Leonard M. Freeman, MD

Exploring Vietnam and Its Nuclear Medicine

Hue, Da Nang, China Beach, Hanoi Hilton, Tet Offensive—to any age-appropriate American, these were household names which occupied the news media during the 1960s and early 1970s when 58,000 young Americans were losing their lives in Vietnam. Less known is the fact that more than two million Vietnamese military personnel and civilians also died during this unfortunate era of our history. Now, more than two decades after the war, the U.S. has normalized relations with Vietnam and innumerable commercial interests have started to infiltrate this developing country.

The thought of visiting Vietnam was certainly not high on my list of priorities. This, despite the fact that three decades of nuclear medicine practice has afforded me and my family many exciting opportunities to visit medical facilities in many unusual locations in the world. The impetus for the visit actually evolved from an invitation my 15-year-old daughter, Joy, received from the official Vietnam-USA Friendship organization in Hanoi. They were aware that Joy had initiated a pen pal program with Vietnamese children and wished her to meet with counterparts in Hanoi and Ho Chi Minh City. Once we decided to proceed as a family, I pursued the thought of identifying and possibly visiting any nuclear medicine colleagues and facilities that might exist. Several American-Vietnamese nuclear physicians were unable to help since they had left their homeland many years earlier. The breakthrough came when Junji Konishi, MD, of the Kyoto University School of Medicine in Japan provided me with the phone and fax numbers of Professor Phan Sy An at the Bach Mai Hospital in Hanoi. Professor An responded rapidly to my fax inquiry and the nuclear medicine plans of our trip were to be realized.

I exchanged several faxes with Professor An prior to the trip in early June 1996. He kindly made arrangements for me to visit with his counterpart, Trinh Thi Minh Chau, MD, at Ho Chi Minh City's Cho Ray Hospital. In one of my last pre-trip communications with him, I asked if I might bring some books or other gifts for his department. I did not anticipate his response, which indicated a need for a dose calibrator. I contacted Art Weis and Jessica Bede from Capintec who very generously donated a calibrator to Hanoi's Bach Mai Hospital.

After a short stay in Singapore, we arrived in Hanoi on a hot summer night. The anticipation I experienced very much reminded me of the adventurous feeling I shared with several nuclear medicine colleagues when we first visited mainland China in 1978. The common denominator was the contemplation of the uncharted waters we were entering. Guide books describe Ho Chin Minh City as being 30 years behind the West and Hanoi as being 30 years behind Ho Chin Minh City, and I would concur. The country's capital of Hanoi is delightfully devoid of automobiles. At times, it was an adventure crossing the street while dodging the motor bikes zig-zagging in all directions. Traffic lights are almost nonexistent, so moving in tandem with the natives helped in crossing safely.

Vietnamese are extremely industrious and appear quite happy. This, despite the fact that their per capita annual income of $280 in the north ($450 in the south) is among the poorest in the world. Everyone was extraordinarily friendly and seemed genuinely delighted about our visit. Of particular interest to me is the fact that despite the country's unification in 1975, it still remains divided in many areas, including medicine. Statistics about nuclear medicine department sites, equipment and personnel were supplied to me in separate north and south categories. It was my observation that a friendly competitiveness exists between the two sections.

Dr. Freeman speaking with Dr. Chau and her nuclear medicine colleagues at Cho Ray Hospital.

Only two of the Vietnamese medical schools have independent nuclear medicine departments. The oldest and largest is located at Hanoi's Bach Mai Hospital, which is the clinical facility for Hanoi Medical College. Professor An is chief of Bach Mai's nuclear medicine department. He, along with several other colleagues, trained in Eastern Europe in the late 1960s and upon their return established the first nuclear medicine departments. Professor An's department at the 1000-bed Bach Mai facility is one of 21 clinical nuclear medicine facilities that are distributed equally between the northern and southern parts of the country.

Of the 60 nuclear physicians in Vietnam (there are 35 in the north and 25 in the south), eight practice at Bach Mai. The department staff includes six nurses, three technologists, three physicists and several other clinical staff and basic science personnel. Most of the younger nuclear medicine physicians are trained in the country. Some may go abroad to European or Asian countries if a scholarship is available from the health or education ministry or an outside organization. The

one gamma camera in the department is an old Picker Dynacamera obtained as a used piece of equipment by the IAEA. It has not been operational for the past two years. This is reflective of the instrumentation problem in the entire country, as only two of the eight available gamma camera systems are functioning.

