

Advance Preparation Will Ease Transition from Planar to SPECT Imaging

USERS ADVISED TO BASE EQUIPMENT PURCHASING DECISIONS ON CLINICAL NEEDS AND FACILITY DESIGN

As nuclear medicine equipment becomes more sophisticated and complex, many potential users find purchasing decisions more difficult to make.

"Ten to 15 years ago, nuclear medicine specialists were faced with the decision of selecting a rectilinear scanner or a stationary imaging system such as a scintillation camera. Today, the decisions to be made are more complex," said David A. Weber, PhD, of the University of Rochester Medical Center (*1*).

Users may also regret those purchasing decisions when newer technologies become unexpectedly time-consuming and difficult, or when unforeseen problems arise from environmental factors. "It's easy to get caught up in the mystique of new technologies and advanced equipment without first evaluating the clinical needs of a particular nuclear medicine department," said Jon J. Erickson, PhD, president of Diagnostic Technology Consultants, Inc., a new company based in Fairway, KS.

As more nuclear medicine facilities decide to acquire single-photon emission computed tomography (SPECT) systems, environmental factors—such as air conditioning, dust, and the supply of electricity—directly affect the performance of that equipment.

Jonathan M. Links, PhD, of the Johns Hopkins Medical Institutions in Baltimore, also stressed the need to explicitly define what a department needs before looking for cameras and/or computer systems to satisfy those needs.

Shopping around for the "best

camera" or the "best computer" is an unrealistic approach, he pointed out, because there are no such products. "You can only buy what's best for your individual clinical setting, and it's imperative to write down a set of generic specifications and capabilities, emphasizing performance requirements, for your department," explained Dr. Links. "Potential customers should then go site-visiting and always try to get some hands-on experience," said Dr. Links.

Compared to gamma cameras of the past, the performance levels of today's cameras are "superb," said Dr. Links, and all manufacturers will be able to show beautiful images. "Users, therefore, need to look at other features, such as ease of positioning, ease of set-up for data acquisition, flexibility, and—if you're doing SPECT—the gantry," he added.

Similarly, almost all computer systems offer the same clinical applications programs: myocardial perfusion with circumferential profiles; ejection fraction; Fourier analysis; and renal, brain, and lung studies. "The way to decide which one to buy is to run through the program, see what kind of operator input is required and what the final display looks like; concentrate on those types of features," said Dr. Links, who is also president-elect of The Society of Nuclear Medicine's (SNM) Computer Council.

Service, which can vary in different regions, and the level of support from manufacturers also weigh heavily in effective purchasing decisions. Technologists who will use the new cameras should always participate in

their selection, said Dr. Erickson.

After installation, an "acceptance test" should be performed to ensure that the equipment performs as specified, said Dr. Erickson. "Acceptance testing is not routinely done in nuclear medicine departments, and I think it's because, historically, this specialty started out with relatively simple equipment. It's progressively become more complicated, and I think many users are not yet aware of the necessity of having an independent party verify the specification," he explained. An acceptance test should not cost more than 1% of the equipment's purchase price, he added.

The National Electrical Manufacturers Association (NEMA) published performance standards for scintillation cameras, including SPECT instrumentation, last June. "At the moment, those standards are probably the best performance guide in the field," said Dr. Weber, who is also president of the SNM Instrumentation Council.

These standards provide uniform criteria for comparing cameras from different manufacturers. Most, if not all, scintillation camera manufacturers in the United States (US) belong to NEMA, and they, as well as most European and Japanese manufacturers, will supply customers with performance specifications that conform with the NEMA standards, said Dr. Weber.

The International Electrotechnical Commission (IEC), which sets standards for manufacturers in countries outside the US, is now writing new standards for scintillation cameras.

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"The IEC standards are important because some European countries require all manufacturers to provide the stipulated performance measurements and to meet any restrictions placed on equipment operation; manufacturers who export equipment to those countries will have to meet those requirements," said Dr. Weber, who is the US representative to the IEC.

No Standards Yet for PET

The NEMA standards for gamma cameras were a valuable development, said Don Perrine, vice president of sales at Computer Technology & Imaging (CTI), a positron emission tomography (PET) system manufacturer. "I hope that the SNM will be supportive of standardizing PET performance standards," said Mr. Perrine. Without those standards, specifications from different PET manufacturers may not always be comparable, said Mr. Perrine, and "the customer could be misled by looking at a set of numbers and not realizing that measurements could have been made in different ways."

In Italy, Dr. Riccardo Guzzardi, is working to establish PET standards for Europe, a project supported by the European Economic Community (EEC), noted Mr. Perrine.

Selecting a PET unit can also be confusing because there are no generally established protocols, yet the capabilities of the technology appear almost limitless, said Wayne Webster, vice president at Scanditronix. "It takes a while for potential users to step back from the aspects of structural imaging and develop a different and new set of criteria for what they wish to accomplish with PET."

Mr. Webster recommends that anyone interested in acquiring PET visit several PET centers. "Do not concentrate on instrumentation. Instead, examine what it takes to operate the facility, in terms of staffing and overhead, and ask how they decided to

acquire the technology," he advised.

Sam Adams, general manager of Positron Corp., noted that the research and clinical needs of an institution with respect to PET greatly influence the purchasing decision. "An institution that wants to acquire PET for heart studies, for example, may not need to invest in a cyclotron if a rubidium-82 generator could satisfy its radiotracer requirements," said Mr. Adams. Potential PET purchasers should also seriously consider obtaining advice from an independent consultant, he said.

