

YES, WE HAVE NO TECHNETIUM: A NOT-SO-FUTURISTIC SCENARIO



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Nuclear medicine practitioners most often function as diagnostic experts, and as a result, may easily lose sight of the importance of nuclear medicine to referring physicians. They and their patients depend on us for our diagnostic and prognostic studies. To better fill this complex role, we need to make sure we have all the tools of our trade.

The majority of diagnostic scans performed in the U.S. today, used in the evaluation of organ systems such as bone and heart, depend on the availability of ^{99m}Tc . These studies are used to provide unique physiological evaluation in a variety of organ systems.

In addition to its diagnostic superiority, one positive feature of technetium is its low cost—only a few dollars per study. Under health care reform and managed competition, ^{99m}Tc imaging agents will become even more important and should continue to serve as a first step in the patient evaluation prior to more costly CT and MRI studies. As the cost of technetium-based radiopharmaceutical imaging agents is significantly better than those labeled to other isotopes such as indium, they are unlikely to be replaced in the near future.

If technetium became unavailable, we would not be able to perform a significant number of scans, and thus most nuclear medicine departments would face severe reduction in the services they could provide until they could obtain more technetium. Even today, we have at best a tenuous link to the technetium supply that meets our needs. From all signs, this radiopharmaceutical will become even more critical as time goes on.

The advent of ever-improving technetium-based products for heart, brain, and infection imaging requires the availability of technetium and continued education of our referring physicians, who also need greater knowledge of technetium-based neurologic imaging, an excellent and under-used diagnostic technology. Demand will grow as new indications, such as improved neuro-imaging studies of patients with dementia, acute stroke, and trauma has become more apparent. In future, the potential addition of newer imaging agents such as peptides and monoclonal antibodies will only bolster this demand. Growth of ^{99m}Tc imaging over the next decade, in fact, cannot be entirely predicted because a number of technetium-based products are in the pipeline—agents for heart and brain imaging as well as cancer detection.

Demand versus Supply

Yet despite increasing demand for ^{99m}Tc , supply remains unstable. In the U.S., we are wholly dependent on one source, Nordion International of Canada, for molybdenum-99, the parent

isotope of ^{99m}Tc and the essential component of ^{99m}Tc generators.

And, with a short half-life, molybdenum cannot be stored for future use. If Nordion is unable to meet demands, we have no alternative site to obtain sufficient quantities of molybdenum. As recently as a year and a half ago, this very scenario appeared likely when Nordion was poised on the verge of a strike.

Even if ^{99m}Tc availability did not halt completely, there could be a dramatic decrease in supply. Many nuclear medicine physicians and technologists are accustomed to calling a central pharmacy in the morning, ordering a particular number of doses of technetium-related products, and having the order show up in their department often the same day or not later than the next morning. Nuclear medicine professionals assume that ^{99m}Tc is like electricity—flick a switch, and it's there. But if only a limited supply were available, this vital radiopharmaceutical might be rationed. Imagine nuclear medicine specialists lining up for their allotment. As a health provider, what would you do? How would you ration use? How would you decide who should have diagnostic tests performed? What kinds of priorities would be established? Equally important, who would establish them? Professional societies? Referring physicians? The government? A ^{99m}Tc shortage could lead to prolonged hospitalization and a more extensive work-up. Patients will bear the brunt of the loss of technetium-based radiopharmaceuticals.

Our profession finds itself with advanced technology and a high level of technical expertise but also with a potential shortage of the raw materials needed to implement this technology. And nuclear medicine is not taking this situation seriously enough.

A critical factor in how the ^{99m}Tc crisis plays out is the commitment of industry to nuclear medicine. Some companies have stopped making generators for a variety of reasons. Their decisions may be based on company goals, market constraints, or insufficient profits in making generators. E.R. Squibb & Son, for example, had been a large supplier in the past. Although Amersham Health Systems/Medi-Physics still provide very large capacity generators for central radiopharmacies around the country, the number of facilities that rely on them is quite small. DuPont Radiopharmaceuticals, and to a lesser extent, Mallinckrodt Medical, supply most of the usual hospital/clinic-sized generators from the molybdenum supplied by Nordion.

We need to encourage radiopharmaceutical suppliers to re-evaluate their involvement with ^{99m}Tc . One company expanding its role is DuPont Radiopharmaceuticals. DuPont's new TechnLite generator helps reduce radiation exposure even further below current safe levels. That's important not only because product improvement itself is significant—namely, a newly designed generator—but also because the procedure for eluting

and handling technetium is critical to the nuclear medicine technologist or user of the generator.

