A Study in Contrasts: How Far Should We Take the CT in PET/CT?

PRO: PET/CT is PET-CT

By Paul Shreve, MD

In the past FDG PET body oncology exams were typically interpreted in conjunction with separately performed CT scans. The emergence of hybrid PET/CT scanners has made the integration of metabolic and anatomic interpretation explicit and routine. Confusion persists regarding the nature and purpose of the CT scan performed on a hybrid PET/CT. The CT portion of the PET/CT scan does provide an attenuation correction map and a registered and aligned source of anatomic reference for interpretation of the PET findings, but even more important, it provides critical anatomic diagnostic findings allowing for a fully merged metabolic and anatomic imaging diagnosis. Like the PET image acquisition, the CT image acquisition of a PET/CT exam should be optimized for body oncology imaging.

There is an emerging consensus among physicians experienced in both PET and CT diagnosis that to obtain the most information from a PET/CT scan, an optimized diagnostic CT scan should usually be performed with the PET scan. For body oncology imaging, this commonly involves, among other things, the use of oral and intravenous contrast material. Such diagnostic CT protocols have been used in PET/CT procedures for some time (1), and the techniques for performing whole-torso, optimized, contrast-enhanced CT scans that can also be used for the PET attenuation correction have been developed (2–4).

Some centers have been slow to employ contrast material for the CT portion of the PET/CT exam, due to either lack of experience with CT or the misconception that the contrast will cause attenuation-related artifacts on the PET images or significantly alter standardized uptake values—or simply due to the perception that a forbidden threshold into the realm of “diagnostic CT” would be breached. Contrast material is an enhancement and does not alone define or render a CT scan diagnostic. Indeed, the non–contrast-enhanced CT scans using roughly 100 mA beam current commonly performed for “anatomic localization purposes only” depict ample anatomic diagnostic findings both related to PET findings and independent of PET findings; in fact, they are diagnostic CT scans, albeit not fully optimized diagnostic CT scans for the purposes of body oncology CT diagnosis. A recently convened focus group of nuclear medicine physicians and radiologists from both academic and private settings concurred that ethically and medico-legally, the CT portion of the PET/CT should not be used only for anatomic localization without full interpretation of the CT findings (5).

To interpret a PET/CT scan merely as a PET scan with an anatomic localization adjunct, and have a fully optimized diagnos-

(Continued on page 3)

CON: PET/CT is Still PET

By David L. Lilien, MD

There is much to the arguments advanced by Dr. Shreve and others with which I agree, but I do not feel that, in our practice and in many other similar practice situations, contrast-enhanced “fully optimized” diagnostic CT studies should become routine.

There are a number of considered reasons that we do not perform “optimized” diagnostic CT in our practice. First, we depend upon the goodwill of community radiologists nearly as much as upon referring specialty physicians. We have no desire to compete with them. Further, especially in patients with new oncologic diagnoses, formal diagnostic CTs have already been performed. In patients seen following therapy (a very large proportion of our case load), contrast CTs are not necessary in most situations. Serial node size, for example, is usually easily measured with non-contrast CT. Of course, more important is whether the node in question demonstrates increased FDG uptake!

The use of IV contrast in CT in has two bases. First, it allows better separation of anatomic structures, such as vessels from surrounding tissues and organs and allows for better delineation of some abnormalities such as hepatic defects that are nearly isodense with surrounding tissue. In addition, especially in lean patients, separation of organs and structures particularly within the upper abdomen, can be quite difficult without contrast. Secondly, and more widely cited as justification for the use of contrast, is its purported value in lesion characterization. I do not think that anyone experienced with both PET and CT would argue that contrast even approaches FDG’s abilities in this regard.

Radiation dose is another important issue. The whole-body dose from standard FDG PET is on the order of 15 mSv, and Germanium/Gallium-68 attenuation correction adds a trivial 0.3 mSv. The radiation dose from low-dose CT (under 100 mA beam current) is approximately 9 mSv while that for “diagnostic” CT (at 200 mA) (Continued on page 3)
Society of Nuclear Medicine Offers New Research Grants

The Society of Nuclear Medicine is offering two new, competitive grants to researchers in molecular imaging/nuclear medicine. Thanks to a $25,000 donation from Tyco Healthcare/Mallinckrodt and a $10,000 donation from Digirad Corporation grant recipients will be announced in December.

The Tyco/Mallinckrodt contribution will be used to fund the first SNM/Mallinckrodt Seed Grant in Molecular Imaging/Nuclear Medicine Research. “Research of this type is essential in expanding the use of molecular imaging and nuclear medicine to better serve patients, both now and in the future. Mallinckrodt is pleased to partner with SNM in this worthy endeavor,” said Chris Wagner, group director of nuclear medicine at Mallinckrodt.

