COMMENTARY

Scientific Highlights of the Asia and Oceania Congress in Nuclear Medicine and Biology

The Fifth Asia and Oceania Congress in Nuclear Medicine and Biology took place in Jakarta, Indonesia in October 1992. Over 500 physicians and scientists representing 25 countries attended the congress, including for the first time delegates from Ukraine, Turkey, Iran, and Trinidad and Tobago. Nuclear medicine physician Wilfrido M. Sy, MD, of the Brooklyn Hospital in New York, prepared the following report on the meeting.

CLINICALLY ORIENTED rather than basic research held center stage at the Asia and Oceania Congress in Nuclear Medicine and Biology, comprising about 80% of the papers presented. Nuclear cardiology accounted for nearly a quarter of all the reports. The trend coincides with the recent availability of the new technetium-99m cardiac imaging radiopharmaceuticals, which were the subject of many baseline reports of clinical experience. Other stimuli for interest in heart studies include cardiac magnetic resonance imaging and clinical positron emission tomography. A half-dozen groups reported correlative studies of cardiac scintigraphy and MRI (see figures 1-2). A study by Tamaki and Konishi from Kyoto, Japan compared the performance of PET and SPECT in assessing myocardial viability (see figure 3).

Assessing Research Trends

Oncology accounted for a full 10% of the reports, and interest in gastroenterology, neurology, genitourinary and endocrinology also remained high. But the number of bone abstracts fell by half from the last congress. If the trend comes as a shock, consider that radiopharmaceutical makers have introduced no significant new diagnostic bone agents in recent years. The clinical applicability of total body bone scintigraphy may have reached a plateau. Bone scintigraphy, however, because of its sensitivity, economy, and whole-body capability, remains a very secure nuclear modality.

Among the most powerful signals in nuclear medicine is the so-called perfusion metabolism mismatch, or preserved uptake of fluorine-18-fluorodeoxyglucose in regions of low myocardial perfusion. This finding predicts recovery in contractile function with an accuracy greater than thallium scintigraphy. But the technique is available only to institutions large enough to afford and support positron emission tomography.

That might change soon. Belgian researchers at the meeting presented a modified gamma camera for imaging the 511 keV annihilation photons of positron-emitting radiopharmaceuticals such as ^{18}F-FDG. Hicks and Kalff at the Alfred Hospital in Melbourne, Australia have similarly modified a gamma camera with lead shielding and a specially constructed collimator to provide planar images of FDG in the heart (see figure 4).

These positron emission planar imaging techniques could extend myocardial and even whole body metabolic imaging to centers unable to support PET. With a half-life of 110 minutes, ^{18}F labeled substrates could be distributed from regional centers just as the Alfred Hospital is supplied by the Australian Medical Cyclotron in Sydney, by air only an hour and a half away.

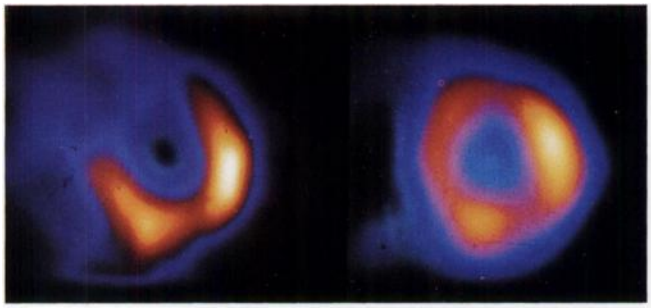

Figure 1a. Thallium-201 in short axis. Left shows dobutamine stress and right shows redistribution. Note anterior septal wall defect in patient with left anterior descending artery stenosis.
Courtesy D.J. Pennell

