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Granulomatous Fungal Infection Coexistence with NET: Not All That Lights Up on PET Scan is a NET

Ayca Dunder¹; Thorvardur Halfdanarson¹; Ayse Tuba Kendi¹;
Saul Friedman¹; Michael Bold¹; Rachel Eiring¹; Geoffrey Johnson¹

¹Mayo Clinic

BACKGROUND: While F18-FDG PET imaging provides visualization of malignancies by detecting hypermetabolic lesions, Ga68-DOTATATE PET provides visualization of neuroendocrine tumors (NETs) through increased somatostatin receptor related radiotracer uptake. However, granulomatous inflammation can show activity on both types of PET scans and present challenges in interpretation. To highlight key educational points related to interpretation of scans in patients who suffer from both disease processes, we present two cases with NETs and coexisting granulomatous pulmonary fungal infection and correlate imaging findings with pathological and microbiological information.

METHODS: PET scans were performed from the orbits through the thighs with CT fusion imaging.

RESULTS: Case 1: A 16-year-old male with bronchial carcinoid tumor and history of histoplasmosis treated with itraconazole underwent F18-FDG PET/CT showing a right hilar mass with mild uptake, and moderate uptake in hilar and mediastinal lymph nodes. Ga68-DOTATATE PET/CT demonstrated intensely DOTATATE-avid (SUVmax 37.6) right hilar mass and no significant activity in the mediastinal lymph nodes. CT showed right hilar mass, calcified right lung granulomas, partially calcified hilar and mediastinal nodes, splenic and liver calcifications. Pathological examination of the resection specimen revealed typical carcinoid tumor, with clear margins. Evidence of histoplasmosis with granulomatous inflammation and fungal organisms was seen in the lung parenchyma and mediastinal lymph nodes. Case 2: A 68-year-old male with partially-resected grade 2 small bowel NET treated with octreotide underwent

Ga68 DOTATATE PET/CT showing multiple mediastinal DOTATATE-avid lymph nodes (SUVmax 6.6), concerning for possible metastatic disease. A bronchoscopy with endobronchial nodal biopsies and bronchial washings were done. The nodes were negative for tumor and revealed necrotizing granulomatous inflammation. Bronchial washing revealed *Cryptococcus neoformans*. The patient was treated with fluconazole.

CONCLUSION: Granulomatous fungal infections may cause increased DOTATATE and/or FDG uptake on PET scans, mimicking NETs, and should be considered as differential diagnosis in cases of mediastinal adenopathy with DOTATATE and/or FDG avidity.