

METASTATIC SURVEY SCAN and POST THYROID THERAPY SCAN
UPDATED: JULY 2013

CPT CODE: 78018

Indications: Thyroid carcinoma patients, post ablation of thyroid remnant, to determine whether a thyroid remnant and/or functioning thyroid carcinoma metastases are present, and to quantitate uptake in identified regions or lesions.

Patient Prep: Patient should be off all thyroid medication: l-thyroxine for one month and Cytomel® for at least 10 days. Note the length of time for which the patient has been off replacement thyroid hormone. The patient should have a TSH measurement in excess of 60 IU/ml prior to scanning (drawn sufficient days prior so result is available prior to scan). The patient might be put on a low iodine diet for 10 days prior to the scan, (avoid fish, seaweed, sushi, shrimp, iodized salt, dairy products, eggs, and sometimes restaurant food in general). The patient thyroid questionnaire should be completed on arrival in Nuclear Medicine.

The patient may also receive two (2) Thyrogen injections, instead of not taking their thyroid replacement medications, prior to receiving the iodine dose (this may vary between three different procedures). The advantage of the Thyrogen injections is that the patient will not become hypothyroid for an extended period of time. Most patients prefer this method for this procedure. The patient should follow the low iodine diet recommended by their physician. See the scheduling section for the three different protocols and their timing.

Scheduling: For patients not getting Thyrogen injections, day one is the iodine dose, either I-123 or I-131. This can be the therapy ablation dose or the met survey dose. For the post ablation patients, day two is the scan which will be 5-8 days post therapy. For the met survey patients, day two is the scan day which will be 24hrs post I-123 dose and 48 hrs post I-131 dose.

For patients receiving Thyrogen injections, day one is Thyrogen injection one, day two is Thyrogen injection two, day three is the iodine dose (met survey dose or therapy ablation). For I-123 met survey patients, day four is the scan day. For I-131 met survey, nothing is performed on day four, and day five is the scan day. For Therapy ablation patients the scan day will vary 5-8 days out from the therapy dose, schedule dependent.

Radiopharmaceutical

& Dose: 5 mCi I-123 for met survey patients who may be receiving a therapy dose the same day.
6 mCi I-131 for met survey patients.
Therapy ablation doses will vary depending on the patient case.

Imaging Device:

GE Infinia 1 & 4 Hawkeye cameras with HEGP collimators for I-131
GE Infinia 1 & 4 Hawkeye cameras with MEGP collimators for I-123

Data Acquisition: Protocols - User - UW Met Survey. Select the appropriate protocol for I-123 or I-131.

Acquisition Parameters:

Phantom Static

<i>Infinia Hawkeye 1</i>	I-123	I-131
<u>Static Key Parameters</u>		
Detector Settings		
Detector 1	Phantom	Phantom
Detector 2	Not used	Not Used
Termination Criteria		
Check	Stop on time	Stop on time
Time in Sec	300	300
Reached On	Each detector independently	Each detector independently
For Energy Set:	I123 159	I131 364
Scan Location		
Mode	H	H
Start Angle	0	0
Patient Location	Feet first supine	Feet first supine
Body Part	Chest	Chest
Use Body Contour	No	No
Image Settings		
Matrix	128x128	128x128
Rotation	0.0	0.0
Zoom	1.0	1.0
Pan X (may change if not centered)	0.0	0.0
Pan Y (may change if not centered)	0.0	0.0
Static Corrections		
Energy Session	I123	I131
Collimator	MEGP	HEGP
Static Admin Parameters		
Body Part	Chest	Chest
Body Side	Other	Other
Static Location Parameters		
Scan Location		
Mode	H	H
Start Angle	0	0
Patient Location	Feet First Supine	Feet First Supine
Body Part	Chest	Chest
Use Body Contour	No	No
Table Height		
Check	Absolute	Absolute
CM	73.0	73.0

