Physician Spotlight: Dr. Bageac

Alexandru C. Bageac, MD

Dr. Alexandru C. Bageac was born and raised in Romania. After graduating from college with a double degree in chemistry and mathematics from University of Washington in Seattle, he moved to Boston to attend medical school at Harvard Medical School and Massachusetts Institute of Technology. He continued his post-graduate training at Harvard with a surgical internship, diagnostic radiology residency and nuclear radiology (including PET) fellowship at Beth Israel Deaconess Medical Center. He returned to the Pacific Northwest to take pleasure in both the joys of the outdoors and the cultural activities of the region. Dr. Bageac joined the Medford Radiological Group in September 2005.

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PET/CT in Oncology

By Alexandru C. Bageac, MD

The year 2006 marks a new era in oncology imaging for Southern Oregon. The installation of a new PET/CT scanner at OAI's new Navigators Landing location coincides with Medicare expanding reimbursement for almost all oncology conditions. In 1998, Medicare approved reimbursement for positron emission tomography (PET) imaging of solitary pulmonary nodules, the first oncologic indication. In 2001, the first PET/CT scanner became commercially available for clinical use. Ever since, PET imaging has become part of the standard of care for many types of cancer. This year the National Oncology PET Registry (NOPR) was set up to collect data and determine the role of PET imaging for those oncologic indications without individual Medicare coverage.

PET Imaging

Although there are many PET tracers in clinical use, only some are approved for Medicare reimbursement. However, most tracers have a very short half-life, making them available only to imaging centers with on-site cyclotrons. [18F]-fluoro-2-deoxyglucose (FDG) has become the ubiquitous PET tracer due to the longer half-life of the fluorine-18 isotope (110 minutes), which allows for its commercial production and distribution. FDG is a glucose analog which is transported and trapped into cells, and can map either low (i.e., myocardial infarcts, dementia patterns in the brain) or high (i.e., tumors, infection, inflammation) cellular metabolism.

PET/CT Imaging

Since its introduction less than 5 years ago, the added value of the PET/CT technology has translated into PET/CT scanners capturing 80 to 90 percent of the market for PET scanners. This happened while PET/CT scanners remain more expensive and provide no additional reimbursement as compared with stand-alone PET scanners.

The CT component of a PET/CT scanner has two main roles:

1) From the technical point of view, the CT scan is used to provide attenuation correction for the PET scan. Attenuation correction is necessary because a source of photons in the center of the body is detected as "less bright"

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Oregon Advanced Imaging is a local community partnership between Rogue Valley Medical Center, Providence Medford Medical Center, and Medford Radiological Group. This partnership provides MRI and PET/CT scan services to patients, physicians, and healthcare providers throughout southern Oregon. We provide uncompromising standards of customer service, integrity, reliability, and accuracy. The entire team at Oregon Advanced Imaging is committed to providing the highest quality imaging services.

The Role of the Radiologist in PET/CT Imaging

In addition to interpreting images, our role as radiologists is to optimize the imaging technique with the goal of extracting the maximum, most accurate information from each imaging study. We have to balance patient comfort and radiation risk with image quality and interpretability. Each patient and type of cancer requires modifications in the imaging protocol, and many of our decisions are based on information provided by the clinician. The following are examples we encounter on a regular basis:

1) Young, thin woman with neck lymphoma is scheduled for a PET/CT on a winter day. Our biggest challenge in imaging this patient is to reduce brown fat activation that can obscure abnormal FDG uptake in lymph nodes. Our protocol specifies that the patient should be in a warm quiet room during administration of FDG and prior to imaging, but we have little control over the temperature exposure prior to her arrival to the imaging center. However, pre-treatment with Xanax or Valium has been shown to reduce brown fat uptake of FDG.

2) Patient with head and neck cancer presents for restaging after therapy. Interpreting non-contrast CT images of the neck is notoriously difficult due to the inability to distinguish lymph nodes from muscle, active from necrotic tumor. This problem is resolved by administration of IV contrast. However, the contrast-enhanced CT needs to be acquired as a separate diagnostic study because the IV contrast produces artifacts on the PET images. Therefore we recommend a diagnostic neck CT to be acquired at the same time as the PET/CT.

Overall, PET/CT is an imaging modality whose success is dependent upon collaboration and communication between clinicians and radiologists.

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by an outside detector than an identical source of photons in a more superficial position, due to the absorptive effect of the body tissues. In traditional nuclear medicine, a transmission source located outside the body is used to determine the attenuation effect of the tissues in a process that adds 30 to 45 minutes to scanning time. PET/CT replaces the transmission source with the x-ray source of a CT scanner, and uses the different CT densities of tissues for attenuation correction. Thus the scan time is reduced by 30 to 45 minutes, increasing patient comfort and reducing artifacts from patient motion.

