

NOTES FROM ABROAD

Nuclear Medicine in the People's Republic of China

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As "springtime" returned to Chinese science after a decade of a long, cold winter, the mainland Chinese Medical Society initiated an energetic search for western technology. When the so-called Second Liberation of China brought the scientists back to their laboratories, the 1978-85 Rolling Plan abruptly opened a closed country. As the Chinese Vice-Chairman commented during his recent trip to Japan, "It is so silly to behave like a beauty if one hasn't seen one's own face." So, China now is revealing herself, not as a beauty perhaps, but as an energetic young country woman. What follows are my observations as a member of the Japanese Delegation of Medical Science during its first mission to China since the signing of the Sino-Japanese peace treaty. The team consisted of four radiologists, five specialists in medical electronics, and myself to represent nuclear medicine. Our group's chief mission was to report on our own most recent advances in the medical sciences to the medical community of China. Their physicians and scientists recognize the developing status of their current technology and are eagerly seeking the introduction of modern methods into medical specialties.

Until I became accustomed to the situation, I felt as though I were giving lectures to large black-and-gray oceans, for that is the illusion produced by the

masses of people all wearing the national uniform of black and gray. It was very difficult, however, to find a sleeper in the audience. These people possess a sense of humor, and I always felt pleased with their enthusiastic reception.

At the invitation of the Chinese Medical Association, we spent 17 days with these enthusiastic and tireless medical scientists, presenting a series of lectures, holding countless discussions, and visiting their medical facilities. These institutions, so to speak, showed their "unveiled selves" to the off-shore visitors for the first time.

Four major cities were selected for the project (sightseeing time was limited). We began our excursion at Shanghai, visited Tientsin and Shijiazhuang, and finally Peking. I was greatly surprised to find nuclear medicine to be a very active, independent technology in the complicated medical system of this country. Although the facilities and instrumentation are not wholly modern, medical knowledge is thoroughly up to date—even hospital cyclotrons and computerized emission tomography are frequent topics of discussion. In many university hospitals and major community hospitals I found active departments of nuclear medicine, usually equipped with two or three domestically manufactured scanners, uptake instruments, renogram systems, and several manual well counters. At a leading teaching hospital in Shanghai, where three scanners were continuously making loud tapping noises, ten scans, five renograms, and 20 thyroid

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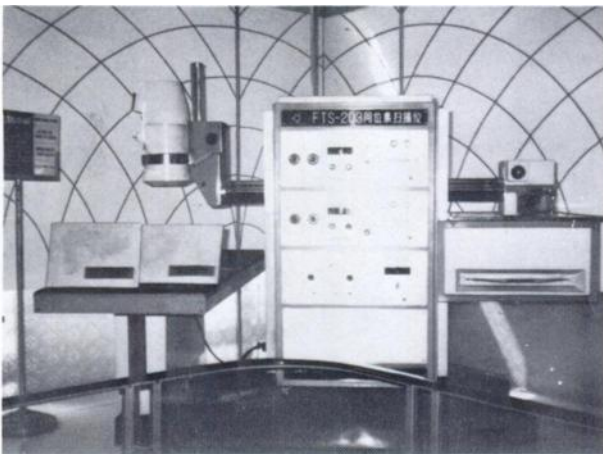


FIG. 1. Rectilinear scanner manufactured in China.

uptakes were being performed daily by six physicians and seven technologists.

The rectilinear scanner is still the backbone of nuclear medicine in China (Fig. 1). I was told that there are more than 200 scanners in operation and that most of them were manufactured in three industrial cities. A 5-in. single-crystal scanner is produced in Shanghai for \$24,000; a Tientsin firm is proud of its dual-crystal (5-in.) scanner, which sells for \$42,000; and in Mudanjiang the most advanced dual-crystal (5-in.) scanner, controlled by micro-computer, is produced for \$53,000.

Renogram systems are widely used, not only for renal studies, but for more rapid dynamic studies, such as radionuclide cardiology, for which quite complex accessories are produced locally. Although versions of the Anger camera are not as yet manufactured in China, 20 imported cameras (seven by Searle-Shimadzu and nine by Toshiba) are in use. Two of these cameras have been interfaced with a minicomputer system. There are two gamma cameras in Shanghai, two in Peking, and two in Shijiazhuang but none thus far in Tientsin. We were told that beginning in 1979 more gamma cameras are to be imported for the leading hospitals in China, and that instruments for computerized transmission tomography will be introduced.

Shortage of radiologic film still appears to be a serious problem and prevents the use of the photorecording systems. Most scans are recorded by color-dot image systems. Small quantities and small sizes of film are carefully used, even in the diagnostic radiology departments. For example, a leading teaching hospital in Shanghai, with 2,000 outpatients and 863 beds, uses only 100 films a day for outpatients and 200 for inpatients. Many of the other hospitals we visited were similarly restricted. Radiologic film is produced in four cities, but the

quality is neither high nor uniform. No automatic film processors were seen during the trip.