The ^{99m}Tc Crisis: Closing the Gap

SNM, ACNP, and radiopharmaceutical industry representatives have been working together over the past few years to assure a constant supply of ^{99m}Tc . We need to continue this work and understand that this is a significant factor in the practice of nuclear medicine. Through an ongoing dialogue with DOE, a task force has been created to establish an accessible supply of molybdenum either through U.S. development of resources or interaction with Canada or other countries.

Overtures have been made to obtain an alternative supply of molybdenum from Russia. But the current political and economic problems there allow no guarantee. Some money has been allocated by the federal government for feasibility studies to develop one U.S. source. But there's no indication that anything will change over the short term. Over the long term,

if we start now to look for additional sources, in five years we may have a secondary supply.

^{99m}Tc is the life-blood of diagnostic nuclear medicine. A stable, accessible supply at a reasonable cost must be assured. The momentum must come both from within the profession and industry itself, combined with governmental forces. The federal government needs to understand that it has to be willing to step in if necessary to assure the continuation of this critical resource.

^{99m}Tc has long been the backbone of the radiopharmaceutical industry and will surely become more important. We as nuclear medicine specialists should not hesitate to express to members of the radiopharmaceutical industry how critical it is that they maintain up-to-date facilities and reliable supply methods. Certainly, we would hope that the industry follows suit and supports the existing supplier as well as explores the potential for a new supplier so that ^{99m}Tc continues to be accessible for essential diagnostic and prognostic information.

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NEWS BRIEFS

Energy Secretary Calls for "Healing"

Addressing the plenary session of SNM's 1994 meeting in Orlando, DOE Secretary Hazel O'Leary asked the nuclear medicine community to join her in rebuilding the public trust in nuclear uses after the era of Cold War secrecy. She illustrated the situation with a two-faced genie, the darker, mysterious side being the products of the Cold War—nuclear weapons and their testing—the brighter side being the benefits of nuclear medicine. Unluckily, she said, the mass media focuses on the darker side, so the public knows little of the brighter. Healing the damage done to the public's image of nuclear radiation means literally focusing on its healing abilities.

Emphasizing the significance of nuclear medicine's image in the media, Sec. O'Leary projected two examples from television. One, an excerpt from the series *Law and Order*, based on true court cases, revealed the darker side of the nuclear genie, at least in the public's mind. A woman on the witness stand vented her anger at the federal government for experimenting on her father, a soldier. The witness asked how a government could turn on a man who had served it with dedication. But the other television segment, a

CBS movie, "My Breast," showed how the genie's other side could also passionately affect the public: a doctor gently explained to a patient how radiation would serve in her cancer diagnosis with no harm to her at all. Sec. O'Leary emphasized the need to make such "good news" widely available. "It's hard to lift a good story and send it across the United States," she said, emphasizing the need to send the message "in simple English."

However, she did not lay the responsibility solely on the nuclear medicine community. She described what she and her department are doing to improve the public attitude about nuclear uses. One effort is to "put the weapons genie back in the bottle," she said—through dismantlement, nonproliferation, and document declassification. On the positive side, she is assisting and promoting nuclear medicine, through such efforts as eliminating full cost recovery for participating in DOE programs, assuring variety in treatment devices, and advancing nuclear medicine radiopharmaceuticals. Running through both sides of the "genie" face is her department's new push for openness (see p. 13N, this issue), primarily to declassify Cold War documents. "We need to demystify, to respond to the public fear," she said. Concerning the way some of the human experiments were conducted, the medical community must "admit it, we're sorry, but we don't

do it that way anymore... We reconcile the genies by healing distrust and healing disease."

During a press conference following her speech, Sec. O'Leary assured *Newsline* that the department was taking a new tack on high-level radioactive waste disposal. After all, producing molybdenum-99 leaves high-level uranium wastes, and a DOE (or any other) program to make this isotope will need a cost-effective disposal in this country. "There was no master strategy for waste streams at the DOE when I came," she said. "Two strategies were existing—a military and a civilian"—because of the interest to keep top-secret military operations entirely separate. "Now we want to plan [waste streams] as a whole."

(A report on the SNM response to Sec. O'Leary's address will appear in the August *Newsline*.) ■

Mallinckrodt Plant Completed, Awaiting Opening

Mallinckrodt Medical has recently completed construction on a facility in the Netherlands which will supply molybdenum-99 for the company's market in U.S. and the rest of the world. The project, originating five years ago, is now in the process of plant-licensing before trial runs begin.

"If all goes well, we will be able to supply European needs in the beginning of