<i>Infinia Hawkeye 4</i>	I-123	I-131
<u>Static Key Parameters</u>		
Detector Settings		
Detector 1	Phantom	Neck
Detector 2	Not used	Not Used
Termination Criteria		
Check	Stop on time	Stop on time
Time in Sec	300	300
Reached On	Each detector independently	Each detector independently
For Energy Set:	I123 159	I131 364
Scan Location		
Mode	H	H
Start Angle	0	0
Patient Location	Feet first supine	Feet first supine
Body Part	Chest	Chest
Use Body Contour	No	No
Image Settings		
Matrix	128x128	128x128
Rotation	0.0	0.0
Zoom	1.0	1.0
Pan X (may change if not centered)	0.0	0.0
Pan Y (may change if not centered)	0.0	0.0
<u>Static Corrections</u>		
Energy Session	I123	I131
Collimator	MEGP	HEGP
<u>Static Location Parameters</u>		
Scan Location		
Mode	H	H
Start Angle	0	0
Patient Location	Feet First Supine	Feet First Supine
Body Part	Chest	Chest
Use Body Contour	No	No
Table Height		
Check	Absolute	Absolute
CM	73.0	73.0
<u>Static Admin Parameters</u>		
Workflow		
Check	Auto Apply	Auto Apply
Ignite Settings		
NM	None	None
Image Orientation		
Body Part	Chest	Chest
Body Side	Other	Other

Neck Static

<i>Infinia Hawkeye 1</i>	I-123	I-131
<u>Static Key Parameters</u>		
Detector Settings		
Detector 1	Neck	Neck
Detector 2	Not used	Not Used
Termination Criteria		
Check	Stop on time	Stop on time
Time in Sec	300	300
Reached On	Each detector independently	Each detector independently
For Energy Set:	I123 159	I131 364
Scan Location		
Mode	H	H
Start Angle	0	0
Patient Location	Feet first supine	Feet first supine
Body Part	Chest	Chest
Use Body Contour	No	No
Image Settings		
Matrix	128x128	128x128
Rotation	0.0	0.0
Zoom	1.0	1.0
Pan X (may change if not centered)	0.0	0.0
Pan Y (may change if not centered)	0.0	0.0
<u>Static Corrections</u>		
Energy Session	I123	I131
Collimator	MEGP	HEGP
<u>Static Admin Parameters</u>		
Body Part	Chest	Chest
Body Side	Other	Other
<u>Static Location Parameters</u>		
Scan Location		
Mode	H	H
Start Angle	0	0
Patient Location	Feet First Supine	Feet First Supine
Body Part	Chest	Chest
Use Body Contour	No	No
Table Height		
Check	Absolute	Absolute
CM	73.0	73.0

Neck Static

<i>Infinia Hawkeye 4</i>	I-123	I-131
<u>Static Key Parameters</u>		
Detector Settings		
Detector 1	Neck	Neck
Detector 2	Not used	Not Used
Termination Criteria		
Check	Stop on time	Stop on time
Time in Sec	300	300
Reached On	Each detector independently	Each detector independently
For Energy Set:	I123 159	I131 364
Scan Location		
Mode	H	H
Start Angle	0	0
Patient Location	Feet first supine	Feet first supine
Body Part	Chest	Chest
Use Body Contour	No	No
Image Settings		
Matrix	128x128	128x128
Rotation	0.0	0.0
Zoom	1.0	1.0
Pan X (may change if not centered)	0.0	0.0
Pan Y (may change if not centered)	0.0	0.0
Static Corrections		
Energy Session	I123	I131
Collimator	MEGP	HEGP
Static Location Parameters		
Scan Location		
Mode	H	H
Start Angle	0	0
Patient Location	Feet First Supine	Feet First Supine
Body Part	Chest	Chest
Use Body Contour	No	No
Table Height		
Check	Absolute	Absolute
CM	73.0	73.0
Static Admin Parameters		
Workflow		
Check	Auto Apply	Auto Apply
Ignite Settings		
NM	None	None
Image Orientation		
Body Part	Chest	Chest
Body Side	Other	Other

