

# Fluorodeoxyglucose PET/CT Scans Are More Sensitive than High-Dose I-131 Scans for Detecting Recurrent Thyroid Cancer in Patients with Elevated Serum Thyroglobulin

Leboulleux S, El Bez I, Borget I, Elleuch M, Deandreis D, Al Ghuzlan A, Chougnnet CN, Bidault F, Mirghani H, Lumbroso J, Hartl DM, Baudin E, Schlumberger M. Post-radioiodine treatment whole body scan in the era of fluorodesoxyglucose positron emission tomography for differentiated thyroid carcinoma with elevated serum thyroglobulin levels. *Thyroid*. June 5, 2012 [Epub ahead of print].

## SUMMARY ●●●●●●●●●●●●●●●●

### Background

Some patients with differentiated thyroid cancer (DTC) who have had successful radioiodine ablation after surgery have elevated serum thyroglobulin (Tg) levels as they are followed. When the source of the increased Tg cannot be found by neck ultrasound or various scans, some experts have recommended that the patient be given an empiric treatment dose of I-131 and then undergo a posttreatment scan to treat and detect the metastatic thyroid tissue because the scan after the large therapeutic dose can be much more sensitive than a diagnostic radioiodine scan. However, one recent study did not confirm this concept (1). The current retrospective study compared the sensitivity of a scan after an empiric dose of 100 mCi of <sup>131</sup>I with that of an FDG PET/CT scan in this clinical context.

### Methods

Inclusion criteria for patients were DTC treated with total thyroidectomy and postoperative I-131 ablation; a normal postablation whole-body scan, defined by the absence of abnormal iodine uptake outside the thyroid bed; increasing or persistently elevated serum Tg levels; empiric I-131 administration given in the absence of iodine contamination; and FDG PET/CT performed within 4 months of empiric I-131 treatment. Patients received 100 mCi of I-131 for empiric therapy based on an elevated serum Tg and had a whole-body scan (WBS) 3 or 4 days later.

### Results

Thirty-four patients met the criteria; 32 were pap-

illary and 2 were follicular cancer; 8 were aggressive subtypes. The median time between postoperative ablation and empiric I-131 treatment for an elevated serum Tg was 33 months (range, 6 to 208). The median Tg level after thyroid hormone withdrawal was 47 ng/ml (range, 4 to 3230). FDG PET/CT was performed before empiric radioiodine was administered in 25 cases, usually within 5 days.

In 23 patients (68%), WBS or FDG PET/CT localized at least one lesion; the findings were concordant in 16 patients; both were normal in 11 patients and abnormal in 5. FDG PET/CT was abnormal in 17 patients with normal WBS and normal in 1 patient with an abnormal WBS. The sensitivity of FDG PET/CT for disease localization was 65%, whereas the sensitivity of WBS was only 18%.

A total of 75 lesions were detected—30 in the neck, 28 in the lungs, 11 in the mediastinum, and 6 in the bones. FDG PET/CT detected 66 lesions, 7 of which had I-131 uptake. The WBS detected 12 lesions, among which 5 did not disclose any FDG uptake. The WBS detected 12 lesions, 5 of which had no FDG uptake. Ultrasound detected 18 of the 30 lesions in the neck.

### Conclusions

In patients with suspicious recurrence of DTC based on an elevated Tg level after apparently successful I-131 ablation, FDG PET/CT is more sensitive for localizing lesions than a WBS after a 100-mCi dose of I-131. Empiric I-131 administration should be reserved for those who do not have significant FDG uptake.

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## ANALYSIS AND COMMENTARY ● ● ● ● ●

Measurement of serum Tg has become a mainstay in the management of DTC. When patients with a previously successful ablation and undetectable Tg have a subsequent Tg that is elevated beyond some arbitrary threshold, often 1 or 2 ng/ml in the TSH-suppressed state or 4 or 5 ng/ml in the TSH-stimulated condition, there is concern about recurrence. Many of these patients have only nodal disease in the neck that can be found by ultrasonography (US), as was the case here, so this is a good first step. When US is negative, other scans are performed, usually diagnostic I-131 scans with a dose of 2 to 5 mCi, but that was not done in this study. Nevertheless, the study clearly shows that FDG PET/CT is more sensitive for finding meta-

static thyroid cancer than is a high-dose I-131 scan.

Another limitation of the study is that nearly one-fourth of the patients had aggressive subtypes of DTC that are less likely to concentrate I-131. Wang and colleagues showed that, in patients with metastatic DTC, the lesions that were PET-positive did not concentrate I-131 (2). Despite these caveats, the current study by Leboulleux and colleagues is a valuable contribution to the evidence indicating that “blind” large doses of I-131 are not as useful as PET/CT for localizing metastatic disease in patients with elevated serum Tg after previously successful ablation.

— Jerome M. Hershman, MD

## References

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