Thyroid Cancer Case Study #1

Clinical History
56-year-old female with a history of papillary thyroid carcinoma underwent resection of the tumor. A rising thyroglobulin level prompted an I-131 scan, which was negative. The physician referred the patient for a restaging PET/CT scan for further evaluation.

Imaging Findings
FINDINGS NUCLEAR MEDICINE I-131 SCAN: Total body images as well as spot images of the neck were obtained. There appeared to be no abnormal areas of uptake of the radiopharmaceutical. There was normal distribution throughout the salivary gland, stomach, and digestive system with no definite evidence of metastatic disease.

NUCLEAR MEDICINE PET/CT
STATED REASON FOR REQUEST: Restaging thyroid cancer
RADIOPHARMACEUTICAL ADMINISTERED: 12.99 mCi $^{18}$F FDG IV
TECHNIQUE: Emission scanning was performed from the neck through the abdomen approximately one hour post radiotracer injection. Images were reconstructed with and without attenuation correction using the CT attenuation coefficients from the corresponding CT portion of the exam.
BLOOD GLUCOSE LEVEL: 81 mg/dL
COMPARISON: I-131 scan

PET/CT FINDINGS: There was a focal abnormal area of moderate to intense increased FDG uptake in the left neck, inferiorly, corresponding to a small left level 4 lymph node on the CT portion of the exam. This was very suspicious for recurrent or residual disease.

Discussion
In general, PET/CT is not used for the evaluation of primary thyroid cancers 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, with some overlap.

PET/CT is used to evaluate patients with a history of thyroid malignancy, have had a thyroidectomy and have a negative I-131 scan, but continue to demonstrate rising thyroglobulin levels. These patients may have at one time had iodine-avid disease, but once these tumors dedifferentiated, they became negative on an I-131 scan. Many of these patients described, will be positive on a PET or PET/CT scan and physicians can detect and localize small or occult disease.

In this particular case, a small normal appearing jugulodigastric lymph node demonstrated 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, Pittsburgh, PA, USA

* 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.