

C-34

Comparative Assessment of 111In-Octreotide Scintigraphy, 68Ga-DOTATOC PET/CT and 18F-FDG PET/CT in the Staging and Management of Neuroendocrine Tumors (NETs)

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BACKGROUND

Accurate imaging is essential for NETs. 111In-octreotide scintigraphy, 68Ga-DOTATOC PET/CT and 18F-FDG PET/CT are the most commonly used modalities. This study compared the three modalities to ascertain the added value of newer functional imaging approaches.

METHODS

A retrospective review was performed on patients who underwent 68Ga-DOTATOC PET/CT and 18F-FDG PET/CT between 07/2018 and 03/2023 as part of a clinical trial at BC Cancer. Patients with 111In-octreotide scintigraphy within one-year prior to their DOTATOC and FDG scans were included if all three scans included the number of detected lesions. Descriptive statistics were used to evaluate the three modalities.

RESULTS

Of the 102 patients identified, 45.1% were female and median age at diagnosis was 61 years (IQR 51-69). The most common primary sites were small intestine (44.1%), pancreas (17.6%), unknown (12.7%), lung and stomach (both 9.8%). Median time between octreotide and DOTATOC scans was 120 days (IQR 66-203) and 4 days (1-11) between DOTATOC and FDG scans. DOTATOC had the highest positive scan rate of 73.5% (75/102, 95% CI [63.9, 81.8]) and a mean number of detected lesions of 5.75 ($p < 0.001$) compared to octreotide (53/102, 52.0%, 95% CI [41.8, 62.0]) with a mean of 1.98 lesions and FDG (34/102, 33.3%, 95% CI [24.3, 43.4]) with a mean of 2.00 lesions.

The most common imaging profiles were Octreotide+DOTATOC+FDG- (28/102, 27.5%), Octreotide-DOTATOC-FDG- (20/102, 19.6%), Octreotide+DOTATOC+FDG+ (19/102, 18.6%) and Octreotide-DOTATOC+FDG- (16/102, 15.7%). Among patients with an initial negative octreotide scan ($n = 49$), 59.2% (29/49) showed positive findings on one or both of DOTATOC or FDG (16/49, 32.7% DOTATOC only; 1/49, 2.0% FDG only; 12/49, 24.5% both), with a median DOTATOC Krenning score of 3 (range 1-4). In patients with either a positive octreotide or DOTATOC scan ($n = 81$), lesion count concordance was observed in 13.6% (11/81), with DOTATOC exhibiting a higher lesion count in 87.1% (61/70) of the discordant scans. Among patients with at least one positive scan ($n = 82$), only 6.1% (5/82) had a higher lesion count on FDG. In patients metastatic at baseline ($n = 65$), DOTATOC and FDG were able to detect liver and bone lesions not observed on octreotide in an additional 17 (13/17, 76.5% DOTATOC only; 2/17, 11.8% FDG only; 2 both) and 9 (7/9, 77.8% DOTATOC only; 2/9, 22.2% both) patients, respectively.

CONCLUSIONS

These findings highlight the potential benefit of incorporating 68Ga-DOTATOC PET/CT with/without 18F-FDG PET/CT for improved detection of NETs compared to 111In-octreotide scintigraphy.

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