In comparison with the available instrumentation, the production and use of radiopharmaceuticals is more advanced. Mo-99-Tc-99m and Sn-113-In-113m generators (Fig. 2) are supplied to more than 100 hospitals once a month, in 100-mCi and 5- to 10-mCi sizes, respectively (some hospitals receive 200-mCi Tc-99m generators). Unlike our more advanced commercial products, the generators appear to be handmade at the reactor site some 20 miles north of Peking. I suggested a visit to the site, but this was one of the few requests that was gracefully passed over in silence. Another surprise for us was that there are several Chinese-made Tc-99m labeling kits—HIDA, pyrophosphate, and phytate—apparently in daily use. Other radiopharmaceuticals used are In-111 transferrin, I-131 as iodocholesterol, Yb-169 chloride, Yb-169 tetracycline, Cs-131 chloride, Ga-67, Se-72 as selenomethionine, Co-57 bleomycin, etc. Cyclotron-produced nuclides are supplied primarily by the installation in Shanghai.

In vitro nuclear medicine is still in the cradle stage (Fig. 3). Analyses of T₃, T₄, [¹⁴C]AMP, alpha fetoprotein, cortisol, etc., were performed by only one or two technologists—all work, including the counting, was done manually. No automatic multisample gamma counting was seen during the trip. In one hospital, however, a small automatic liquid-scintillation counter is treasured. It occupies the only air-conditioned room and is used for analyses of carbon-14, alone, in cortisol, or in adenosine monophosphate. Compared with the crowded and busy in vivo laboratories, the in vitro rooms are quiet.

Nuclear medicine in China is not a stepchild of radiology, nor of internal medicine; it is a young

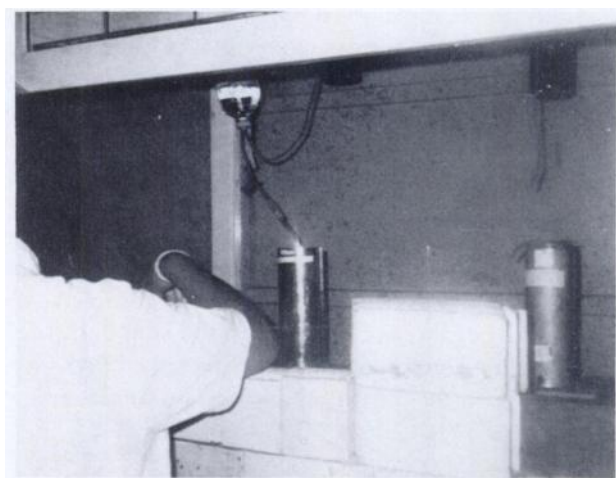


FIG. 2. Radiopharmaceutical laboratory.



FIG. 3. In vitro radioisotope laboratory.

discipline and still belongs to basic medicine. Although there are some 1000 doctors in this field already, a society of nuclear medicine has not yet been founded, and the scientific activities are carried out under a branch of the Atomic Energy Technique Association.

Before concluding this short report, a few words about the Chinese medical system, medical education, and some aspects of a doctor's life might be appropriate. Medical care for China's 800-million-plus population is provided by 310,000–320,000 qualified physicians, 118 million "barefoot" doctors, and another 4.2 million paramedics. Bed-to-population ratio is 3.7 per 1,000 in the city and one per 1,000 in the countryside. China's leading hospital, with 560 beds and a 2700-outpatient clinic, has a recently increased annual budget of two million U.S. dollars. The salaries of the medical staff members, however, are still low and represent only 3% of the budget. "Barefoot" doctors work mostly in the cooperative medical service for China's rural medical care. The M.D.s are integrated into the country's hospital system etc., and no private practice exists. The monthly income starts at \$43 and can increase to \$242, with the average for a hospital staff member only \$60. A doctor's life appeared to be much less elegant than in western countries. He or she travels to the hospital by bicycle or bus because there are no private cars. Some doctors

may attend scientific meetings once or twice a year, but rail fare from Shanghai to Tientsin by first-class sleeping car costs about \$47, which makes travel still very expensive for them. Even though living expenses are not high by our standards, Engel's index (percentage of income spent on food) is very high. Those people who can save some of their income tend to buy first a black-and-white domestic TV set, which can cost as much as \$533. Although we met more than 3,000 M.D.s on this trip, we found only one therapist (trained in the United Kingdom) who wore a white shirt with a red tie.

During the proletariat revolution of 1966–76, the medical curriculum at the university was shortened from 6 years to 3½ years and was frequently interrupted. Last year, however, a 5-year course was restored to provide better education. In a syllabus of 4,000 hours, as many as 300 hours are devoted to the Chinese medical system, since the marriage of Chinese with western medicine is the final goal. The syllabus of internal medicine is 400 hours and includes radiologic diagnosis. Thirty hours are devoted to nuclear medicine.

During this very exciting trip to the Chinese medical communities, I took more than 700 photographs and filled three notebooks with my observations. I left, however, with the feeling that I had scratched only the surface of this huge giant. The people were always very friendly, and we were never deterred from visiting any part of a hospital, taking pictures of patients, facilities, or staff, or even asking embarrassing questions.

Our impressions closely parallel those of the 18th-century tourists to China, for, like them, we were astonished by the warmth of our welcome. Instead of the erstwhile horse or palanquin, however, we were provided with modern domestic cars named "Shanghai" and were always accompanied by an attentive guide.

To conclude, I believe that the world-wide community of nuclear medicine will be pleased to know that we have more brothers on the Asian continent who, several thousand years ago, created one of the first civilizations of the human race and who are now plunging enthusiastically into our specialty.