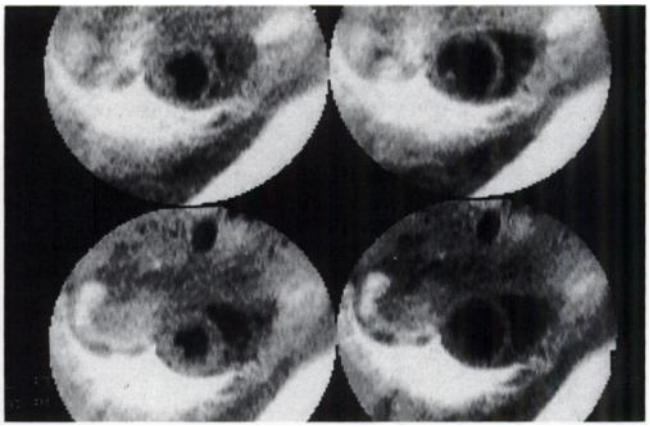

Figure 1b. MRI of same patient during dobutamine stress. Top row is pre-stress, bottom row during dobutamine. Left is end diastole, right is at end systole. Note the presence of anterior septal hypokinesia during stress and correspondence with ^{201}Tl defect.

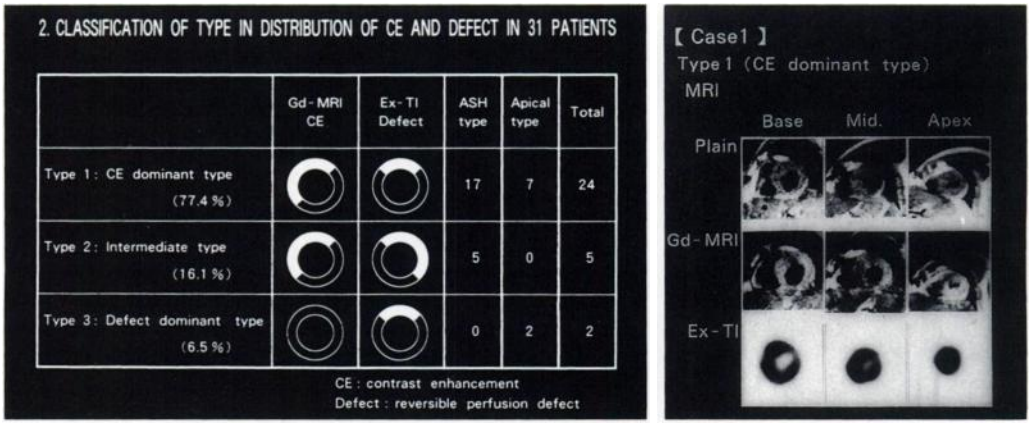

Figure 2. Miyao and co-workers classified their findings in hypertrophic cardiomyopathy of defects seen on ^{201}Tl scintigraphy to the degree of contrast enhancement (CE) on Gd-MRI studies into CE dominant type, intermediate type, and defect dominant type. In a typical CE dominant type, shown on the right, regions of defects on ^{201}Tl scintigraphy overlap areas of contrast enhancement on MRI.

Courtesy K. Miyao

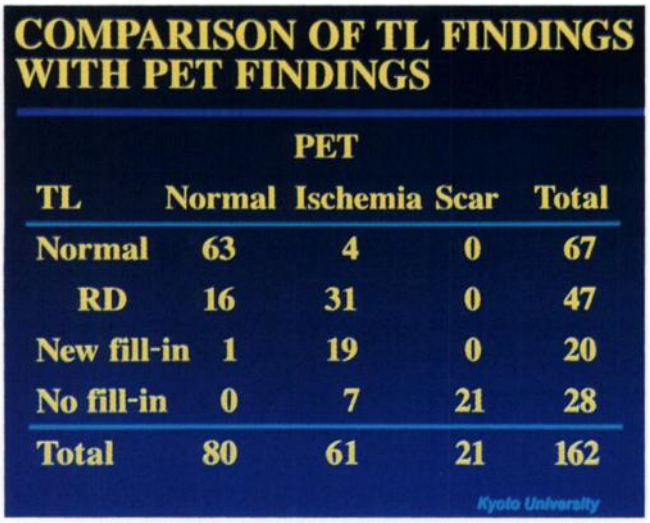

Figure 3. Comparison of Tl and PET findings in 162 patients.

Courtesy of Tamaki & Konishi

Gastrointestinal Medicine

Having the means to differentiate periappendiceal abscess from acute appendicitis would aid in properly managing the two similar conditions. Using semi-quantitative ^{99m}Tc-HMPAO leukocyte imaging, M.S. Lin and others at Taipei Municipal Chunghsiao Hospital in Taiwan were able to separate patients with periappendiceal abscess from those with acute appendicitis. In 25 patients with atypical symptoms for appendicitis, six had acute appendicitis and 19 patients had periappendiceal abscess at surgery in concordance with the scintigraphic diagnosis.