The $10,000 William L. Ashburn, MD, Pilot Research Grant for researchers in molecular imaging/nuclear medicine is funded by Digirad Corporation in memory of William L. Ashburn, a thought leader in the field of nuclear medicine. “Dr. Ashburn was a passionate visionary and leading contributor in the commercialization of Digirad’s proprietary solid-state technology,” said Gary Burbach, Digirad president and chief executive officer. “His early belief in our technology and profound dedication in developing significant medical applications has forever changed the way nuclear medicine is performed.”

Both donations were made to the Education and Research Foundation for SNM.

PET Researchers Recognized by SNM Awards

Many of the awards and grants recently announced at the SNM Mid-Winter Meeting went to researchers working on various PET projects.

The $2,500 Mark Tetalman Award, funded by the Education and Research Foundation (ERF), was presented to Georges El Fakhri, PhD, MEng, MS EE, MSBME, at Brigham and Women’s Hospital, Harvard Medical School, Boston, MA.

El Fakhri is a staff physicist in the joint program in nuclear medicine and an assistant professor of radiology at Harvard Medical School. He received his doctorate from the University of Paris in 1998 and holds a master’s degree in biomedical engineering from the University of Paris and a master’s degree in electrical engineering and computer science from the University of Texas, Austin. His interests include the design and evaluation of new compensation methods for physical factors affecting image quality in SPECT and PET for estimation and detection tasks; optimization of acquisition and processing techniques for lesion detection in whole-body oncologic PET imaging; and simultaneous dynamic dual isotope imaging ($^{123}$I/$^{99m}$Tc) in brain and cardiac SPECT.

The $10,000 Mitzi and William Blahd, MD, Pilot Research Grant, which honors the couple’s dedication to philanthropic support for education and research in nuclear medicine, went to Gary Ulaner, MD, PhD, University of Southern California, Los Angeles. His research project was “PET and Bioluminescent Imaging of Telomerase Promoter Activity to Evaluate in Vivo Chemotherapy Response.”

Shyam Srinivas, MD, PhD, Hospital of the University of Pennsylvania, Philadelphia, PA, received an $8,000 pilot research grant for “Using $^{64}$Cu-ATSM as a Tracer for “Hot Spot” PET Imaging of Hypoxia in Exercise Stress-Induced Myocardial Ischemia.”

Christopher Kim, University of Cincinnati College of Medicine, Cincinnati, OH, was named a $3,000 Bradley-Alavi fellow and will receive a $3,000 grant to conduct research on “Drug Development Application of FDG-PET Imaging: P13K Isoform Inhibitors in Ovarian Cancer.”

Student fellowships, which provide $3,000 to support students’ full-time participation in clinical and basic research activities in molecular imaging/nuclear medicine, were awarded to:

- Carrie Hruska, Mayo Clinic College of Medicine, Rochester, MN, for “Optimization of Collimator Selection for Molecular Breast Imaging”;
- Paras Lakhani, University of Pennsylvania School of Medicine, Philadelphia, PA, for “Correlation Between PET and Digital Mammography of Normal Breasts”;
- Bao Tran, University of Pennsylvania Medical School, Philadelphia, PA, for “FDG-PET Imaging as a Potential Technique for Detecting Clots: Validation by in Vitro and Animal Models”;
- Yingbing Wang, Stanford University School of Medicine, Stanford, CA, for “Comparison of $^{18}$F-2-flouro-2-deoxyglucose (FDG) Versus $^{124}$I-Anti-CEA Minibody Fragments in PET Imaging of Patients with Rising CEA Levels and Suspected Recurrent Colorectal Cancer.”
A Study in Contrasts: How Far Should We Take the CT in PET/CT?
(Continued from page 1)

PRO: PET/CT is PET-CT continued
tic CT scan performed and interpreted separately, compromises a central feature of PET/CT: a single integrated metabolic-anatomic diagnostic imaging exam. Performing a separate diagnostic CT in addition to the PET/CT only adds to patient radiation dose. Performing an optimized diagnostic CT after a PET/CT only “when needed” assumes that no relevant CT findings have been missed on the interpretation of the PET/CT and that there are no unrelated or unanticipated diagnostic findings that are best or exclusively depicted on CT.