Whole Body Parameters

<i>Infinia 1 Hawkeye</i>	I-123	I-131
<u>Whole Body Key Parameters</u>		
Detector Settings	Auto filled	Auto filled
Start Position	H	H
Use Body Contour	Yes	Yes
Patient Location	Feet First Supine	Feet First Supine
Location From: (may be changed)	190	190
Location To: (may be changed)	0	0
Scan Mode		
Check	Continuous	Continuous
Exposure Time per Pixel	360	360
Speed	6	6
<u>Whole Body Corrections</u>		
Energy session	I123	I131
Collimator	MEGP	HEGP
<u>Whole Body Admin Parameters</u>		
Body Part	Chest	Chest
Body Side	Other	Other
<u>WholeBody Location Parameters</u>		
Table Height		
Check	Absolute	Absolute
Height in CM	73.0	73.0

<i>Infinia 4 Hawkeye</i>	I-123	I-131
<u>Whole Body Key Parameters</u>		
Detector Settings	Auto filled	Auto filled
Start Position	H	H
Use Body Contour	Yes	Yes
Patient Location	Feet First Supine	Feet First Supine
Location From: (may be changed)	190	190
Location To: (may be changed)	0	0
Scan Mode		
Check	Continuous	Continuous
Exposure Time per Pixel	360	360
Speed	6	6
<u>Whole Body Corrections</u>		
Energy Session	I123	I131
Collimator	MEGP	HEGP
<u>WholeBody Location Parameters</u>		
Table Height		
Check	Absolute	Absolute
Height in CM	73.0	73.0
<u>Whole Body Admin Parameters</u>		
Workflow		
Check	Auto Apply	Auto Apply
Ignite Settings		
NM	None	None
Image Orientation		
Body Part	Chest	Chest
Body Side	Other	Other

Hawkeye Parameters

<i>Infinia Hawkeye 1</i>	I-123	I-131
<i>Tomo Key Parameters</i>		
Mode	H	H
Start Angle	0	0
Patient Location	Must Choose	Must Choose
Use Body Contour	Yes	Yes
Acquire CT/AC	Check	Check
Select	Table In	Table In
Select	Emission First	Emission First
CT/AC Range	Partial	Partial
Select On	Emission	Emission
Zoom	1.0	1.0
Matrix	128x128	128x128
Pan Y	0	0
Select	Step & Shoot	Step & Shoot
Seconds	30	30
<i>Tomo Corrections</i>		
Energy session	I123 SC [159 and 130]	I131 SC [364 and 297]
Collimator	MEGP	HEGP
COR Correction	Check	Check
<i>Tomo CT/AC Parameters</i>		
Slice Step	10 mm	10 mm
Rotation		
Velocity	2.6 RPM	2.6 RPM
Reconstruction		
Matrix	256x256	256x256
Frequency	1.0	1.0
<i>Tomo Location Parameters</i>		
Mode	H	H
Start Angle	0	0
Patient Location	Must Choose	Must Choose
Body Part	Chest	Chest
Use Body Contour	Yes	Yes
Detectors 1 and 2	Check	Check
Total Angular Range	360	360
View Angle	5	5
Direction	CW	CW
Check	Release at end of scan	Release at end of scan
Table Height		
Check	Default	Default
<i>Tomo Admin Parameters</i>		
Body Part	Chest	Chest
Body Side	Other	Other

Hawkeye Parameters

<i>Infinia Hawkeye 4</i>	I-123	I-131
<u>Tomo Key Parameters</u>		
Mode	H	H
Start Angle	0	0
Patient Location	Must Choose	Must Choose
Body Part	Chest	Chest
Use Body Contour	Yes	Yes
Acquire CT/AC	Check	Check
Select	Table In	Table In
Select	Emission First	Emission First
CT/AC Range	Partial	Partial
Select On	Emission	Emission
Zoom	1.0	1.0
Matrix	128x128	128x128
Pan Y	0	0
Select	Step & Shoot	Step & Shoot
Seconds	30	30
<u>Tomo Corrections</u>		
Energy session	I123 SC [159 and 130]	I131 SC [364 and 297]
Collimator	MEGP	HEGP
COR Correction	Check	Check
<u>Tomo CT/AC Parameters</u>		
Scan Type	Helical	Helical
Pitch	1.9	1.9
Voltage	140.0	140.0
Current	2.5	2.5
Velocity	2.6	2.6
Matrix	512x512	512x512
Filter	Stnd	Stnd
Extended FOV	Check	Check
<u>Tomo Location Parameters</u>		
Mode	H	H
Start Angle	0	0
Patient Location	Must Choose	Must Choose
Body Part	Chest	Chest
Use Body Contour	Yes	Yes
Detectors 1 and 2	Check	Check
Total Angular Range	360	360
View Angle	5	5
Direction	CW	CW
Number of FOVs	1	1
FOV Time Multiplier	1.0	1.0
Rough Overlap	4	4
Direction	Table In	Table In
Select	Default	Default
Motorized Pallet Support	Check	Check
<u>Tomo Admin Parameters</u>		
Auto Apply	No	No
Release at End of Scan	Check	Check
NM	None	None
CT/AC	None	None
FOV	None	None
Body Part	Chest	Chest
Acquisition Context	Unknown	Unknown
Body Side	Other	Other