The investigators presented a companion study on the diagnosis of appendicitis in the elderly, in whom the condition presents with more subtle symptoms and less subjective signs. Such patients stand to benefit from additional documentation before undergoing surgery. Out of 36 patients (mean age: 60 years), imaging in 24 appeared positive. Pathological findings proved positive in all 20 who required appendectomy. Three patients with positive scintigraphic features but no appendicitis had carcinoma of the ascending colon, Crohn's disease or active diverticulitis. One patient was judged not to require surgery. Concluding that leukocyte imaging is an effective modality in the early diagnosis of acute appendicitis in the aged, the investigators said the technique shortened the clinical observation time and could obviate unnecessary exploratory laparotomies.

Discerning which patients suffering from liver cirrhosis are most likely to benefit from shunt surgery can be difficult. Brandhorst and co-workers from the Institute for Diagnostic Imaging and J.W.C. University Hospital, in Frankfort, Germany used hepatobiliary scintigraphy and a computer simulation for predicting the success of shunt surgery in 24 patients with severe liver cirrhosis. The authors were able to differentiate pre-hepatic, intra-hepatic, and post-hepatic disease and generated data for deciding whether a patient was a good surgical candidate.

In studies of kidney function, A.L. Moase from the Prince of Wales Hospital, Sydney, Australia, showed that frusemide half clearance time values using ^{99m}Tc-MAG_3 are comparable to those using ^{99m}Tc-DTPA. They attributed this to the fact that the half clearance time is a measure of the washout of a tracer from the collecting system, which is independent of the mechanism of extraction by kidney.

N. Chantaraptick and H.A. Ziessman from Rajavithi Hospital, Bangkok, Thailand, and Georgetown University Hospital, Washington, D.C., used ^{99m}Tc-MAG_3 as a replacement for DTPA and iodine-131 hippuran in renal transplant evaluation. In 22 studies on 15 patients, they concluded that the image and time activity curve quality possible with MAG_3 were superior.

Oncology and Nuclear Medicine

The use of thallium-201 in detecting primary malignancy, introduced by Dayem and colleagues at the last congress, continues to draw new clinical interest. S. Matsuno and colleagues from Kagawa Medical School, Japan compared ^{201}Tl SPECT and CT studies in 44 patients with primary lung car-

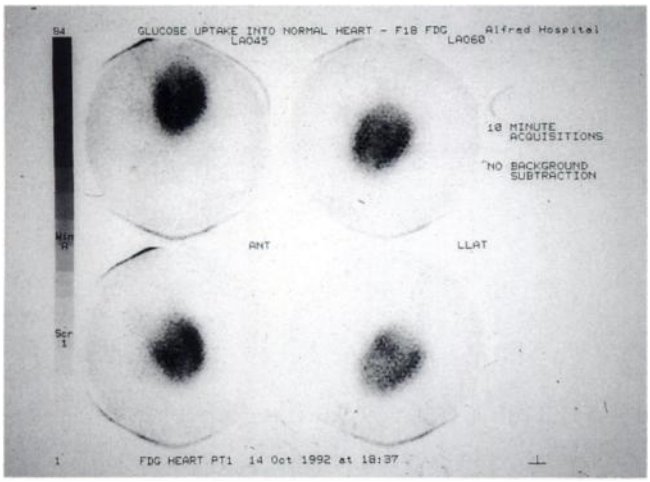

Figure 4. A modified gamma camera made these images of ^{18}F-FDG uptake in the normal adult myocardium.
Courtesy R. Hicks

cinoma. The authors concluded from their data that the SPECT studies are superior to CT for detecting mediastinal lymph node metastases.

H. Macapinlac and co-workers from Memorial Sloan Kettering Cancer Center and St. Vincent's Hospital, New York, correlated ^{201}Tl SPECT with CT and MRI in evaluation of metastatic brain tumors. They found ^{201}Tl SPECT useful as an adjunct to CT and MRI in confirming the presence of viable tumor tissue. The SPECT study can be used to guide biopsy and to monitor the progress of patients undergoing radiation therapy.