Contrast material is not always required for the appropriate optimization of the CT of a PET/CT exam. CT scans of small pulmonary nodules and routine follow-up CT scans for lymphoma, for example, have been performed at many centers without intravenous contrast, and such can be the case with PET/CT scans. On the other hand, T staging of many cancers requires use of contrast-enhanced CT. Among those with both PET and CT training and experience, over 80% at a recent focus group believed oral and intravenous contrast should be used routinely in PET/CT exams (6). The need for aggressive use of intravenous contrast in CT oncology diagnosis will likely, as predicted, undergo some reconsideration as CT is fully integrated with FDG PET (7).

Determining the optimal use of CT contrast material in an integrated imaging examination employing the “smart” contrast of FDG, in particular, and the broader optimization details of the diagnostic CT in the setting of PET/CT will require efforts by physicians and technologists trained and experienced in both nuclear medicine/PET and contemporary multi-detector CT. The integration of these two complimentary modalities will only increase, however, and the dominant model for PET/CT will be fully merged, metabolic-anatomic diagnosis. In a recent Journal of Nuclear Medicine commentary, Dr. James Fletcher observed, “Just as PET/CT has begun largely to replace dedicated PET, PET/CT with the incorporation of diagnostic CT scans that use oral and intravenous contrast material and have higher effective amperage will begin to replace single-modality CT” (8).

References
5. Brink JA. PET/CT unplugged: The merging technologies of PET and CT imaging. AJR. 2005;184:S135-S137.

CON: PET/CT is Still PET continued
beam current) is on the order of 19 mSv (1). This represents more than a doubling of radiation dose for the CT portion. In these days where our profession has come under broad criticism for the high radiation doses given for diagnostic CT and when efforts are being directed to minimizing that dose, one must carefully justify such a dose increase.

Many centers routinely perform low beam current, non-contrast CT scans for attenuation correction and perform full, “optimized” contrast-enhanced CTs when requested by the referring physician—after the PET/CT study has been performed. Part of the reasoning behind this approach was predicated upon the potential of over-attenuation artifact production by the concentrated contrast bolus. It is now clear that this can be avoided by attention to injection technique. An even more important consideration is that this approach increases the total radiation dose still more. It also adds perhaps 20 to 30 minutes to the total examination time, and this may result in decreasing patient throughput, an important consideration in busy centers. The approach advocated by Dr. Shreve, where every study consists of whole body CT with contrast, minimizes the scheduling impact but not the radiation dose.

An argument may be advanced that the patient will likely have a full-diagnostic contrast CT in addition to the PET scan in any case. Currently, this is even required in many group-sponsored clinical trials. However, as I indicated above, I strongly feel that the use of such CT studies will gradually be reduced as it becomes more obvious to oncologists that PET/CT without contrast provides nearly all the needed information for careful therapy follow-up. (Studies to demonstrate this concept are urgently needed.) It is quite clear that therapy monitoring will account for the majority of PET utilization in the future.

Lastly, there are economic considerations, potentially positive for the imaging center, but certainly negative for the overall cost of healthcare delivery. Now that CMS has increased reimbursement for PET/CT, it may be justifiable to add a charge for contrast injection, but unless we bill for CT studies separately (and this may well be warranted in many cases), we are in danger of adding significantly to total health care costs, and, in the long run, this will be a losing strategy.

In summary, while I agree with much of what Dr. Shreve says, I feel that there are more than one potential model for the provision of PET/CT services. Perhaps the most important considerations are those related to the practice milieu in which a PET facility operates, but there are other factors that must be taken into account when making a decision about the type of CT scan performed and the use of IV contrast.

References
**PET Case: Esophageal Carcinoma**

This 73-year-old man had a history of esophageal carcinoma treated surgically five years earlier, without evidence of recurrence. He had a chest CT scan because of weight loss and an abnormal chest x-ray. The CT scan showed adenopathy in the mediastinum and adjacent to his gastric pull-through (Fig. 1). A PET scan was ordered for further evaluation.

The PET scan (Fig. 2) showed increased FDG uptake along the mediastinum (arrows), in the upper mid abdomen (white arrow), and in the right femoral head (arrowhead). Sections through the liver showed a hepatic focus as well (Fig. 3). In retrospect, a subtle low-attenuation hepatic lesion corresponding to the PET abnormality was identified on the CT scan (Fig. 4). Biopsy of a mediastinal lymph node showed adenocarcinoma identical to the patient’s original tumor. He is now undergoing chemotherapy.

**How Did PET Imaging Help?**

The PET scan demonstrated distant metastases, including an unrecognized hepatic metastasis, in addition to confirming the mediastinal disease.

Recent studies demonstrated that PET was more accurate than CT and endoscopic ultrasound for diagnosing stage IV disease (82% vs. 64%) (1) and that PET is the most accurate method for detecting distant metastases (2).

