

Identifying recurrent disease in thyroid cancer in PET imaging

PET/CT offers diagnostic accuracy in identifying recurrent disease

“PET/CT enables detection and precise localization of loco-regional recurrence and distant metastases of differentiated thyroid cancer in patients with elevated serum thyroglobulin, but negative radioiodine.”¹

PET/CT has a significant impact on patient management in 57% of patients.¹

PET/CT performance in recurrent disease in differentiated thyroid carcinoma

	Sensitivity	Specificity	NPV	PPV	Accuracy
All patients	68% ¹	60% ¹	27% ¹	89% ¹	67% ¹
Patients with Tg > 10 ng/mL	70% ¹	100% ¹	14% ¹	100% ¹	71.4% ¹

PET/CT can help diagnose and stage poorly differentiated and anaplastic thyroid cancer by determining the location of the cancer and where the cancer has metastasized in the body. It is also useful for treatment planning, determining the best site for biopsy and selecting the appropriate therapy-based on

the cell biology. PET/CT is important in evaluating how the cancer responds to treatment.²

The American Thyroid Association (ATA)

“PET scans are superior to radioactive iodine whole-body scanning in localizing recurrent or persistent thyroid carcinoma.”³

Medicare recognizes the utility of PET and PET/CT in thyroid cancers.⁵

Initial Treatment Strategy (formerly Diagnosis and Staging)

- To determine whether or not the beneficiary is an appropriate candidate for an invasive diagnostic or therapeutic procedure
- To determine the optimal anatomic location for an invasive procedure
- To determine the anatomic extent of the tumor when the recommended anti-tumor treatment reasonably depends on the extent of the tumor

Restaging applies to testing after a course of treatment is completed and is covered subject to the conditions above.

Monitoring response to therapy

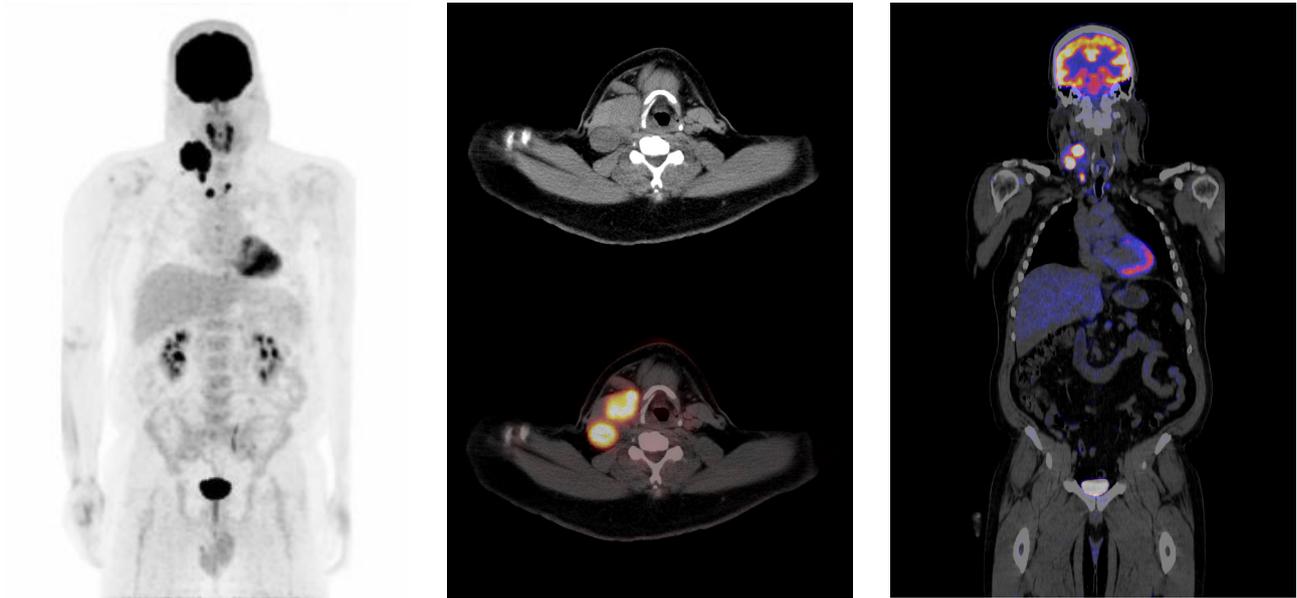
PET is covered for monitoring tumor response to treatment during the planned course of therapy (ie, when a change in therapy is being considered).

The ordering physician is responsible for documenting the medical necessity of the PET scan and that it meets these criteria.

Subsequent Treatment Strategy (Restaging)

- After completion of treatment for the purpose of detecting residual disease
- For detecting suspected recurrence or metastasis
- If it could potentially replace one or more conventional imaging studies when it is expected that conventional study information is insufficient for the clinical management of the patient

PET reveals recurrent disease in patients with thyroid cancer



Data courtesy of Northern California PET Imaging Center, Sacramento, California, USA

History

A 47-year-old male was diagnosed with thyroid cancer approximately four years ago and underwent a thyroidectomy, followed by adjuvant radiation therapy with ^{131}I . The patient now presents with a new mass in the right neck that was confirmed to be positive for metastatic papillary thyroid carcinoma.

Imaging findings

A PET/CT scan was ordered for the evaluation of recurrent disease, which revealed prominent abnormal hypermetabolism corresponding to two large nodal masses in the right neck, as well as in smaller bilateral supraclavicular nodes. These findings are consistent with metastatic thyroid cancer.

Discussion

PET/CT plays a valuable role in the post-thyroidectomy workup. A substantial number of patients have residual or metastatic disease that is not radioiodine avid, and PET/CT has emerged as a powerful tool in the assessment of patients who have a recurrent or metastatic tumor not demonstrable with other imaging modalities.⁵

This particular case demonstrates the subset of patients who pose a diagnostic and therapeutic challenge because disease localization can be difficult. Due to new Centers for Medicare and Medicaid Services (CMS) rules, PET imaging is now made more readily available.

¹ Bannas P, et al. Can 18F FDG-PET/CT be generally recommended in patients with differentiated thyroid carcinoma and elevated thyroglobulin levels but negative I-131 whole body scan? *Annals Nuclear Medicine*. 2012; 26: 77-85.

² Abraham T, et al. Thyroid cancer—indications and opportunities for positron emission tomography/computed tomography imaging. *Seminars in Nuclear Medicine*. Vol 41, Issue 2 (2011) pages 121-138.

³ American Thyroid Foundation. PET scans are superior to radioactive iodine whole-body scanning in localizing recurrent or persistent thyroid carcinoma. *Clinical Thyroidology for Patients*. *Clinical Thyroidology* 5.11 (2012): 8-9. https://www.thyroid.org/wp-content/uploads/publications/ctfp/volume5/issue11/ct_patients_v511_8_9.pdf

⁴ PET PROS. PET/CT Practice Guidelines in Oncology. April 2014. http://www.snm.org/docs/PET_PROS/OncologyPracticeGuideline-Summary.pdf

⁵ CMS Publication 100-03, Medicare National Coverage Determinations Manual, Chapter 1, Part 4, Section 220.6. Accessed August 5, 2014. http://www.cms.hhs.gov/manuals/downloads/ncd103c1_part4.pdf

⁶ Marcus C., et al. *AJR Am J Roentgenol*. 2014 Jun;202(6):1316-29.

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Published by

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