Approximately 400 studies per month are performed on Bach Mai's two rectilinear scanners and one renograph system. With ^{131}I and ^{99m}Tc (eluted from a ^{99}Mo generator) as the primary radionuclides and several commercial kits, liver, bone, kidney, blood-pool and brain studies are commonly performed. There is one Vietnamese reactor at Dalat in the south, but most of the radiopharmaceutical supplies come from Europe. Oral radiopharmaceuticals, e.g., ^{131}I, may be administered by trained nurses. However, all intravenous doses are administered by a physician. Technologists or physicists perform the actual study. The primary therapeutic application of nuclear medicine throughout the country is ^{131}I therapy for diffuse toxic goiter. Ho Chi Minh City's Cho Ray Hospital recently started treating metastatic thyroid carcinoma.

Approximately 100 radioimmunoassays are performed at Bach Mai, which is one of the six RIA laboratories in the country. Thyroid (T3, T4, TSH) and other endocrine assays predominate.

Da Nang and Hue in the center of the country afforded us the opportunity to see the beauty of the interposed beaches and lush mountainous terrain. It is difficult to contemplate that this serene part of the country was the site of many bloody confrontations during the war. Da Nang and its China Beach is a lovely seaside resort under intense hotel development by multinational firms. The three-hour drive between Da Nang and the old imperial capital of Hue provided innumerable photo opportunities of the beautiful countryside. The major sites in Hue included the imperial citadel and the tombs of the ruling monarchies, most notably the Nguyen dynasty. As in Hanoi and, later, in Ho Chi Minh City, the accommodations and food were quite good, greatly exceeding our modest expectations. Our stay in Hue ended with an interesting motor boat ride on the Perfume River, allowing us to observe everyday life on houseboats and waterside dwellings.

Ho Chi Minh City presents an interesting dichotomy in that its more cosmopolitan air and modern architecture is still punctuated by natives camped at street corners selling their wares. We learned that most local inhabitants prefer the shorter name, Saigon, to the more complicated Ho Chi Minh City. In fact, they are used interchangeably. The French influence still exists in vestiges of French colonial architecture and many fine

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Medical Equipment Donation Programs Under Way

Vietnam's severe shortage of modern medical equipment is typical of the situation in many developing nations worldwide, according to spokespeople from the SNM Education and Research Foundation (ERF) and the American Chemical Society's (ACS) Office of International Activities (OIA).

As the accompanying article points out, only two of the eight available gamma cameras in Vietnamese nuclear medicine facilities are operational, and this Asian nation's faulty or nonexistent equipment is all-too-typical of medical infrastructure outside the wealthier countries of Western Europe and Japan.

Although high technology devices are obviously rare, even more common instruments like infrared spectrometers, taken for granted in the U.S., are badly needed.

"In developing nations, scarce resources often mean a desperate scramble for research instruments, textbooks, and journals," says the ACS's John Malin, head of the OIA.

In fact, the Society's ERF has been embarked for some time on a program to underwrite free subscriptions to *The Journal of Nuclear Medicine*, according to Abass Alavi, MD, University of Pennsylvania, who heads up developing nations programs for the Foundation. In collaboration with the International Atomic Commission, the ERF has identified a number of nuclear medicine centers that qualify for the subscription. Often, Alavi says, "unfavorable exchange rates of local currencies" make the cost of *JNM* subscriptions prohibitive.

Efforts are now under way to expand the *JNM* Subscription Program to other deserving facilities in developing nations.

Meanwhile, two equipment donation programs undertaken by SNM and ACS seek to address at least some of the needs among developing countries.

ACS's "Project Instrumentshare," begun in the summer of 1996, aims to meet some of the demand for research instruments at needy institutions in "impoverished" countries. Malin's office identifies appropriate recipients at educational and nonprofit institutions around the world—including some in the U.S.—where the needs are particularly acute.

Both Alavi and Malin emphasize the importance of building a strong scientific infrastructure as the basis for real economic growth in developing nations.

"Training... scientists is an essential part of building a regional economy that will support" a stable national environment, says Malin.