**Reference**

(2) *Radiographics.* 2000;20:713-723.

---

**About Views You Can Use**

This case was provided by David Seldin, MD, Franklin Square Hospital, Baltimore, MD. It was also featured on the Web site of Gabriel Soudry, MD, at [www.petcases.com](http://www.petcases.com). In addition to the Web site, Soudry also mails printed versions of his example cases to the referring physicians both within Franklin Square and in the surrounding community. Working with Soudry and other PET specialists, the PCOE Web site ([www.snm.org/PET](http://www.snm.org/PET)) features regular “Views You Can Use,” single-sheet PDFs that include specific cases, images, and references to supporting documentation. As a PCOE member, you can add your own contact information to these sheets and distribute them electronically or by printed hardcopy to referring physicians for educational purposes.
PET in the Literature

The international literature on PET and PET/CT continues to grow at a pace that challenges the abilities of both researchers and clinicians to stay current. In this issue the PCOE Newsletter presents a tomographic slice of the breadth of PET literature that appears weekly in publications around the world. A full listing of all PET research may be downloaded from the PET COE Web site each week along with live links to the PubMed abstracts. (Note: You must be signed in to the Web site to use this feature.) Below, the full PubMed URL is given for the first citation only. After that, only the citation number is given. If you are reading this online, you may click the citation number of any article to go directly to the PubMed abstract.

Cardiology
Kalliokoski, RJ, Kalliokoski, KK, Sundell, J et al.

General Clinical Practice
Early detection of bone infection and differentiation from post-surgical inflammation using 2-deoxy-2-18F-fluoro-d-glucose positron emission tomography (FDG-PET) in an animal model. (15896941)
Use of Ultrasonography and Positron Emission Tomography in the Diagnosis and Assessment of Large-Vessel Vasculitis. (15905837)

Instrumentation & Data
A new approach to spatial covariance modeling of functional brain imaging data: ordinal trend analysis. (15901409)
Habeck, C, Krakauer, JW, Ghez, C et al.
Efficient multi-modal dense field non-rigid registration: alignment of histological and section images. (15897000)
du Bois d’Aische, A, Craene, MD, Geets, X et al.

Neurology
A Potential Role for alpha-Methyl-l-tryptophan PET in Seizure Localization in Patients with Intractable Epilepsy. (15902316)
Duchowny, MS.
What can functional neuroimaging tell the experimental psychologist? (15903115)
Henson, R.
Detection of thyroid malignancy in a hot nodule by fluorine-18-fluorodeoxyglucose positron emission tomography. (15902360)
Low, SC, Sinha, AK, Sundram, FX.

Oncology
Initial experience in use of fluorine-18-fluorodeoxyglucose positron emission tomography/computed tomography in thyroid carcinoma patients with elevated serum thyroglobulin but negative iodine-131 whole body scans. (15902358)
Ong, SC, Ng, DC, Sundram, FX.
18F-FDG PET/CT in the evaluation of recurrent ovarian cancer: a prospective study on forty-one patients. (15893908)
Nanni, C, Rubello, D, Farsad, M et al.

Radiopharmacology
Brain regional alpha-[11C]-methyl-L-tryptophan trapping correlates with post-mortem tissue serotonin content and [11C]5-hydroxytryptophan accumulation. (15896264)
Leyton, MPD, Diksic, MPD, Benkelfat, CMDD.
Positron Emission Tomography and Single-Photon Emission Computed Tomography in Central Nervous System Drug Development. (15897947)
Brooks, DJ.
SNM Speaks Out on PET

The PCOE Newsletter presents a roundup of recent press releases, letters, statements, and government agency communications issued by the Society of Nuclear Medicine that are related to PET, PT/CT, and PET radiopharmaceuticals.

PET/CT Can Identify New Cancer Lesions at Early Stage, Allowing for Prompt Treatment
Released: May 27, 2005

A team of researchers at Johns Hopkins Medical Institutions in Baltimore, MD, reports that whole-body PET/CT scans may help physicians identify new, unexpected malignant cancerous tumors in patients, according to an article in the May issue of the Society of Nuclear Medicine’s Journal of Nuclear Medicine.

“PET/CT can help find additional lesions in patients known to have cancer,” said SNM member Richard L. Wahl, MD, director of nuclear medicine/PET at the Russell H. Morgan Department of Radiology and Radiological Science. PET/CT scans from nearly 2,000 cancer patients over a two-year period were evaluated retrospectively, explained Wahl, who was one of the first in the world and the first in this country to prove that PET could accurately diagnose breast cancer, melanoma and ovarian cancer and that it was superior to CT in staging lung cancer.

