Gallium-68 DOTATOC PET-CT for Localization of Primary Tumor in Patients with Metastatic Neuroendocrine Tumors

Yusuf Menda1; Thomas O’Dorisio2; James Howe3; Michael Graham1; Michael Schultz1; David Dick1; Parren McNeely1; Laurie Ponto1; Len Watkins1; David Bushnell1; John Sunderland1; and Sue O’Dorisio4

1Department of Radiology, University of Iowa Carver College of Medicine, Iowa City, Iowa 52242
2Department of Internal Medicine, University of Iowa Carver College of Medicine, Iowa City, Iowa 52242
3Department of Surgery, University of Iowa Carver College of Medicine, Iowa City, Iowa 52242
4Department of Pediatrics, University of Iowa Carver College of Medicine, Iowa City, Iowa 52242

Background: Surgical resection of the primary tumor may improve survival in patients with neuroendocrine tumors (NET) even in the presence of metastatic disease.

Objective: To evaluate the utility of Gallium-68 DOTA-D-Phe1-Try3–Octreotide (Ga-68 DOTATOC), an investigational PET radiopharmaceutical targeting somatostatin receptors, for localization of primary tumors in patients (pts) with metastatic NET.

Methods: Patients with known or suspected NET underwent whole-body 68Ga-DOTATOC PET-CT in a prospective study. Ga-68 DOTATOC was produced at the University of Iowa under a physician-sponsored investigational new drug (IND) approval using an automated 68Ge/68Ga generator coupled with a ModularLab PharmTracer fluid handling system (Eckert-Ziegler). PET-CT scans were obtained 60 min after the IV administration of 148 MBq of Ga-68 DOTATOC with a low-dose non-contrast CT. Images were interpreted qualitatively with focal uptake above normal background considered positive for NET.

Results: 20 pts with histologically proven NET metastases underwent Ga-68 DOTATOC PET-CT for localization of the primary tumor and evaluation of disease extent. Metastases were mostly in the liver (n=17) and lymph nodes (n=6). All pts had previous CT or MRI and 8 patients had In-111 Octreotide scan within 1 year of Ga-68 DOTATOC. Ga-68 DOTATOC PET-CT was positive in potential primary tumor sites in 14 pts (70%) and was negative for a primary lesion in 6 pts (30%). 9 primary tumor sites demonstrated with Ga-68 DOTATOC were confirmed (45% true positive), 7 with histology and 2 on follow-up imaging, including 3 ileal lesions and 6 lesions in the pancreas. There were 2 false positive Ga-68 DOTATOC PET-CT scans and 3 lesions are unconfirmed.

Conclusion: Our findings suggest a promising role for Ga-68 DOTATOC PET-CT in localization of the primary tumor in patients with metastatic neuroendocrine tumors.