In patients with brain cancer in whom CT, MRI and angiography showed no distinctive features, Y.K. Hong and collaborators from Yonsoi University College of Medicine, South Korea, used SPECT to differentiate meningeal hemangiopericytoma from meningioma. The former correlated with increased uptake of ^{99m}Tc-HMPAO, the latter showed decreased activity.

S.D.J. Yeh and co-workers from Memorial Sloan Kettering Cancer Center in New York studied radioimmunoimaging of glioma with an anti-ganglioside monoclonal antibody called 3F8. They found the 3F8 antibody useful for imaging primary malignant brain tumor and were able to quantitatively measure antibody uptake with a conjugate view method. The authors also reported on the use of 3F8 in soft tissue sarcoma. The quantity calculated by the conjugate view method made it possible to estimate the magnitude of tumor uptake, which they later verified by measurement in the surgical specimen.

From basic and clinical studies with Cancer Antigen 130, E.P. Ohtsuka and collaborators from Yamato City Hospital, Japan, concluded that immunoradiometric assay with CA 130 is significant for the diagnosis of metastatic breast cancer and for estimation of therapeutic course. The test showed excellent sensitivity, specificity, analytical recovery, and reproducibility. The study included patients with pulmonary and ovarian cancer.

To monitor patients who underwent therapy for breast cancer, A.L. Hotze and co-workers from the University of Bonne, Germany, used MRI and bone-marrow scintigraphy. In patients with ambiguous findings, the bone marrow scan using an anti-granulocyte monoclonal antibody achieved a sensitivity comparable to MRI and bone scintigraphy. They presented images of excellent quality, which can be used to visualize the entire bone marrow.

In studying cerebellar vasoreactivity in stroke patients, M.C. Lee and co-workers at Seoul National University Hospital concluded that cerebellar vasoreactivity is intact in stroke patients with crossed cerebellar diaschisis. The investigators assessed the condition using acetazolamide and ^{99m}Tc-HMPAO SPECT. Their finding appears to support the concept that reduced cerebellar blood flow is secondary to functional deactivation and subsequent transneuronal degeneration.

Lung Scanning Aerosol

Technegas, an aerosol widely used for ventilation studies in Europe, Australia and parts of Asia, consists of hydrophobic, ^{99m}Tc labeled carbon particles. Makoto Miki and co-workers from Tohoku University in Japan compared the distribution of inhaled krypton gas and Technegas in the lungs and found little difference between the two preparations in normal lungs. In severe obstructive disease, however, the aerosol deposited more in the lung bases than krypton gas. Technegas leaves characteristic hot spots that the investigators consider useful in the diagnosis of obstructive airway disease.

M. Berts of Australia's John Curtin School of Medical Research in Canberra, where Technegas was developed, says he's found that lung visualization by the carbon aerosol is superior to krypton-81m. He cited the literature as well as his own clinical observations using a computer simulation on convective and diffusional transport systems based on the Wydel model of the lung. Berts's results show a rapid rise in Technegas retention in the lungs, from 20% to greater than 80% if a second breath hold maneuver is performed. He believes that this illustrates the pure diffusional, gas-like behavior of the particles and validates the prediction of the model.

A new technique of lung ventilation scintigraphy using ^{99m}Tc-pyrophosphate aerosol was introduced by Al-Mohannadi and co-workers at Mubarak Al-Kabeer Hospital, the Kuwait Ministry of Public Health and Kuwait University. These investigators found that post-perfusion dynamic aerosol studies are economical and can avoid the need for other ventilation studies.

Investigators from Kuwait used ^{99m}Tc-DTPA aerosol to study the lungs of people exposed to dense pollutants from the oil wells set ablaze by Iraqi troops during the Persian Gulf War. A. Owunwanne and co-workers from the Kuwait Uni-

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Pioneer Award

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extra reassurance made all the difference in the world."

Mr. Harris received the Distinguished Educator Award of the Society of Nuclear Medicine in 1985.