Procedures:

A 5-minute acquisition of a standard is acquired using the neck phantom. This is either the peaking source for I-131 (between 50-200uci) or a I-123 standard sent from Cardinal. Pre-measure either standard before the acquisition for its value. Record this for the neck calculations later. The standard should be acquired within 10 minutes of the neck acquisition image.

A 5-minute acquisition of the neck is acquired with the patient supine on the bed. Next, the whole body images are acquired anterior and posterior. Then SPECT/CT images may be acquired. This is dependent on the reading physician of the day (two sets of SPECT/CT images may be needed).

Image Processing and PACS:

To process the neck uptake, highlight both the phantom image and neck image, and click on the Met Survey Uptake I131 and I123 icon in Xeleris.

1. Click on **Process**. This will take you to step two.
2. Center the standard region of interest (ROI) over the standard on the image, click proceed.
3. Draw the thyroid ROI on the neck image, click proceed.
4. Draw the thyroid background ROI on the neck image (this should be an area outside the neck, preferably the shoulder area or some other image without increased areas of uptake), click proceed.
5. Enter the patient dose in **micro** Curies.
6. Enter the number of hours since the dose was administered to the time of the neck image (round to the nearest quarter hour).
7. Enter the standard activity in **micro** Curies, click proceed.
8. Take a screen capture (see example below) of this results page, file, and exit.

After completion of the whole body imaging, highlight the anterior and posterior images and select the Whole Body & Spot Bone review icon in Xeleris. This will display dual intensity images for the physicians.

- Click on the anterior images.
- Select ALL under the intensity box. Adjust the intensity to suit.
- Label the anterior and posterior images accordingly.
- Label the anterior image with the patient dose, the type of iodine dose received, and the number of hours post-dose.
- Take a **DatabaseStudy1024B&W** screen capture (see example below), save and exit. Check the images with the reading physician of the day to see if additional images and/or SPECT/CT are needed. Sometimes two SPECT/CT image sets are needed.

For additional static images, acquire them by doing a copy of the neck image, relabel the image for proper orientation, and display them using the Load to New icon in Xeleris. Adjust the intensity of the images as necessary and label all images. Take a **DatabaseStudy1024B&W** screen capture and exit.

If SPECT/CT is acquired, the processing will depend on which Xeleris the study is acquired on. If images are acquired on a different camera than the initial images, make sure to pull the data to the current Xeleris and merge the studies before processing and sending the additional images to PACS. This will save from having to merge the data in PACS and rectifying issues. See the below for processing on the different Xeleris systems.

For SPECT/CT data acquired on the **Infinia 1** and processed on the **INFEXEL**:

- Highlight the Tomo hwky file, the CT Tomo hwky file, and the ATT MAP TOMO hwky file sets.

- Click on the Volumetric HWKY for Oncology icon on the Xeleris. Make sure your filters are set appropriately for type and strength.
- Take screen captures of the nuc med transverse, sagittal and coronal images (see example below). Before exiting the processing software, make sure to save the MIP file separately. Then save and exit.
- Highlight the CT TOMO HWKY file. Click on the CT to Hounsfield units icon on the Xeleris, then file and exit. This gives the correct file to send to PACS for use in the Mirada software for the physicians.

