

Comparison of ⁶⁸Ga-DOTATATE (Ga) PET/CT with ¹¹¹In-Octreotide (Octreoscan) SPECT in Somatostatin Positive Neuroendocrine Tumors (NET)

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Background: Somatostatin analogues target 5 different somatostatin receptors (SSR) expressed on NET. ¹¹¹In-Octreotide has high affinity for SSR2 and low affinity for SSR3 and SSR5, and octreoscan scintigraphy has lower image resolution than PET resulting in high detection failure of 20-50% of NETs (1). In comparison, Ga has a higher affinity for SSR2, and PET/CT has 2-3 fold higher spatial resolution (2). The purpose of this study is to compare Octreoscan SPECT to Ga PET/CT for lesion detection in NET patients.

Methods: Nineteen patients underwent one Octreoscan SPECT on the ECAM Siemens Dual Detector gamma camera and one Ga PET/CT scan on the Biograph 16 Siemens PET/CT scanner. The Ga PET/CT scan was performed within six weeks after the Octreoscan SPECT. Areas of abnormal uptake were compared with CT or MRI to confirm the presence of lesions. The Octreoscan SPECT was read by a nuclear medicine physician (NM) blinded to the Ga PET/CT scan results, and the Ga PET/CT scan read by another NM physician blinded to the Octreoscan SPECT results. A third NM physician performed a consensus read. Lesions quantified were in the chest, liver, pancreas, adrenal glands, mesentery, bowel, pelvis, bones and lymph nodes.

Results: In imaging skeletal, liver, and lymph node manifestations, Ga PET/CT was more efficient than Octreoscan SPECT with a statistically significant difference ($p < 0.05$). Lesion detection was superior with Ga PET/CT in the bowel and pelvis, similar in the pancreas and adrenal glands, and equivocal in the chest and mesentery. There was no statistically significant difference in these other regions.

Conclusions: Ga PET/CT is more accurate for staging and superior to Octreoscan SPECT in the detection of NET lesions in the skeleton, liver, and lymph nodes. These results are promising and warrant further analysis in a larger cohort of patients.

Sources

1. G6rges R, Kahaly G, M6uller-Brand J, M6acke H, Roser H.W., & Bockisch A. Radionuclide-Labeled Somatostatin Analogues for Diagnostic and Therapeutic Purposes in Nonmedullary Thyroid Cancer THYROID 11, 647-659 (2001).
2. Buchmann I, Henze M, et al. Comparison of ⁶⁸Ga-DOTATOC PET and ¹¹¹In-DTPAOC (Octreoscan) SPECT in patients with neuroendocrine tumors. Eur J Nucl Med Mol Imaging (2007) 34: 1617-1626.