Wahl explained that in patients with known cancer, work-ups focus on a patient’s primary disease, and incidental coexistence of another primary malignant lesion can be missed. “Such newly identified lesions are often of early stage and have a better likelihood of being cured if treated promptly and aggressively,” indicated Wahl, the senior author who co-wrote the JNM article, “Detection of Unexpected Additional Primary Malignancies With PET/CT,” with SNM members Takayoshi Ishimori, MD, PhD (lead author), and Pavni V. Patel, MD. Results of modern techniques such as PET/CT can be “potentially medically significant and relevant,” said Wahl.

Use of Positron Emission Tomography (PET) Can Reduce, May Eliminate More Strenuous Drug Treatment Trials With Animals
Released: April 26, 2005

A number of articles explore the use of positron emission tomography (PET) and small animal imaging—nonsurgical techniques that open the door to understanding and treating human diseases—in the April issue of the Society of Nuclear Medicine’s Journal of Nuclear Medicine.

A major benefit of small animal imaging “is the ability to carry out many studies at various time points with the same animal,” said SNM member Michael J. Welch, PhD, co-author of “Preparation, Biodistribution and Small Animal PET of 45Ti-Transferrin.” Welch, a co-director of the division of radiological sciences at Washington University’s renowned Mallinckrodt Institute of Radiology and head of the institute’s radiochemistry laboratory, explained that studies on the same living animal can be extended over a period of time, allowing researchers to follow the development of disease in one subject and to monitor the effects of interventions on disease progression and outcome. Crucial information can be obtained noninvasively, repeatedly and quantitatively in the same animal, he said. With small animal imaging, one can very rapidly evaluate new radiopharmaceuticals using a limited number of animals and possibly eliminate the need for biopsies, extending an animal’s life.

PET provides a noninvasive view into a person’s living biology as it tracks a range of biological processes from metabolism to receptors, gene expression and drug activity. This imaging tool examines the chemistry and biology of a person’s body by monitoring ingested tracer molecules, and it is used to study the metabolism of the brain, the heart and cancer. A miniature version of PET was developed and is used in much the same way to image small animals.

Small animals, especially mice, play a fundamental in the study of human biology and disease. Mice have nearly the same set of genes as humans, offering an opportunity to learn about the function of the many genes shared by both. This could lead to improved diagnosis of disorders such as Alzheimer’s and Parkinson’s diseases, epilepsy, cardiovascular illnesses and many cancers. Researchers can gain a broader understanding of basic insights into normal physiology and disease processes to drug development and early response to anticancer and gene therapy. In addition, small animal imaging significantly reduces the preclinical evaluation time for therapeutic pharmaceuticals, possibly speeding the way for innovative drugs to patients, said Welch. Since there is no public registry of animal researchers, Welch estimates that there may be as many as 12,000 academic and private animal imaging labs in the world and that more than 200 may do small animal PET routinely.

Through small animal imaging research, Welch and his researchers gained more of an understanding about titanium anti-cancer drugs and new techniques for PET imaging with 45Ti, which they found to have excellent imaging characteristics and to be relatively inexpensive to produce. Welch and his researchers are also investigating the effect of cancer therapies on tumor function and performing cardiac studies that explore drugs that reverse the conditions of animals.

SNM Officers Explain Importance of Isotope Production, Maintaining DOE Funding for Molecular/ Nuclear Imaging to Capitol Hill Representatives
Released: April 26, 2005

SNM President Mathew L. Thakur, PhD, addressed Capitol Hill lawmakers April 25, explaining that the future of radionuclide therapies and innovative research in molecular imaging/nuclear medicine depends on a reliable, affordable and sustainable domestic supply of radionuclides.

Speaking to members of the Senate Science and Technology Caucus at the Senate Dirksen Office Building, Thakur relayed the importance of SNM’s proposed National Radionuclide Production Enhancement Program. “If America is to sustain its leadership in the fields of molecular imaging and nuclear medicine and continue to provide the innovative health care that our citizens deserve, our nation must have a reliable and stable supply of radionuclides,” said Thakur, a professor of radiology and radiation oncology at Thomas Jefferson University in Philadelphia, PA.
“SNM wants to promote a unified voice for the National Radionuclide Production Enhancement program,” said Thakur, indicating that such a plan, which addresses the current and projected future shortfalls of radionuclides in this country, is supported by 12 related organizations, including the Academy of Molecular Imaging, the Academy of Radiology Research, the American Association of Physicians in Medicine, the American College of Nuclear Physicians, the American College of Radiology, the American Medical Association, the American Society of Nuclear Cardiology, the Society of Radiopharmaceutical Sciences, the Council on Radionuclides and Radiopharmaceuticals, the Radiation Therapy Oncology Group, the Radiological Society of North America and the Society for Molecular Imaging.