For SPECT/CT data acquired on the **Infinia 4** and processed on the **INF2XEL**:

- Highlight the Tomo CT file, the CT TOMO CT file, and the ATT MAP TOMO CT file sets.
- Click on the Volumetric icon on the Xeleris. Make sure your filters are set appropriately for type and strength.
- Take screen captures of the nuc med transverse, sagittal and coronal images (see example below). Before exiting the processing software, make sure to save the MIP file separately, then save and exit.
- Highlight the CT TOMO CT file, click on the CT to Hounsfield units icon on the Xeleris, then file and exit. This gives the correct file to send to PACS for use in the Mirada software for the physicians.

Please send these images to PACS:

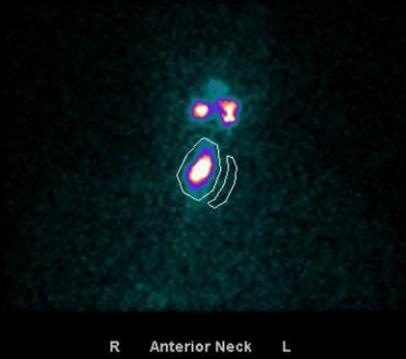
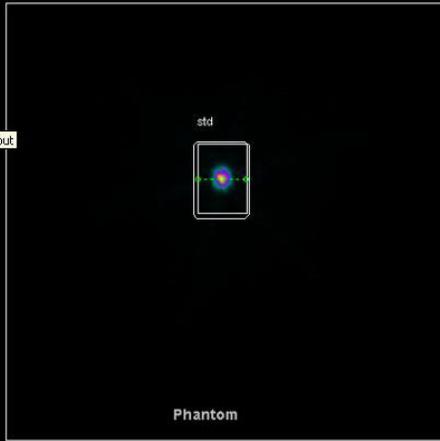
- Phantom raw image
- Neck raw image
- Screen capture of neck uptake
- Whole body RAW and screen capture of whole body images
- Static RAW and screen capture (if acquired)
- IRAC OSEM file in the TOMO_hwky_EM_Transaxial file on the INF2XEL
- IRAC OSEM file in the TOMO CT_IRAC_transaxial file on the INF2XEL
- CT corrected image
- Transverse, sagittal and coronal screen captures
- MIP
- 2nd IRAC OSEM transaxial (if acquired)
- 2nd CT corrected image (if acquired)
- 2nd MIP (if acquired)

Also send the entire study to the MDXCEL2.

The physicians may acquire their own screen captures off the MDXCEL2 and ask that they be sent to PACS. The screen captures will need to be sent back from the MDXCEL2 to the processing Xeleris, and then to PACS. The MDXCEL2 is not directly linked to PACS.

Date:06/24/2013

S_basic2 Layout



ISOTOPE = I131

Uptake in Neck(%) = .00742

uCi in Neck = 21.6136

Phantom Cts = 17203.59

Neck Cts = 6347.19

uCi in Standard = 54.

Patient Dose(uCi) = 159900.