But as far as nuclear medicine equipment is concerned, Alavi points out, there's an irony involved in trying to build up a poor nation's medical infrastructure. "The country has to have enough technological infrastructure to start with to maintain the equipment," he says. Some countries do, he notes, like Egypt and Poland.

Currently, the Foundation is encouraging SNM members to donate both imaging and nonimaging equipment for the program. Careful selection of sites will ensure that donated instruments will be optimally maintained and operated by host centers. Costs of transferring equipment will be borne by sources other than the donating organization or individuals, Alavi also noted.

"The program fosters growth of the field in developing countries," Alavi says. "Many countries of the world are deprived of the benefits provided by nuclear medicine procedures because of the cost of purchasing high technology equipment."

Reinvention of PET

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an 86% sensitivity for detecting myocardial viability compared to the gold standard PET which was considered to have a 100% sensitivity (*J Nucl Med* 1996;37:(suppl):177P). Standard SPECT had a 61% sensitivity. "SPECT using a 511-keV collimator and PET resulted in a good agreement in 90% of myocardial regions. Statistically speaking, PET and high-energy SPECT were in excellent agreement," said study co-author William MacIntyre, PhD. This study confirmed previous research conducted by Martin Sandler, MD, and colleagues at Vanderbilt University in Nashville, TN.

Even if coincidence detection is reserved mainly for oncology imaging, it remains to be seen whether artifacts will factor in diagnosing certain cancers. Garcia pointed out that with brain studies the hardware for attenuation correction is not needed since it can be easily calculated. Whether attenuation correction will be needed for breast cancer imaging, for example, is still an open-ended question. In ADAC's early trials so far using FDG and coincidence detection, "we've obtained good results for lung cancer, head and neck cancer, breast cancer, melanoma and colorectal cancer," said Hines. Coincidence detection has not been as successful with prostate cancer since prostate tumors do not always have high FDG uptakes.

An Increased Need for FDG

A determining factor in whether SPECT-PET will come into widespread use is the availability of FDG, the radiopharmaceutical used in the vast majority of PET procedures. Currently, FDG is an "orphan" drug, which means no pharmaceutical company owns it. This combined with the two-hour half-life of FDG is why PET centers have their own cyclotrons on site to produce FDG on demand. Without an on site cyclotron, hospitals that purchase coincidence detection cameras or 511 keV collimators must somehow find a way to obtain FDG.

Enter PETNet Pharmaceutical Services, a new pharmacy network that distributes FDG. The corporation was formed six months ago as a joint venture between Syncor and CTI and already has about 100 customers, according to Ruth Tesar, vice president of marketing for PETNet, which is based in Atlanta, GA. "Most of our customers are using new coincidence detection images and high-energy collimators to do FDG studies," she said.

PETNet currently has 10 sites where it produces FDG at cyclotrons owned by hospitals and universities throughout the country. "We plan to increase to 25 sites over the next three years," said Tesar.

For $750 per dose, a nuclear medicine department can obtain FDG within a day of filing an order or even on the same day in an emergency case. With the two-hour half-life of ^{18}F, customers need to be located within a 120-mile radius of a distribution site. "We have flown our shipments to customers, but this increases the price to over $1000 a dose," said Tesar.

One of the main challenges to setting up this network was getting sanctioning from the FDA. PETNet still has yet to receive FDA approval for their abbreviated New Drug Application, which would formally allow them to distribute FDG. Until they get this approval, the network is being allowed to operate under the FDA's watchful eye and with the agreement that it will work within each state's laws of pharmacy and medicine, according to Tesar.

With the new distribution network for FDG and the lower cost cameras that can perform positron imaging, nuclear medicine is on the brink of some major changes. However, the clinical acceptance of SPECT-PET may be hampered by FDA regulations and by the Health Care Financing Administration's reluctance to reimburse for the procedures. The new developments have thrust PET into the spotlight of clinical nuclear medicine. What was once largely a research tool is now facing the bureaucratic realities of the clinical world.

—Deborah Kotz

Editor's Note

As coincidence detection cameras and high-energy SPECT collimators come into widespread use, we in the nuclear medicine community need to establish terms to distinguish the new PET imaging from traditional PET. SPECT-PET is one reference I've seen. Any other suggestions?

