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Comparison of the Effectiveness of ^{68}Ga-DOTATATE PET/CT and ^{111}In-Octreotide SPECT in Patients with Somatostatin Positive Neuroendocrine Tumor

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Background: Somatostatin analogues target five different somatostatin receptors (SSR) expressed on neuroendocrine tumors (NET). Octreoscan is currently the standard of care and only FDA approved and commercially available diagnostic test for well-differentiated NET. ^{111}In-Octreotide has a high affinity for SSR2, and Octreoscan has lower image resolution than PET resulting in high detection failure of 20-50% of NET. In comparison, ^{68}Ga-DOTATATE has a higher affinity for SSR2, and PET/CT has 2-3 fold higher spatial resolution than gamma camera imaging. The purpose of the study is to compare the effectiveness of ^{68}Ga-DOTATATE PET/CT (Ga) to ^{111}In-Octreotide SPECT (Octreoscan) in NET patients.

Methods: Seventy-nine patients underwent one Octreoscan on the ECAM Siemens dual detector gamma camera or equivalent camera and one Ga on the Biograph 16 Siemens PET/CT scanner. The Ga was performed ≤ 42 days of the Octreoscan (mean 4.1 days). Areas of abnormal uptake were compared with CT, MRI, bone scan, NaF and FDG PET/CT to confirm presence of lesions. The Octreoscan was read by a Nuclear Medicine physician (NM) blinded to the Ga results, and the Ga scan read by another NM blinded to the Octreoscan results. A consensus read was then performed. Lesions quantified were in organs, lymph nodes, and bones.

Results: Paired t-test analysis was performed. Ga shows significantly higher detection rate versus Octreoscan for organs (p-value of <0.0001), lymph nodes (p-value of <0.0001), bones (p-value of <0.0001), and combined organ, lymph node, and bone lesions (p-value of <0.0001).

Conclusions: Ga PET/CT is more accurate for staging and superior to Octreoscan SPECT in the detection of overall number of lesions in the body as well as organs, lymph nodes, and bones. Ga PET/CT also allows for calculation of SUV, has less whole body radiation, and is performed in less time versus Octreoscan.

	^{68}Ga-DOTATATE PET/CT	^{111}In-Octreotide SPECT	P-value (Paired T-test)
Organs	541	201	<0.0001
Lymph Nodes	272	61	<0.0001
Bones	1028	221	<0.0001
TOTAL	1841	483	<0.0001