1) WB & Spots Bone Review
Whole Body Review with Dual

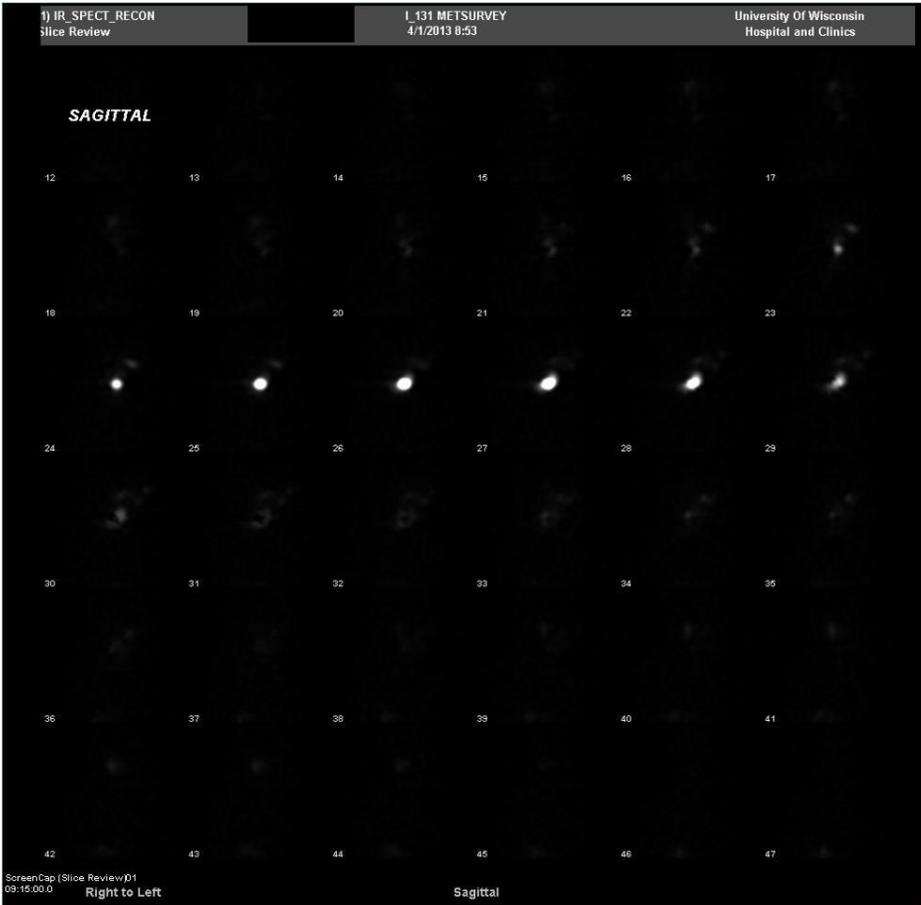
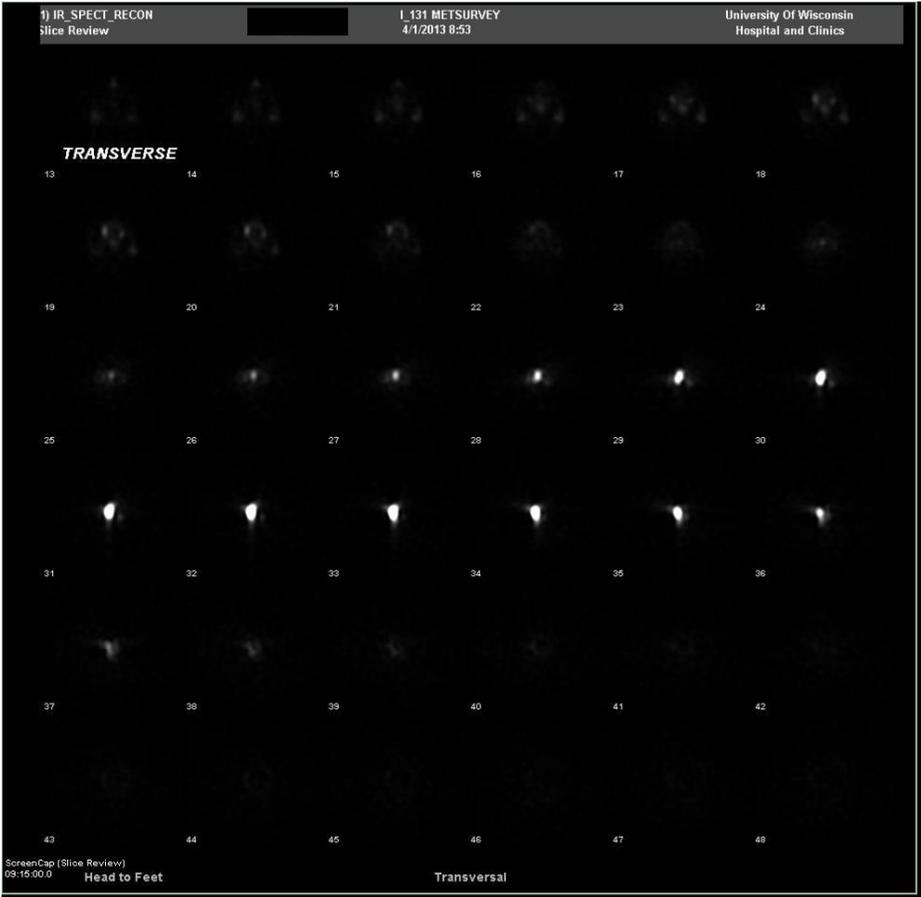
I_131 METSURVEY
4/1/2013 8:17