In addition, the SNM president stressed the importance of continued funding for nuclear medicine basic science research programs in the Department of Energy’s fiscal year 2006 budget. President Bush’s planned federal budget includes devastating cuts to molecular/nuclear medicine research funding, including a $23 million cut from the Medical Applications and Measurement Science Program, almost entirely eliminating this DOE program.

Thakur, along with SNM President-Elect Peter S. Conti, MD, PhD, a professor of radiology, clinical pharmacy and biomedical engineering at the University of Southern California, Los Angeles, and SNM Government Relations Chair Terrence Beven, MD, Nuclear Medicine Associates, Baton Rouge, LA, spent the day visiting the offices of representatives to protest the proposed DOE budget cuts. “We need to let our lawmakers know about the crucial work performed by molecular imaging/nuclear medicine professionals,” said Thakur. The SNM officers visited with representatives of Sen. Ted Stevens (R–AK); Sen. Richard Burr (R–NC); Sen. Arlen Specter (R–PA); Sen. Pete Domenici (R–NM); Sen. Christopher “Kit” Bond (R–MO); Sen. Dianne Feinstein (D–CA); Rep. Lucille Roybal-Allard (D–34th–CA); and Rep. Jerry Lewis (R–41st–CA).

SNM actively encourages its members and others in the molecular imaging/nuclear medicine community to express their concerns about proposed cuts to the DOE budget to their elected representatives. For more information about the proposed DOE budget cuts, visit SNM’s Web site at www.snm.org/doe.

SNM Continues Fight to Restore Funds for Molecular/ Nuclear Imaging Programs in National Budget

Released: April 25, 2005

SNM officer Alan B. Packard, PhD, continued the society’s effort to reinstate funding for molecular/nuclear imaging basic research programs by the Department of Energy, taking SNM’s case to members of the Biological and Environmental Research Advisory Committee (BERAC) April 20–21 on Capitol Hill.

“Without DOE funding, nuclear medicine research will be seriously slowed and millions of patients will be deprived of innovative care,” Packard told BERAC members. The FY 2006 budget proposed by President Bush in February includes devastating cuts to molecular imaging/nuclear medicine research funding, including a $23 million cut from the Medical Applications and Measurement Science Program, essentially eliminating this DOE program. BERAC, an independent scientific advisory committee to DOE’s BER program, is charged with making recommendations for funding that program to the DOE’s Office of Science.

“Research carried out with DOE funding made the pioneering contributions that form the basis of molecular imaging/nuclear medicine as it is practiced today,” said Packard, who is senior research associate in the division of nuclear medicine at Children’s Hospital Boston and assistant professor of radiology at Harvard Medical School, as well as vice president of SNM’s Radiopharmaceutical Sciences Council. “Without continued DOE funding, the future of new diagnostic and therapeutic radiopharmaceuticals—as well as cutting-edge basic research in molecular imaging/nuclear medicine—is in jeopardy,” he added.

With continued DOE funding for the Medical Applications and Measurement Science Program, essential molecular imaging/nuclear medicine research will continue at universities, research institutions, national laboratories and small businesses, Packard told BERAC chair Keith O. Hodgson, PhD. With DOE funding, research will continue in radiochemistry, genomic sciences and structural biology that will usher in a new era of mapping the human brain and using radiopharmaceuticals to more precisely diagnose neurological illnesses, heart disease and cancer, said Packard.

SNM actively encourages its members and others in the molecular imaging/nuclear medicine community to express their concerns about proposed cuts to the DOE budget to their elected representatives. For more information about the proposed DOE budget cuts, visit SNM’s Web site at www.snm.org.

Society of Nuclear Medicine Offers Program to Meet Patients’ Current, Future Need for Radionuclides

Released: April 5, 2005

The Society of Nuclear Medicine—in recognizing that the future of radionuclide therapies and innovative research in molecular imaging/nuclear medicine depends on a reliable, affordable and sustainable domestic supply of radionuclides—has developed an important, new position paper on a proposed National Radionuclide Production Enhancement (NRPE) program.

