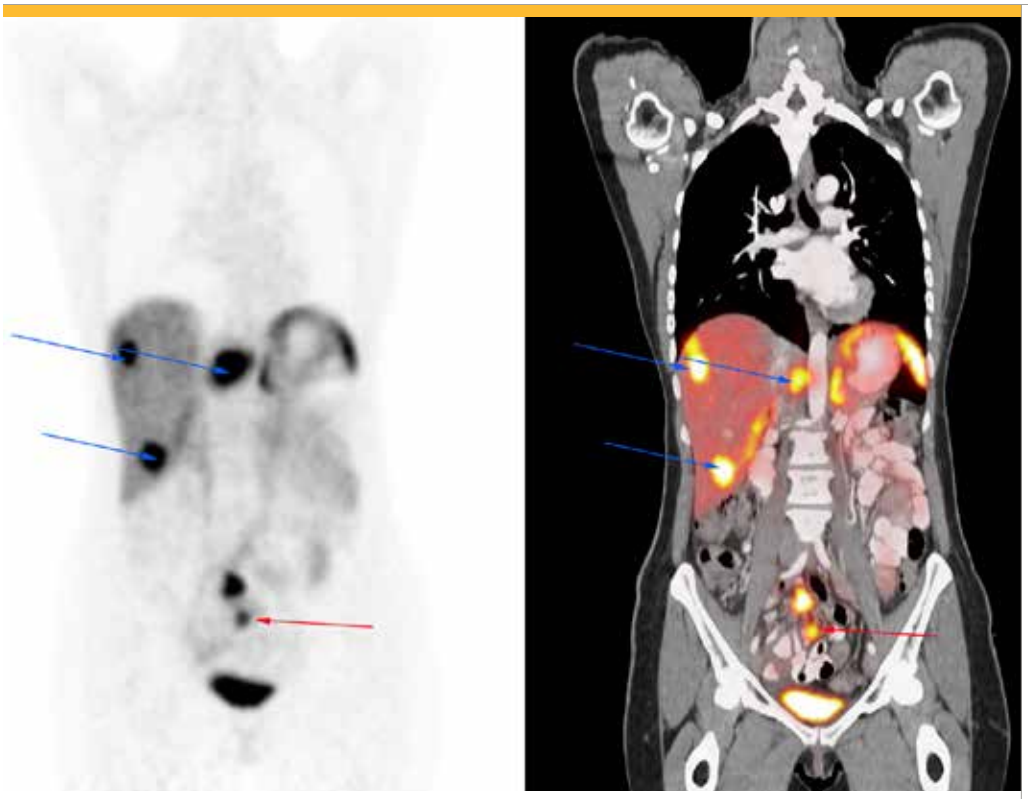
UCLA Health

DOTATATE PET/CT represents enhanced molecular imaging for neuroendocrine tumors



3-D PET reconstruction (left) and coronal slice of fused PET/CT image (right) showing metastatic disease in the liver (blue arrows) and the primary cancer site in the small bowel (red arrow). The site of the primary disease could not be identified prior to this scan.

Neuroendocrine cancer, which is diagnosed in about 8,000 Americans each year, consists of a heterogeneous group of tumors that arise mostly in the gastrointestinal tract. These tumors are often challenging to diagnose and treat. Symptoms can be vague, consisting of diarrhea, abdominal cramps, shortness of breath, blood pressure changes, headaches and rashes. Tumors may not be detected by routine imaging. As a result, a diagnosis is often made when the disease is at an advanced stage.

Appropriate treatment of neuroendocrine tumors depends on the particular type of tumor, where it originated and its stage and grade. Recent advancements in molecular imaging with PET have led to a greater ability to accurately evaluate neuroendocrine tumors.

UCLA Nuclear Medicine, in a joint venture with UCLA Radiology, is the first facility on the West Coast to assess neuroendocrine tumors using positron emission tomography with computed tomography (PET/CT) and a new imaging agent called gallium-68 DOTATATE (68Ga DOTATATE).

Working to make DOTATATE more available

While neuroendocrine tumor imaging using DOTATATE PET/CT is well established in Europe, the technology is less well known in the United States and is dramatically underutilized, says Martin Allen-Auerbach, MD, medical director of the UCLA Nuclear Medicine Clinic.

"Before you decide what treatment to give patients, you need to stage and characterize the tumor," Dr. Allen-Auerbach explains. "The image quality of the current imaging technology (octreotide SPECT) is clearly inferior to DOTATATE PET/CT. That has been proven in the scientific literature. Many studies have compared the two modalities side by side. DOTATATE PET/CT has superior sensitivity and specificity when it comes to neuroendocrine neoplasm."

At this time, DOTATATE PET/CT isn't routinely covered by insurance. However, the staff of the UCLA Nuclear Medicine Clinic works with each patient to assess reimbursement.

"We hope insurance reimbursement policies will change soon because DOTATE actually costs less than the currently covered octreotide SPECT scan," Dr. Allen-Auerbach says.

Enhanced imaging quality

The conventional approach to evaluating neuroendocrine tumors relies on a nuclear scan using indium-111 octreotide and single photon emission computed tomography (111In-octreotide SPECT). Patients receive an injection of octreotide, a substance binding to somatostatin receptors on neuroendocrine tumors, that has been linked to a radioactive isotope. The scan reveals octreotide binding to somatostatin receptors and provides information on the tumor size and other important characteristics.

The 68Ga-DOTATATE PET/CT scan is a new generation of scan that offers improved sensitivity and resolution specifically for neuroendocrine tumors. DOTATATE labeled with the radioisotope gallium 68 is given in trace amounts injected intravenously. Like octreotide, DOTATATE binds to somatostatin receptors that are highly expressed in most neuroendocrine tumors. However, the spatial resolution of PET/CT is far superior to SPECT, so tumors expressing somatostatin receptors are more visible with DOTATATE PET/CT than with octreotide SPECT. Numerous clinical trials have verified that DOTATATE PET/CT yields a higher rate of lesion identification compared to conventional imaging technology.

Imaging guides treatment decisions

The benefits of using this enhanced imaging technology are substantial. With the additional information achieved through DOTATATE PET/CT, physicians are able to refine the treatment plan. Patients with localized tumors can be referred to surgery with a high degree of confidence while those with advanced disease can avoid an operation that will produce no clear advantage and can instead proceed to systemic therapies such as chemotherapy. A published clinical trial found that use of DOTATATE PET/CT imaging led to changes in the clinical management of 70 percent of patients studied. Follow-up scans can be used to determine patients' response to therapy.

Patient convenience is an additional advantage. Patients who undergo SPECT octreotide scans receive an injection and undergo imaging at four, 24 and some times 48 hours, requiring up to four visits to the imaging clinic. In contrast, DOTATATE PET/CT requires an injection followed by a one-hour wait and a single scan.

Citation

"The Role of 68 Ga-DOTATATE PET in Patients with Neuroendocrine Tumors and Negative or Equivocal Findings on 111 In-DTPA-Octreotide Scintigraphy," Rajaventhan Srirajaskanthan, et al., *Journal of Nuclear Medicine*, 2010; 51:875–882.

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