2) From the interpretative point of view, the CT scan is used as an anatomical map to position the areas of abnormal FDG accumulation. The fusion of PET and CT increases both the specificity (i.e., distinguishing between lymphadenopathy, brown fat and muscle uptake) and sensitivity (i.e., detecting abnormal FDG uptake in smaller pulmonary nodules). However, the CT images do not have full diagnostic quality because of the lower energy used to reduce the radiation exposure to the patient, and the hypoinflation of the lungs used to match the tidal breathing of the patient during the PET acquisition.

National Oncologic PET Registry (NOPR)

The past seven years have seen an exponential growth in the utilization of PET imaging, with PET gaining a prominent role in the diagnosis, staging and restaging of many malignancies. The ability to image both the anatomy and physiology of tissues makes PET/CT a unique tool in monitoring the response to therapy of many cancers. Despite the lack of data on the utility of PET for clinical indications other than the ones already approved, Medicare determined the need to expand reimbursement for PET imaging to all cancers starting in January 2006.

The National Oncology PET Registry (NOPR) was established to collect data on the clinical use of PET in imaging of all cancers not covered, or new indications for cancers already covered by Medicare. The only major exceptions specifically excluded for reimbursement by Medicare are the diagnosis and initial staging of axillary lymph nodes for breast cancer. (Private insurers align themselves with the Medicare reimbursement policies in most cases.) Mammography, ultrasound and sentinel node scintigraphy remain the first line of imaging for breast cancer, while Breast MRI improves the specificity and sensitivity of characterizing breast abnormalities.

Reimbursement for PET imaging of these new cancers or indications is contingent on prompt submission of the necessary information to the new National Oncologic PET Registry (NOPR). Participation in NOPR will benefit many patients who thus far have not had access to this imaging modality. The information gained from the registry will almost certainly diversify the range of PET/CT applications for the foreseeable future.

Oregon Advanced Imaging (OAI) can provide assistance in getting the registration process started. Additional information can be found at the NOPR website: www.cancerPETregistry.org.

Medicare Coverage for PET

Indication	Coverage	
Brain Tumor	Diagnosis, Staging	Registry
	Restaging, Monitoring	Registry
Breast Cancer	Diagnosis	NO
	Staging of Axillary Nodes	NO
	Staging of Distant Mets	YES
	Restaging, Monitoring	YES
Cervical Cancer	Diagnosis, Staging	Registry
	Restaging, Monitoring	Registry
	Staging as Adjunct to Convential Imaging	Support
Colorectal Cancer	Diagnosis, Staging, Restaging	YES
	Monitoring	Registry
Esophageal Cancer	Diagnosis, Staging, Restaging	YES
	Monitoring	Registry
Head and Neck (non-CNS/Thyroid)	Diagnosis, Staging, Restaging	YES
	Monitoring	Registry
Lymphoma	Diagnosis, Staging, Restaging	YES
	Monitoring	Registry
Melanoma	Diagnosis, Staging, Restaging	YES
	Monitoring	Registry
	Evaluation of Regional Nodes	NO
Non-Small Cell Lung Cancer	Diagnosis, Staging, Restaging	YES
	Monitoring	Registry
Ovarian Cancer	Diagnosis, Staging	Registry
	Restaging, Monitoring	Registry

Indication	Coverage	
Pancreatic Cancer	Diagnosis, Staging	Registry
	Restaging, Monitoring	Registry
Small Cell Lung Cancer	Diagnosis, Staging	Registry
	Restaging, Monitoring	Registry
Soft Tissue Sarcoma (not osteo)	Diagnosis, Staging	Registry
	Restaging, Monitoring	Registry
SPN (Solitary Pulmonary Nodule)	Characterization	YES
Thyroid Cancer	Staging of Follicular Cell Tumors	YES
	Restaging of Medullary Cell	Registry
	Diagnosis, Staging	Registry
	Restaging, Monitoring	Registry
Testicular Cancer	Diagnosis, Staging	Registry
	Restaging, Monitoring	Registry
All Other Cancers NOT Addressed Above	Diagnosis, Staging	Registry
	Restaging, Monitoring	Registry
PET Cardiac Imaging	Myocardial Viability	YES
	Perfusion Imaging	Support
PET Metabolic Brain Imaging	Pre-Surgical Seizure Evaluation	YES
	AD vs. FTD	Support
PET Perfusion	Brain Imaging 0-15 Water	YES

YES: Covered by CMS with physician certification of medical necessity
NO: Not Covered. Patient must sign ABN
Support: Covered by CMS with detailed supporting information
Registry: Covered when requirements of data registry are met