This suggested program, which addresses the current and projected future shortfalls of radionuclides in this country, has gained the support of numerous professional organizations. They include the Academy of Molecular Imaging, the Academy of Radiology Research, the American Association of Physicians in Medicine, the American College of Nuclear Physicians, the American College of Radiology, the American Society of Nuclear Cardiology, the Society of Radiopharmaceutical Sciences, the Council on Radionuclides and Radiopharmaceuticals, the Radiation Therapy Oncology Group, the Radiological Society of North America and the Society for Molecular Imaging. The American Medical Association has also gone on record of strongly supporting a national radionuclide production enhancement program.

“SNM wants to promote a unified voice for this plan, which when implemented will assure our nation of a stable and secure supply of radionuclides for future generations,” explained SNM President Mathew L. Thakur, PhD, in the April issue of The Journal of Nuclear Medicine. Reports indicate that the majority of radionuclides used in applications every day are imported on a daily basis, and disruption

(Continued on page 8)
of their availability threatens to interrupt tens of thousands of nuclear medicine procedures each day. Those radionuclides required for innovative research are either available only sporadically and in limited quantities or not available at all. New radionuclide production for diagnostic and therapeutic uses is not being developed, as the national radioisotope infrastructure is chronically underfunded at the Department of Energy (DOE).

The program suggests that federal funding of approximately $69–$79 million over the next 10 years will be needed to implement identified goals, such as upgrading the University of Missouri Research Reactor (MURR), the only research facility in this country that provides reactor-produced radionuclides for therapeutic applications. In addition, the NRPE national program calls for developing the capability to produce large quantities of radionuclides to maintain existing technologies and stimulate future growth in the biomedical sciences. It suggests that medical and industrial users collaborate to assess radionuclide needs and transfer technologies to accelerate applications. It proposes that the transfer of commercially viable radionuclide programs be facilitated to the private sector and an investment be made in research and development to improve radionuclide production, processing and utilization.

“Radionuclides are part of the foundation supporting today’s applied molecular/nuclear technology. The very duality of purpose of molecular imaging/nuclear medicine—offering both noninvasive diagnostic methodology and a powerful therapeutic modality—drives the exploration and development of new radiopharmaceuticals. Radiochemical research leads to a better understanding and improved or early diagnosis of human diseases and to the development of effective treatments and the monitoring of the effectiveness of existing ones. For these reasons, SNM is committed to gaining support for this program and promoting it at the federal level,” said Thakur.

Society of Nuclear Medicine Urges Congress to Save Research Efforts, Restore Crucial Funding in DOE Budget

Members of SNM and ACNP called on Congress today to restore crucial funding to the Department of Energy’s (DOE) fiscal year (FY) 2006 budget, thereby allowing molecular/nuclear medicine professionals to continue making innovative discoveries that help diagnose and treat life-threatening cancer, heart and other diseases that affect millions every year.

SNM President Mathew L. Thakur, PhD; ACNP President Bennett S. Greenspan, MD, and Michael J. Welch, PhD, a professor of radiology and chemistry at the Washington University School of Medicine, St. Louis, MO, testified today before a nuclear science advisory panel that included representatives from DOE, the National Science Foundation, the Office of Management and Budget and the Office of Science and Technology. “The future of effective therapies and cutting-edge basic research in molecular imaging and nuclear medicine depends on funding for the Medical Applications and Measurement Science Program,” explained Thakur. “Without funding, future innovations in nuclear medicine research will never be developed, and millions of patients will be deprived of innovative care,” he added. “The termination of this funding will weaken the leadership position of our nation in atoms for medical use and bench-to-bedside programs,” said Thakur.

The FY 2006 budget, which was proposed by President Bush in February, includes devastating cuts to molecular/nuclear medicine research funding, including a $23 million cut for the Medical Applications and Measurement Science Program, essentially eliminating this DOE program.

“These cuts are detrimental to the future of molecular/nuclear medicine. The impact will be much greater than expected, and science will continue to change, leaving us behind in our pursuit to understand it,” Greenspan said.

Welch, an SNM past president and director of the research division at Washington University, oversees four DOE grants and is the principal investigator of two DOE grants. He echoed Greenspan’s sentiment, saying, “Even in this tight fiscal year we cannot shortchange the efforts to uncover future life-saving therapies and imaging.” He added, “The DOE is key in training nuclear medicine research scientists, and with the expansion of molecular imaging, these cuts will have a dramatic effect.”

Pioneering PET/CT Research Widens Applications of Imaging for Diabetic Foot

Pioneering research with PET and CT scans provides accurate detection and localization of foot infection in diabetic patients, according to an article in the March issue of The Journal of Nuclear Medicine. PET/CT scans could potentially offer a single-step, noninvasive technique for the diagnosis of infection, said SNM member Zohar Keidar, MD, PhD, the article’s lead author.

