Clinical Chemistry in the People's Republic of China: 1985

Lilia Sun

In October 1985, as an appointed delegation leader for the People-to-People Citizen Ambassador Clinical Chemistry Program and AACC, I took 46 AACC members as delegates, their six companions, and two assistant leaders on a visit to the People's Republic of China for two weeks. The purpose of the visit was to exchange information between the two countries regarding clinical chemistry.

The delegates visited major medical centers in four cities, a biochemistry academy, reagent and serum institutes, and a large chemical manufacturer, and discussed problems of mutual interest. In each city, delegates also gave lectures and participated in roundtable discussions highlighting the current state of clinical chemistry in the United States.

Compared with six years ago, there is evident improvement in the variety of chemistry tests offered in the hospitals, and clinical chemical tests are beginning to be recognized as an important diagnostic tool for physicians. The variety of equipment is also greater, including both foreign manufactured and that manufactured locally. Clinical scientists are more aware of newer testing methods and are eager to explore and adopt the new techniques. Six years ago, medical-technology schools or clinical-chemistry departments/divisions did not exist. Today, they have appeared in large medical facilities. Large hospitals now perform open-heart surgery, and kidney dialysis is also available for more patients. Acupuncture as an anesthetic tool for surgery is no longer practiced (remember, during 1975, the Chinese slogan "Self reliance"). Newer acupuncture techniques are being introduced for muscle- and nerve-related diseases.

Many institutes are anxious to contract with foreign companies for joint ventures or technical exchanges for the manufacture of reagents, instruments, or diagnostic specialties.

In a few areas we observed, it seems that no improvements or changes have been made during the last few years. For instance, most hospitals still do not practice quality control in the laboratory, there is little routine instrument maintenance, and new instruments purchased from foreign countries often are not being installed or calibrated, owing to the difficulty of arranging for service from the original manufacturer. Screening tests and tests that are only semiquantitative are used in practically all clinical laboratories. This may be ascribable to a lack of instruments or reagents, as well as to small sample volumes (most samples are earlobe blood).

We first visited the Shanghai Institute of Biochemistry, which also was visited in 1975 (2). At that time research emphasis was on how to produce larger quantities of rice and fish products. Instruments were limited to 1940 vintage and Shanghai-made types. Today, the workers in this institute are doing high-tech research and development work; they are equipped with Beckman Protein and Amino Acid Analyzers and they also have other more-advanced equipment, including an Applied Biosystems DNA Fragment Synthesizer-380A. The institute now has much larger funding, both from government and the World Health Organization.

We also visited Shanghai's second Medical College, Ruijiang Hospital, for the second time (2). The hospital now has an emergency laboratory, a school of medical technology, and more clinical laboratory equipment. Although it displayed somewhat sophisticated instruments, most of their routine chemical tests are still done by manual or semi-automated methods.

The Shanghai Institute of Biological Products is one of the largest producers of biological products in the People's Republic of China. Research and production for clinical diagnostics are both in one building. Enzyme reagents are not yet available. Routine chemistry kits for tests such as urea nitrogen, creatinine, and glucose, as well as some of their standards (aqueous), are displayed in various rooms. Immunological products such as reagent kits for hepatitis, IgM, IgG, and RIA (T3, T4, etc.) are also on display. Lyophilized porcine serum control material is being prepared.

At Wuxi, we visited the Nuclear Medicine Institute, Wuxi's "number one" hospital. A Canberra Multichannel...
Analyzer for elemental analysis is used, but for analysis of hair instead of blood. A Picker Gamma Camera and a Chinese computer are being used to study heart disease and brain scans. Other instruments we saw included American Optical's Histostat, Perkin-Elmer's spectrophotometer, and Varian's high-performance liquid chromatograph with a radioactivity detector. This institute performs many sophisticated assays, including those for choriogonadotropin, triiodothyronine, thyroxin, thyrotropin, CEA, α-fetoprotein, and cortisol. The kits are obtained from Shanghai's Beijing Hospital.

Our first visit in Nanjing was to the Nanjing Municipal Drum Tower Hospital, the largest municipal hospital, located in the heart of the downtown area. Their laboratory is equipped with both automated and semi-automated instruments. As in other hospitals, manual methods are still in evidence in all of the four laboratory rooms. Both Western and traditional medicine are practiced in this hospital. Very little quality control is done in this large facility.

