection (if patient has renal disease, decrease to 0.3 ml daily). The referring physician can write the Rx. (2)

Remove all metal objects and prostheses before imaging. Because urinary bladder is normally seen, the patient should void just prior to imaging. Significant colonic activity can be seen in 15% of patients. If there is extensive colonic activity seen on the first day of scanning, the nuclear medicine physician may suggest a cathartic to be taken prior to imaging the second day.

a. Magnesium citrate, 1 bottle - 8 oz, orally. Drink entire contents the night before imaging. **DO NOT ADMINISTER TO PATIENTS WITH RENAL DISEASE.**
Equipment & Energy Windows

Gamma camera: Large field of view.
Collimator: Low energy, high resolution, parallel hole.
Energy window: 20% window centered at 159 keV.
Matrix 128x128

Radiopharmaceutical, Dose, & Technique of Administration

Radiopharmaceutical:
I-123-metaiodobenzylguanidine (I-123-MIBG).

Dose:
I-123-MIBG: 10 mCi(370 MBq) (2,8,16).

Technique of administration: Intravenous injection over 30 seconds (2).

Patient Position & Imaging Field

Patient position: Supine.
Imaging field: Neck, chest, abdomen, and pelvis.

Acquisition Protocol

At 24 hours acquire ANT and POST images from head to pelvis (3,15):
*For imaging of neural crest tumors (neuroblastoma), total body scintigraphy should be performed.

Each image should be acquired at 5cm/sec or >250,000 counts minutes. SPECT or SPECT/CT may be requested by the physician.

Data Processing

For SPECT/CT images use the Siemens and follow processing protocol.

Optional Maneuvers

SPECT images (17):
1. Degrees of rotation: 360°.
2. Number of images: 64.
3. Time per image: 45 seconds.
Dosimetry – I-123

References


Normal Findings

Note: This procedure has not yet been reviewed by the Society of Nuclear Medicine procedure guideline development process.