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The Utility of F-18 DOPA PET/CT in Identifying Unknown Site of Primary Neuroendocrine Disease

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Introduction: Several studies have shown that positron emission tomography with F-18 fluoro-dihydroxyphenylalanine has been useful in the initial diagnosis, staging, and restaging of neuroendocrine disease. We, therefore, sought to determine if F-18 DOPA PET/CT could identify the primary site of disease in a series of 12 patients where other imaging modalities failed to.

Methods: Twelve consecutive patients with a history of biopsy-proven primary carcinoid tumor that had previously been resected with recurrence of symptoms (n=2), metastatic carcinoid disease (n=3), or a symptom complex with biochemical markers highly suspicious for a neuroendocrine tumor (either carcinoid n=5, or pheochromocytoma n=2) were evaluated. All patients underwent F-18 DOPA PET/CT scans after undergoing CT and/or MRI, Indium-111 pentetreotide scintigraphy, and I-123 metaiodobenzylguanidine (I-123 MIBG) imaging (specifically in the two patients with suspected pheochromocytoma). All patients received clinical follow up after all imaging modalities were completed.

Results: No primary site of disease was found in any of the 12 patients by any of the imaging modalities. Although F-18 DOPA PET/CT did show a suspicious lesion in the pancreatic head in one patient, CT did not show an anatomical correlate. Endoscopic ultrasound evaluation was performed in this patient, revealing no abnormality to biopsy. It also appeared that contrast enhanced CT detected more metastatic bone, liver, and retroperitoneal lymphadenopathy lesions with better distinction than F-18 DOPA PET/CT, likely due to the added value of intravenous contrast in better delineating lesions on CT.

Conclusion: Although F-18 DOPA PET/CT has been shown by others to be useful in characterizing the disease extent in patients with known neuroendocrine tumors, this observational investigation raises the possibility that, in a small subset of patients with an unidentified primary site of disease, it may be not useful in identifying the primary site of disease.