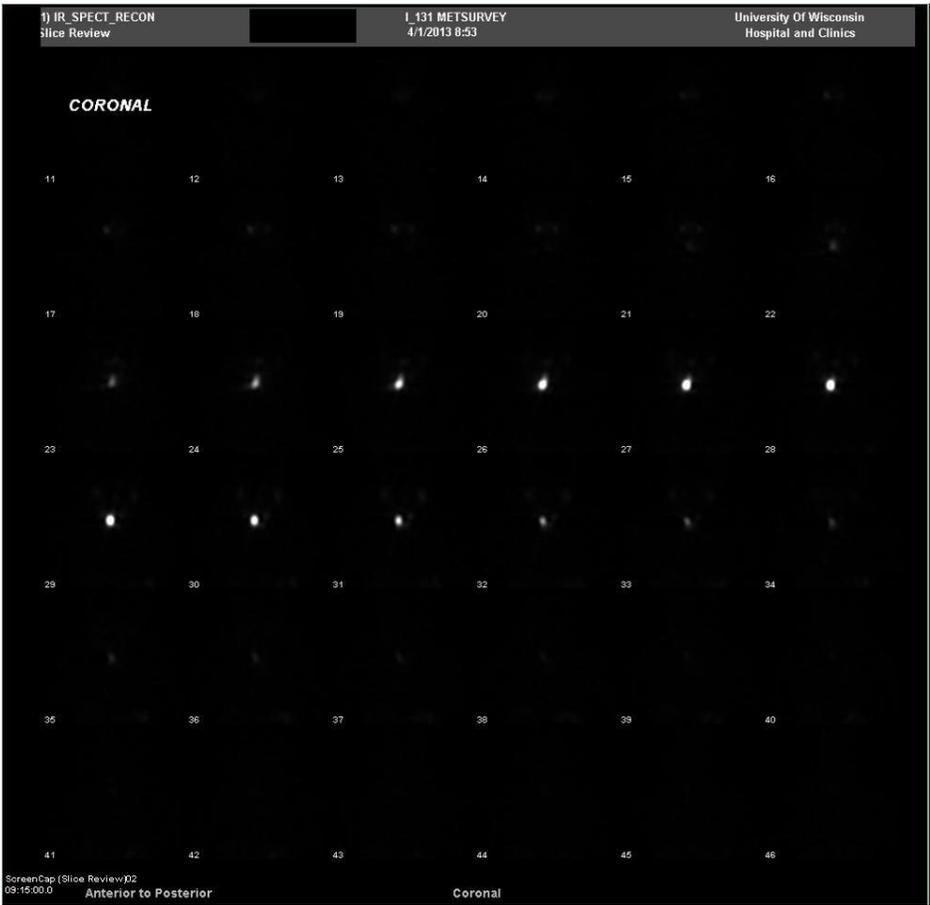
University Of Wisconsin
Hospital and Clinics

RT ANTERIOR LT LT POSTERIOR RT RT ANTERIOR LT LT POSTERIOR RT
 I_131 MET SURVEY
 118.5 HRS POST
 108.5 MCI THERAPY

ScreenCap (Whole Body Review with Dual Intensity)
08:47:00.0

L POSTERIOR R





Interpretation:

Functioning thyroid tissue in the neck requires ablation with 30 mCi doses. The minimum uptake exceeds in intensity the submandibular gland and nasal activity. This represents an uptake of > 0.03% of the administered dose. The physician should indicate pre scan TSH, plan for therapy (if any), when to restart T-4 (and dosage), and follow-up plans. If functioning metastases are seen then the patient is scheduled for therapy 100-125 mCi for lymph node mets, 125-175 for pulmonary mets, and 175-220 mCi for skeletal metastases.

NOTE: The NM physician must have the patient restart their thyroid hormone. A follow-up scan or appointment is made.

Reviewed By: S. Perlman, D. Fuerbringer, S. Knishka

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

Derek Fuerbringer, CNMT
Manager, Nuclear Medicine

Scott Knishka, RPh, BCNP
Radiopharmacist