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PET/CT captures hidden source of neuroendocrine cancer

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The origin of cancer is often obscured by metastases—tumors that have already spread to other tissues. This is especially the case for neuroendocrine tumors (NETs), a malignancy of nerve cells scattered throughout various organ systems that are sensitive to the signaling of neurotransmitters and hormones. An investigational molecular imaging technique could be the key to finding the elusive primary tumor, say presenters at the 2015 Annual Meeting of the Society of Nuclear Medicine and Molecular Imaging (SNMMI).

Researchers are rooting out these primary tumors, many of them found in the gastrointestinal tract or the lungs, with combined positron emission tomography and computed tomography (PET/CT), which provides both functional and structural imaging of the body. What makes this technique novel is the accompaniment of an imaging agent known as Ga-68 DOTATOC, which binds to somatostatin receptors in neuroendocrine cells that use the hormone somatostatin to mediate endocrine function, the release of neurotransmitters and cellular proliferation. PET/CT with Ga-68 DOTATOC highlights malignant tumors because the agent binds to these more strongly than normal tissues. Such an imaging technique could provide critical information that alters cancer patients' treatment.

"Our study shows that Ga-68 DOTATOC PET/CT can change the management of patients with unknown primary tumor and neuroendocrine metastases, including potential surgical resection of the primary tumor," said Yusuf Menda, MD, lead author of the study and a

researcher in the department of radiology and division of nuclear medicine at the University of Iowa in Iowa City, Iowa. "There is evidence that surgery could lead to improved survival for these patients."

For this research, Ga-68 DOTATOC, short for gallium-68 1,4,7,10-tetraazacyclododecane-N,N?,N??,N???-tetraacetic acid-d-Phe1-Tyr3-octreotide, was administered to 36 patients with metastatic NET and unknown primary tumor site. All patients underwent PET/CT. Results showed that 29 patients' scans revealed strong-binding metastases with a high affinity for the imaging agent.

Of these scans, 19 indicated the location of primary tumor. Confirmation of primary tumor site was achieved in three patients by further imaging and in eight patients by histological examination. Five suspected primary tumors remained undefined, and no primary tumor site was found for seven patients. False positives were noted for three patients. A total of seven patients went on to have primary tumors surgically removed, and another patient was treated with peptide receptor radionuclide therapy. In total, 28 percent of patients underwent a major change in cancer management as a result of Ga-68 DOTATOC PET/CT.

"Ga-68 DOTATOC and similar agents are investigational drugs in the United States and are not yet approved for clinical use," said Menda. "They are being investigated in clinical trials across several U.S. institutions. It is hoped that these studies and previous European published experience will ultimately lead to regulatory approval of these agents within the next one to two years."

More information: Scientific Paper 143: "Role of Gallium-68 DOTATOC PET-CT in Neuroendocrine Tumors with Unknown Primary Site"

Provided by Society of Nuclear Medicine