

# Diagnostic I31-I SPECT/CT Scans Detect Unsuspected Metastases after Thyroidectomy for DTC

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Avram AM, Fig LM, Frey KA, Gross MD, Wong KK. Preablation I31-I scans with SPECT/CT in postoperative thyroid cancer patients: what is the impact on staging? J Clin Endocrinol Metab. February 21, 2013 [Epub ahead of print].

## SUMMARY ●●●●●●●●●●●●●●●●

### Background

After surgery for differentiated thyroid cancer (DTC), routine postoperative radioiodine scans have largely been abandoned, for several reasons. First, the use of relatively large doses of radioiodine may “stun” residual thyroid tissue and prevent the uptake of a subsequent therapeutic dose. Second, in young patients with tumors <2 cm and no evidence of metastatic disease, routine thyroid ablation is no longer recommended. Third, in patients who are selected for radioiodine ablation, the posttherapy scan is believed to provide more information because it results from a much larger dose than that used for diagnostic scans. However, advances in scanning technology have resulted in better quality of diagnostic scans. In the present study, the authors prospectively performed postoperative scans in patients with DTC using single-photon-emission computed tomography (SPECT) combined with inline computed tomography (CT) that provides coregistration of tomographic functional data.

### Methods

All patients with DTC at the University of Michigan between April 2007 and April 2011 who were referred for postoperative <sup>131</sup>I therapy underwent preablation <sup>131</sup>I planar and SPECT/CT imaging after preparation with a low-iodine diet for 2 weeks under conditions of thyroid hormone withdrawal. Images were acquired 24 hours after the administration of 1 mCi <sup>131</sup>I. Data were analyzed according to TNM staging and age <45

or ≥45 years. The diagnostic scans were evaluated by two experienced nuclear medicine specialists; one was unaware of the clinical data.

### Results

Data were acquired on 320 patients; 43% were <45 years of age, and 68% were women. Ninety percent had papillary cancer. Regional nodal metastases were present in 47% of resected specimens.

The two observers agreed on interpretation of the scans in 84% of the cases. In 138 patients younger than age 45, the SPECT/CT detected distant metastases in 5 (4%), restaging them to stage 2, and nodal metastases in 61 (44%), of whom 24 were not considered to have nodal metastases at surgery. In 182 patients ≥45, the SPECT/CT detected distant metastases in 18 (28%) and nodal metastases in 51 (28%). Incorporation of these findings led to upstaging of the disease in 25% of the older patients.

In 67 patients with tumors of 1 to 2 cm, nodal metastases were found by SPECT/CT in 35 (52%) and distant metastases in 3 (4.5%). In 49 patients with tumors <1 cm, nodal metastases were found in 11 (22%) and distant metastases in 2 (4%).

In 303 patients, the diagnostic scan results were compared with the posttherapy scans. The results were concordant in 92%. In 6%, additional foci were found on the posttherapy scans, but in only 1.4% were new metastatic lesions found.

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## Conclusions

Diagnostic preablation SPECT/CT scans detected regional metastases in 35% of patients and distant

metastases in 8% of patients. This information changed staging in 4% of younger and 25% of older patients.

## ANALYSIS AND COMMENTARY ● ● ● ● ●

This study could dramatically alter the use of diagnostic  $^{131}\text{I}$  scans after thyroidectomy in postoperative patients with DTC. However, there is one major caveat. The group of patients studied were highly selected because they were referred to a nuclear medicine unit for  $^{131}\text{I}$  ablation therapy, even though 43% were younger patients and less than half had nodal disease. The patients had more aggressive tumors than the usual group of patients with DTC. Pathology showed that 30% had vascular invasion, 63% had capsular invasion, and 26% had positive surgical margins.

The SPECT/CT showed an impressive number of patients with residual nodal disease. The finding of distant metastases on the scans in over one fourth of older patients is very surprising. There was no information provided with regard to how many of these new findings occurred in the patients with more aggressive pathologic results. In addition, there was no information concerning correlation with serum thyroglobulin in this group with distant metastases. Although the scans were read to include the classification of uptake in the thyroid bed, there was no comment on the frequency of this finding.

In patients selected for  $^{131}\text{I}$  ablation, the positive findings on diagnostic SPECT/CT could influence the amount of the dose for ablation. Others have claimed utility for diagnostic  $^{131}\text{I}$  scans before ablation (1). One study reported that SPECT/CT performed after radioablation was much more sensitive than planar imaging and detected nodal involvement in one fourth of patients with papillary thyroid carcinoma (2).

If the improved sensitivity for finding residual disease by SPECT/CT is confirmed in an unselected group of patients with DTC, then the wheel will have come full circle by a return to routine  $^{131}\text{I}$  diagnostic scans in virtually all patients, a practice largely abandoned over a decade ago because of data showing that stimulated thyroglobulin and neck ultrasound are more sensitive diagnostic tools than  $^{131}\text{I}$  scans. In the meantime, this study influences me to consider SPECT/CT for the patient who is classified as low risk and who is not selected for  $^{131}\text{I}$  ablation because a negative result would give the patient a very good prognosis. Of course, cost considerations would influence the decision to use SPECT/CT in such a patient.

## References

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