

## Thyroid Cancer Case Study #1

### Clinical History

A 56 year old female with a history of papillary thyroid carcinoma, and status post thyroidectomy presents with rising thyroglobulin level and negative I-131 scan. She is scheduled for a restaging PET•CT scan.

### Imaging Findings\*

NUCLEAR MEDICINE, THYROID IMAGING WHOLE BODY (Images not available)

#### STATED REASON FOR REQUEST:

History of thyroid carcinoma with abnormal sestamibi scan performed one year ago for parathyroid adenoma. There are two areas of focal uptake within the left neck on that scan and differential consideration included parathyroid adenoma versus recurrent or residual thyroid carcinoma.

#### RADIOPHARMACEUTICAL ADMINISTERED:

The study was performed utilizing 8.5mCi I-131 orally.

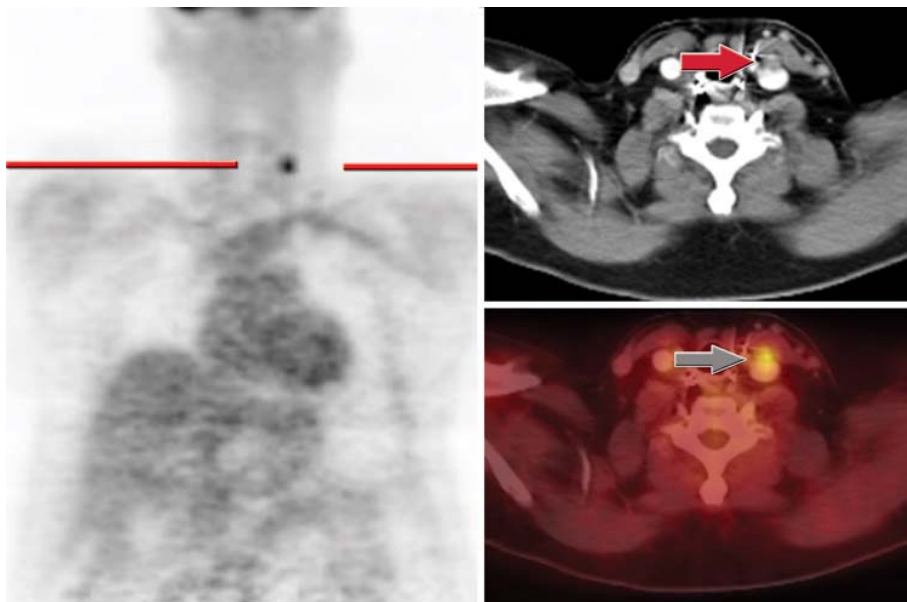
#### FINDINGS:

Total body images as well as spot images of the neck were obtained. There appear to be no abnormal areas of uptake of the radiopharmaceutical. There is normal distribution throughout the salivary gland, stomach, and gut.

The TSH prior to the examination was 41.8 and the thyroid uptake on the examination was 0.07%.

#### IMPRESSION:

Normal appearing total body I-131 scan with no definite evidence of metastatic disease. The patient's thyroglobulin levels are pending and treatment will be withheld pending the thyroglobulin levels. This information was discussed with the patient as well as Dr. X. Patient was instructed to withhold hormone and stay on her low iodine diet until thyroglobulin results were obtained.



NUCLEAR MEDICINE FDG WHOLE BODY PET CT SCAN  
(One year after I-131 scan above)

STATED REASON FOR REQUEST:  
56 year old female with a history of papillary thyroid carcinoma, status post thyroidectomy with rising thyroglobulin level and negative I-131 scan. Patient presents for a restaging PET•CT scan.

RADIOPHARMACEUTICAL ADMINISTERED:  
12.99mCi F18 FDG IV.

#### TECHNIQUE:

Emission scanning from the neck through the abdomen was obtained approximately one-hour post injection. Images were reconstructed with and without attenuation correction using the CT attenuation coefficients from the corresponding CT portion of the exam. The patient's blood glucose measured 81mg/dl.

#### FINDINGS:

There is a focal area of moderate to intense increased uptake of FDG in the left neck inferiorly, corresponding to a small left level 4 lymph node on the CT portion of the exam.

#### IMPRESSION:

Focal area of moderate to intense increased uptake of FDG in the left neck inferiorly, corresponding to a small 8mm left level 4 lymph node and very suspicious for recurrent or residual disease.

## Differential Diagnosis

Normal node.  
Recurrent thyroid cancer.  
Second primary malignancy.

## Pathology

PRE-OP DIAGNOSIS:  
Parathyroid adenoma.

POST-OP DIAGNOSIS:  
Same.

PROCEDURE:  
Exploratory parathyroid and excision of lipoma. CJ/kmr.

FINAL DIAGNOSIS:  
PART 1:  
Neck, cervical region, left, biopsy:  
Thymic tissue remnants and fibroadipose tissue.

PART 2:  
Parathyroid, 2/5 of left superior, excision:  
A. Hypercellular, enlarged parathyroid (72mg) (see comment).  
B. Oil red-o stain shows decreased intracytoplasmic lipid.

PART 3:  
Soft tissue, deep, left, excision:  
A. Seven (7) benign lymph nodes.  
B. No evidence of malignancy.

PART 4:  
Lymph node, excision:  
One (1) benign lymph node.

PART 5:  
Arm, right upper, lesion, excision:  
Lipoma.

## Treatment

Re-exploration of left neck.

## Discussion

Re-staging of thyroid cancer is the most recent indication to be approved for PET or PET•CT coverage by Medicare and most third party payers. In general, we do not use PET•CT for the evaluation of primary disease or for staging because many of these tumors will be relatively non-FDG avid. There is a well-known flip-flop phenomenon, wherein a tumor that is iodine avid tends to be FDG negative and tumors that are not iodine sensitive tend to be FDG avid. Ofcourse, there is some overlap.

The patients that we use PET•CT to evaluate are patients with a history of thyroid malignancy, have had a thyroidectomy and have had a negative I-131 and rising thyroglobulin levels. These patients may have at one time had iodine avid disease, but once their tumors have dedifferentiated, they often become negative on I-131. Many of these patients, as described above, will be positive on PET or PET•CT. We have had great success in localizing small or occult disease in this patient population.

In this particular case, a small normal appearing jugulodigastric lymph node was found to have FDG uptake and was subsequently resected and found to be positive for recurrent papillary carcinoma.

Data courtesy of Dr. Todd Blodgett, University of Pittsburgh Medical Center

\* Any of the protocols presented herein are for informational purposes and are not meant to substitute for clinician judgment in how best to use any medical devices. It is the clinician that makes all diagnostic determinations based upon education, learning and experience.

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