Some SPECT manufacturers have found that customers who bought those systems often use them for planar imaging rather than for tomography. "SPECT can look very attractive when you go to a meeting and hear interesting papers illustrated with wonderful images," said Dr. Erickson. "I think that perhaps some people buy the equipment without really understanding what's involved in doing SPECT. It requires a great amount of time, work, and dedication on the part of the staff," he added.

The technology is more fragile, and probably an order of magnitude more complicated, than that for planar imaging. A SPECT system is much more sensitive to variations in electricity and room temperature than a planar camera.

"Quality SPECT is more difficult to achieve than quality planar imaging, and many departments with SPECT equipment are either wary of trying

"Potential SPECT users should prepare a questionnaire for themselves, asking exactly what they want to do with the technology."

to do tomographic imaging, or after trying it, found that the results were so disappointing that they went back to planar imaging," said Dr. Links. Other departments may have found that they could not afford the time required to process SPECT studies. In addition, there are only a few clinically proven and established applications for SPECT, he noted. Besides the technical problems, the scans produced by SPECT are more difficult to interpret.

SPECT for Planar Imaging?

Some people still find advantages with SPECT systems even when they're not used to their full potential. "I think everyone should buy SPECT systems, even if they're going to be used for planar imaging," said Dr. Links. The gantry is more stable, the quality of the head is usually better, the camera is easier to position, and it gives the department the potential for doing tomographic scanning in the future, he explained.

Barbara Y. Croft, PhD, a physicist in the Radiology Department at the University of Virginia Hospital, said that nuclear medicine departments will not be overwhelmed by SPECT if they prepare in advance. "Potential SPECT users should prepare a questionnaire for themselves, asking exactly what they want to do with the technology, and then prepare a list of questions for manufacturers."

"Site visits should not be just for
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NEWS BRIEFS

ABNM Adopts Recertification Policy

At its December 6, 1986, meeting, the American Board of Nuclear Medicine (ABNM) adopted the policy of issuing time-limited certifications beginning in 1992. "We plan to issue certificates for a 10-year period," said Joseph F. Ross, MD, president of the ABNM. "After that 10 years, diplomates will need to be reevaluated and recertified," he explained. Time-limited certification will not affect certificates already issued.

Additionally, the ABNM has decided to provide a mechanism for voluntary recertification, and is working now to develop the procedure for diplomates to qualify for this distinction, said Dr. Ross.

The ABNM also adopted a policy of attempting to work with the American Board of Internal Medicine (ABIM), the American Board of Pathology (ABP), and the American Board of Radiology (ABR) to develop a cooperative training plan whereby physicians in those specialties with addi-

tional training could qualify to take the ABNM examination, and whereby nuclear medicine physicians could partially fulfill the requirements for the other three certifying boards.

Last year, the ABNM certified 79 new specialists in the field of nuclear medicine, bringing the total number of ABNM diplomates to 3,502.

Incorporated on July 28, 1971, as a conjoint board of the ABIM, ABP, and ABR, the ABNM became an independent, primary certifying board on March 21, 1985. ■

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observation, but for actually practicing on the system," said Dr. Croft, adding that technologists should accompany physicians on these trips and also try working with the system.

When a department acquires its first SPECT system, it may also be acquiring a nuclear medicine computer system for the first time. Decisions on disk space, power, and speed, can only be made after the clinical needs are established. "A department that is going to do one or two SPECT studies a day without archiving them, for example, will not need the same computer as a department that plans to do 10 studies a day and save the data for two weeks," she explained.

Tsur Bernstein, PhD, product manager for nuclear medicine at Elscint, Inc., pointed out that potential purchasers need to consider the software capabilities of a system.

At one end of the spectrum, users may need a great deal of flexibility if they want to change the existing software packages or write their own programs; users who have no interest in developing their own unique software should be looking at well-vali-

dated software packages, he explained.

At the beginning, it's important for physicians to get involved in the technological aspects, working together with technologists to establish routines and protocols. "Although we think our packages acquire and process a study in an optimal way, don't take us for granted. Play around with the software and optimize the procedure for your individual style," said Dr. Bernstein.

In addition to preparing before the purchase, Dr. Bernstein stressed the need to prepare before the installation: "Nobody went from x-ray to x-ray computed tomography (CT) without some education, and the same holds true for making the leap from planar nuclear imaging to SPECT."

Dr. Croft noted that since many nuclear medicine groups are a part of radiology departments, they are likely to be working with CT already, and the transition from planar to tomographic nuclear scans will be even smoother for them.

"A good technologist should be able to learn the general concepts of SPECT in a week," said Dr. Erickson, who believes that a manufacturer's applications team should train a de-

partment when the equipment is installed, and then that team should return to the department a month or two later and essentially repeat the training. "During the first training session, the nuclear medicine staff most likely will not know the right questions to ask, but after a few weeks, they will come up with questions that can be answered during the second training session," he explained.

Councils to Publish Buyers' Guides

Members of the Instrumentation Council have written a primer on the scintillation camera, which will be published by the SNM. It includes a chapter on how to purchase this piece of equipment.

In addition, the SNM Computer Council is planning to publish a buyers' guide to aid nuclear medicine professionals in selecting the most appropriate computer system for their department's needs.

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Reference

1. Weber DA: NM imaging instrumentation—buy now or wait? *Appl Radiol* July/Aug 1986, pp. 46-57