—Conrad Nagle, MD, JNM Associate Editor

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French-Vietnamese restaurants.

My professional host in Saigon was Dr. Trinh Thi Minh Chau, head of the nuclear medicne department at the 1050-bed Cho Ray Hospital. This facility serves as the clinical campus for the Medical College of Ho Chi Minh City. There are five physicians, twelve technologists and six nurses as well as other basic science support personnel in the department. The monthly census of procedures consists of 200 thyroid uptake and rectilinear scans as well as 100 imaging studies performed on a MEDEX reconditioned Searle/Siemens camera-computer system. Heart, bone, liver, brain and kidney studies predominate. At the time of my visit, Dr. Chau and her colleagues had treated 20 patients with metastatic thyroid cancer with 131I.

I delivered nuclear oncology lectures at both Bach Mai and Cho Ray, which were translated into Vietnamese by one of the staff physicians. From the questions asked, it was clear that my hosts possessed fairly sophisticated knowledge about the lecture topics. This, despite the fact that they do not have ready access to books and journals from the West. I was pleased to bring several publications with me as gifts for the Bach Mai and Cho Ray physicians: These included copies of the CME syllabi from the recent SNM meeting in Denver. They were genuinely delighted.

One message that they wanted me to carry home was their strong desire to have more contact with their colleagues in the United States, Europe and other parts of the world. They would be gracious recipients of any books, journals or usable

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NEWSLINE

Defense Department R&D Awards Total $1/2 Billion

The U.S. Department of Defense (DoD) has announced that half a billion dollars will be awarded to small technology companies this year for early-stage research and development projects. The Small Business Innovation Research (SBIR) program will fund up to $850,000 for pre-prototype R&D in small technology companies, and up to $600,000 in such funding for small companies working cooperatively with researchers at universities and other research institutions.

Another $36 million will be awarded to to small technology companies working cooperatively with research institutions through the Small Business Technology Transfer (STTR) program.

The purpose of the programs, says a DoD spokesperson, is to "harness the innovative talents of small technology companies for the benefit of the U.S. military and the U.S. economy." Projects selected for awards must serve a DoD need and have the potential for commercialization in private sector or military markets.

Although the majority of past awards have not been to medical technology firms, some funding has already gone to medically related technology. One such company, Q-Source, Inc., East Hartford, CT, has won several SBIR contracts for the development of medical laser technology.

"This is one of the best programs government has ever come up with," says Peter Chenausky, president of Q-Source.

For further information on the programs, interested firms may contact the DoD at 703-205-1596. A web site fully describing the programs, and offering application materials, can be found at http://www.acq.osd.mil/sadbu/sbir. ■

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equipment that anyone may wish to donate to them. It is hoped that Professor An may be able to visit America in 1997 and attend the SNM meeting in San Antonio. He and Chau make it clear that they would welcome any American nuclear medicine physicians who would be interested in visiting Vietnam and their departments. I would be delighted to offer any assistance to SNM members who would like to consider a professional trip to Vietnam.

Overall, my family and I found our trip to be exciting and incredibly educational. I particularly enjoyed the opportunity to interact with our fellow nuclear medicine physicians. I was accepted and made to feel comfortable in this otherwise foreign environment. The warm, friendly feeling I experienced is wonderfully described by Stan Goldsmith in his "Scatter" column (February 1994). In a brief treatise called "Home," he describes how the familiar surroundings of a nuclear medicine department in Asia allowed him to relax despite the fact that he was 10,000 miles away from New York. Similar to Stan's feelings, I felt "at home."

—Leonard M. Freeman, MD

Dr. Freeman works at the Montefiore Medical Center in the Bronx, New York.

The SNM Education and Research Foundation (ERF) encourages members of the nuclear medicine community to donate used equipment in working condition to medical centers in developing countries. Such donations can include imaging instruments, computers, dose calibrators and other equipment utilized in the day-to-day practice of nuclear medicine. The ERF will facilitate the transfer and coordinate the efforts toward the optimal utilization of the donated instruments. For more information or to contribute, please contact:

Abass Alavi, MD
Chief, Division of Nuclear Medicine
118 Donner Building
3400 Spruce St.
Philadelphia, PA 19104-4283
Phone: 215-662-3069 • Fax: 215-349-5843
E-mail: alavi@darius.pet.upenn.edu