Keidar explained that foot infection is one of the most severe complications of diabetes. Diabetes can lead to decreased circulation in one’s extremities. This poor circulation—and the reduced ability to fight off minor infections—put diabetics at risk for development of chronic infection involving bone and soft tissues. “Early detection of infection is crucial and may prevent amputation,” said Keidar, explaining that antibiotic therapy can cure these infections if administered in time.

Keidar and his colleagues at Rambam Medical Center in Haifa, Israel, used PET/CT, the novel technology that combines two imaging modalities into one device, in their study of foot infection. By using labeled glucose (radiotracer 18F-FDG), Israeli physicians demonstrated the presence of infection with PET imaging. CT scans showed the localization of the infection site detected by PET as well as structural changes in bone and soft tissues. “This combined imaging approach in a single session using a single device leads to better localization of the infection process and facilitates the diagnosis,” noted the lead author of “The Diabetic Foot: Initial Experience With 18F-FDG PET/CT.” PET/CT technology, which is being used currently for cancer evaluation, may be applied potentially to the investigation of infection during evaluation of prolonged fever, suspected infected vascular graft or limb prosthesis, he added.

The group’s preliminary results have been “enthusiastically welcomed” by nuclear medicine professionals and referring physicians, especially orthopedic and vascular surgeons, said Keidar, who is with
Rambam Medical Center’s department of nuclear medicine and Technion-Israel Institute of Technology’s school of medicine, both in Haifa, Israel. He believes that these findings will encourage additional investigations on the role of PET/CT in infection and inflammation in larger patient populations.

The authors of “The Diabetic Foot: Initial Experience With $^{18}$F-FDG PET/CT” are Zohar Keidar, MD, PhD, Rambam Medical Center’s department of nuclear medicine and Technion-Israel Institute of Technology’s school of medicine, both in Haifa, Israel; Daniela Militianu, MD, Rambam Medical Center’s department of diagnostic radiology, Haifa, Israel; Eyal Melamed, MD, Rambam Medical Center’s department of orthopedics, Haifa, Israel; SNM member Rachel Bar-Shalom, MD, Rambam Medical Center’s department of nuclear medicine, Haifa, Israel; and SNM member Ora Israel, MD, Rambam Medical Center’s department of nuclear medicine and Technion-Israel Institute of Technology’s school of medicine, both in Haifa, Israel.

SNM Speaks Out on PET
(Continued from page 8)

The PET Center of Excellence Newsletter is a quarterly member information service published under the direction of the PCOE leadership and the Society of Nuclear Medicine.

PCOE Newsletter Editorial Board

Spring Issue Editor:
Paul E. Christian, CNMT, PET, BS
Paul.Christian@hsc.utah.edu

David L. Lilien, MD
DLilien@biomed.org

Gabriel Soudry, MD
gabriel.soudry@MedStar.net

PCOE Board of Directors

Center Chair: Peter S. Conti, MD, PhD
Center Vice Chair: Alan H. Maurer, MD
Center Secretary/Treasurer: Paul D. Shreve, MD

Center Board Members

Paul E. Christian, CNMT, PET, BS
Michael J. Gelfand, MD
Paul C. Hanson, CNMT, FSNMTS
Homer A. Macapinlac, MD
Henry D. Royal, MD
Heinrich R. Schelbert, MD, PhD
Jeffry A. Siegel, PhD
Annick D. Van Den Abbeele, MD
Henry W. Yeung, MD

Non-Voting Members

Robert Bridwell, MD, MBA
David M. Eve, CNMT
Susan L. Wallace, PhD

SNM Executive Director
Virginia Pappas, CAE

SNM Director of Education
Lynn Barnes, MEd

Graphic Design
Kerri Sarembock, BA

Managing Editor
Ann Coleman, MA

2005 Summer/Fall Schedule

Neuro PET Symposium
July 30: Las Vegas, NV

PET and PET/CT: Physics, Instrumentation and Applications Symposium
August 27–28: Boston, MA

Cardiac PET and PET/CT Imaging
September 24–25: Boston, MA

Advanced Oncologic PET/CT for Physicians
October 15–16: Reston, VA
December 10–11: Houston, TX

Technologist Training: CT and PET/CT
July 16–17: Reston, VA
August 6–7: Palo Alto, CA
September 10–11: Indianapolis, IN
November 12–13: Houston, TX

Confidence in Imaging Series for Referring Physicians
September 24: St. Louis, MO
October 8, 2005: Philadelphia, PA
November 5, 2005: Los Angeles, CA
November 19: Boston, MA

For more information visit www.snm.org/lc or call 703-708-9000 x1229.