Another large hospital we visited in Nanjing was the Jiang Su Provincial People's Hospital. This teaching hospital has several foreign-made instruments. Despite the heavier load of laboratory testing and larger volume of patients, most laboratory tests are for screening. Vacuum tubes, one of the delegates, were intriguing to the Chinese laboratory staff, because they have not yet been introduced to this large hospital. The laboratory staff mentioned that most of the time the laboratory can get money for instruments but not for reagents. There is also insufficient training for operators of the instruments already in place, and the practice of quality control is rare. Especially needed is monoclonal antibody (in the Beijing area only polyclonal material is used). Tests for hepatitis are needed and, recently, the first case of acquired immune deficiency syndrome was reported (in an Argentinian).

Beijing Union Medical College Hospital is one of the hospitals in the institution that the Chinese call the "Harvard of China." It has improved somewhat during the last six years (2). The SMA 12/60 is now running three channels: urea nitrogen, creatinine, and CO₂ (it was only urea nitrogen in 1979). Other tests are done with a Baker Encore. An Ames instrument is used for Ca and PO₄, another Ames instrument for enzymes. A fluorometer is used for coagulation test. The thyroid panel is done with an Ames Gamma Counter; the Beckman liquid scintillation counter is used for others. Beckman electrophoresis systems are being used routinely for protein as well as for isoenzymes, lipoprotein, and hemoglobin. The laboratory has certainly improved the equipment as well as the quality, but capillary (ear-lobe) blood sampling is still preferred because of reluctance of patients to have venipuncture. Styluses and needles are "sterilized" in open containers of 70% alcohol.

The First Teaching Hospital of Beijing Medical University is a similar six-year teaching hospital. They do little research because of the heavy workload. The clinical-laboratory tests were a mix of older manual procedures with some limited automation in high-volume tests. There were several foreign-made instruments in place. Because this hospital has a hematology research project ongoing, particularly on hemoglobin "G," they seem to have been provided with more semi-automated hematology instrumentation than usual. The director, Dr. Weng, mentioned that she has developed a glutamyltransferase test for screening liver function; ear-lobe blood is used, and the test requires only 30 min. If the test is positive by visual reading, it will be confirmed by a quantitative method. When questioned about what they use as a control material, the answer was "experience."

The Beijing Chemical Works invited a few of the industry representatives in our group for a conference one afternoon. During the tour of the quality-control and testing laboratories, various pieces of sophisticated equipment were in evidence, such as Perkin-Elmer's Elemental Analyzer, Hitachi's H-500 Electron Microscope, Beckman's ACTA spectrophotometers, and Jarrell Ash analyzers.

Later, at the discussion session, we learned that this institute started production of diagnostic products a year ago. They stressed that clinical enzymology is a technique new to the institute, but they have plans to manufacture the purified enzymes soon. When we toured the production area for routine clinical diagnostic kits, we found that thymol turbidity kits and visual color standards are still being produced. Older colorimetric kits for aspartate aminotransferase and glutamyltransferase are packaged in another area.

Beijing Chemical Works, one of the largest manufacturers of organic and inorganic chemicals in China, has more than 4000 employees, and it manufactures approximately 1500 different chemicals. Besides distributing the products nationwide, they export chemicals to Southeast Asia, Australia, and Eastern Europe. Production increases by approximately 10% each year.
The National Vaccine and Serum Institute was visited by Dr. Robert Ritchie (he also was one of the 1979 delegates) and two other delegates. This institute is also anxious for new technology on hepatitis, AIDS, and other new popular diagnostic tests.

The reader must remember that, over the centuries, the Chinese people have endured unspeakable hardships, natural, self-inflicted, and probably worst of all, at the hands of other nations. The result has been a remarkably hearty people who have—in spite of marginal nutrition and housing, arduous work, epidemics, and often nonexistent medical care—come into the 1980s with a life expectancy for men of about 71 years and for women of about 75 years—which compares very favorably with the latest U.S. statistics announced in January. It is not surprising, therefore, that “improved” medical care and research in the health sciences area is not a priority issue. What is a high priority is national and personal pride—in that order. By Western standards, China and the Chinese may seem far behind us. But if we are mindful of the travail and obstacles that faced the Chinese after World War II, the rate of progress in Western countries affords less reason for self-congratulation. Perhaps the most dramatic aspect is that, in spite of the stresses placed on the Chinese, they present the visitor with a pleasant face, honesty, and a pride in themselves that other nations could well emulate.

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References