"Our nuclear medicine department is what it is today thanks to Craig and his hard work and devotion to seeing the job through," says Ed Coleman, PhD, Professor of Radiology and Director of the Nuclear Medicine Division at Duke, who worked closely with Mr. Harris for almost 15 years.

Mr. Harris handled the task of designing a new nuclear medicine service for Duke Hospital North in 1976. Three years later he took on added responsibilities as nuclear medicine scientist at the Durham Veterans Administration Medical Center. When Duke bought a positron emission tomograph in 1984, Mr. Harris volunteered to oversee the installation of the multimillion dollar equipment and he became proficient in the synthesis of fluorine-18-deoxyglucose and other short-lived radiopharmaceuticals. Mr. Harris returned temporarily from retirement to oversee the installation of a new PET scanner last year. A self-professed "jack of all trades, master of none," Mr. Harris has influenced the lives and careers of world-renowned physicians and small-town nuclear technologists alike. His retirement has left a void in the field of nuclear medicine that is not likely to be filled anytime soon. His labor and efforts have made an indelible mark on nuclear medicine and its professionals. Dr. Coleman summed up Mr. Harris's contributions simply: "You don't replace a Craig Harris."

Mark A. Newman

Asia Congress

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versity, Mubarak Hospital, and the Kuwait Cancer Control Center showed that the clearance rate of the aerosol in preliminary studies indicated that inhalation of smoke from the burning oil did not alter the integrity of pulmonary epithelial membranes.

Assessing Endocrine Function

Bone metabolism can be altered inadvertently by radionuclide treatment of thyroid disease. I.K. Lee and co-investigators at Keimyung University and Kyungpook National University in Korea studied the process and found that serum osteocalcitonin levels are initially elevated in patients with hyperthyroidism, probably due to thyroid hormone-induced increases in bone absorption, which could lead to decreased serum PTH levels.

In a related study of ten patients with thyroid carcinoma, the same investigators found that a high dose of ^{131}I used for thyroid ablation could damage endocrine function of the parathyroid and affect osteoblastic activity in some patients. These preliminary results require confirmation from further studies.

Another group led by A. Vattimo used ^{99m}Tc-MIBI scintigraphy to assess thyroid nodules. They recommend the nuclear scan as an alternative to thyroid-stimulation hormone (TSH) stimulation for visualizing "inhibited extranodular tissue" in patients suspected to have autonomously functioning thyroid nodules.

Endemic Infectious Diseases

Brucellosis is an infectious disease endemic to regions of the Middle East. M. El-Dosouki and others at King Saud University, King Khalid University Hospital in Riyadh assessed the value of three-phase bone scintigraphy in diagnosing skeletal brucellosis. Of 214 patients with proven disease, 53% complained of low back pain. Bone scintigraphy was abnormal in 92% of the cases. Increased bilateral sacroiliac uptake was the most common bone scan feature followed by abnormal findings in the large joints.

Confronting another infectious disease, Neshander Asli Isa from the Iran's Beheshti University School of Medicine used liver scintigraphy to evaluate patients suffering the effects of toxocariasis, an infection by nematode parasites. The researcher reported that liver scintigraphy clearly indicated single or multiple areas of decreased photons even when hepatic sonography showed normal or equivocal findings.

A. Hussein and colleagues from Mubarak Al-Kabeer Hospital, the Kuwait Ministry Public Health, and Kuwait University reported their experience using ^{99m}Tc-DTPA diuretic radionuclide imaging to study the complications of chronic urinary schistosomiasis, an infection by parasitic trematode worms also called bilharziosis. Studies of 192 patients showed that most patients with the chronic infection present with non-obstructive pelvico-calyceal retention rather then obstruction.

A round-table discussion at the congress focused on ways to advance nuclear medicine in the developing countries to address unique problems such as the onslaught of endemic diseases and the lack of diagnostic imaging equipment.

Among other achievements, the congress drew meaningful attention to the medical needs of nations such as Indonesia. In preparation for the congress, Indonesian President Suharto gave his National Atomic Energy Commission approval to purchase 15 new gamma cameras and he presided in person over the opening ceremonies of the congress. The cameras are to be installed in hospitals throughout the archipelago republic, including remote facilities that have gone without nuclear medicine imaging systems altogether.

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