Clinical Chemistry in the Peoples Republic of China Today

Ed. note: For some months now, the Editorial Office has been receiving the English version of the Chinese Medical Journal, published bimonthly by the Chinese Medical Association, the most recent issue (New Series vol. 1, no. 5) having been received in December. This well-illustrated publication gives interesting insights into Chinese medicine. In this report, an AACC member summarizes a recent visit to mainland China. Interested readers may obtain more information on this subject from China Medicine As We Saw It, an anthology of articles by scientists who have recently visited mainland China, published by the Fogarty International Center, NIH, Bethesda, Md. 20014, and available on request (limited number). Another intriguing description of medical education and practice in that part of the world appears in a series of two articles on India by Elmer Bendiner, which appeared in the May and September 1975 issues of Hospital Practice.

In August 1975, I visited the Peoples Republic of China—my first visit "home" in 26 years. While there, I talked with scientists in the biochemical and biophysical institutes and at a cancer-research hospital, observed surgery during acupuncture anesthesia, interviewed doctors working on farm communes, and presented a series of seminars on radioimmunoassay, nuclear counting, and spectrophotometry. I also had an opportunity to exchange ideas with scientists and learn about the new medical-research programs in China.

It was a very informative experience. Most impressive was the self-reliant attitude of the Chinese. Although foreign technologies are welcome in China, they do not intend to depend on them.

In China, political thoughts come first; other considerations, including business, follow. "Serve the people" dominates thought and activity. Chairman Mao's pictures and statues spur China on to greater achievement.

My first tour was to the Shanghai Industrial Exposition in Shanghai, where Shanghai-made clinical instruments were on display, such as single-beam UV spectrophotometers, pH meters, gas and liquid chromatographs, EEG, blood-gas analyzers—more than a dozen of them were in this exhibit on the exposition floor.

I was surprised that complicated clinical instruments could be built in Shanghai. Recalling 26 years ago, I couldn't remember the colleges ever having any such instrument that had not been imported from a foreign country. The instruments I saw in the exposition were not as sophisticated as the ones we have here in the United States. In another area of the exposition, Chinese medicines (herbs) in the form of tablets were displayed. I remembered that when I was a child my parents fed me preparations from plants when I was ill—with always a bitter or unpleasant taste. The old Chinese saying, "Good medicine is always bitter," no longer holds true with this improvement in health remedies.

I visited a large vegetable farm commune in a suburb of Shanghai. The farm has 4300 families, with 28,000 people living in seven units. Besides large apartment complexes and schools up to 12 grades, they also have a 40-bed hospital with a clinical laboratory, pharmacy, and outpatient clinic. Doctors and nurses are on duty 24 hours a day. Usually doctors visit the patient in the patient's home. Doctors are assigned on a rotating basis; they have to work in the communes one to two months a year. Consequently, the Chinese government has achieved an outstanding goal, the aim of which is twofold: (1) it has permitted the doctors to work directly with the farmers and give them medical treatment; (2) it has also made the doctors realize that farmers have an important task in serving their country. The hospital is only for minor diseases or obstetrics. For major cases, patients are moved to the large city hospital. Prenatal care was unheard of on the farms 26 years ago. Now, women from the farm regularly go to the clinic for a checkup. The laboratory is equipped with common instruments for CBC, urinalysis, and microbiology. I
I was invited by Drs. K. Lin and W. Y. Chao from Chun Shan Hospital (about 500 beds) to tour their facilities. I had an opportunity to view two surgical procedures in which acupuncture anesthesia was used. One of them, rather complicated, was ureterolithotomy. During this surgery, the patient was alert and wide awake. When I took a picture of him, he smiled and said "thank you." I toured the hospital clinical laboratories, and the director of the laboratory told me that they are doing most routine clinical chemical procedures as well as some special ones: phenotyping electrophoresis, isoenzymes, urinary hormones, blood gases, etc. Most of the equipment I saw in their laboratory was of the basic sort; some instruments were made by the hospital instrument shop, some were old ones from 1940–50. Radioimmunoassay is done in the Nuclear Medicine Department. A single-well gamma counter with digital readout, built by the hospital, is being used for carcinoembryonic antigen assay and thyroid-function tests. I did not see any fully automated chemical instrument in any of the laboratories that I visited.

The laboratory in Shanghai Chun San Hospital makes its own reagents. Chemicals are prepared and supplied by other institutes such as inorganic and organic institutes, biochemical institutes, vaccine and serum institutes, etc. I believe that no reagent test kits like those in the United States are marketed in the People's Republic of China.

From what I have heard and observed, pathologists are not necessarily the ones in charge of the clinical laboratory in China. The laboratory is usually supervised by a specialist; i.e., a clinical chemical laboratory would be directed and supervised by an experienced clinical chemist, a radioimmunoassay laboratory by a nuclear medicine physician.

In Shanghai, I visited Biochemistry Professor C. W. Shen, of the Institute of the Chinese Academy of Sciences. Prof. Shen, educated in Canada and the United States, is the director of the institute. The institute has three main divisions: Research, Biochemical Reagents and Drugs, and Instrument Shop.

The research division is doing much biochemical research, on subjects such as insulin, amino acids, enzymes, rice germination, and immunology. At the Insulin Research Laboratory I learned that it was in China that insulin was first synthesized by a chemical method six years ago. Now they are working on the relation of insulin to biochemical, physiological, metabolic, and related problems.

The second division produces amino acids and derivatives, nucleic acids and related substances, coenzymes, proteins, enzymes and their inhibitors, carbohydrates, and steroids. These biochemical reagents have immediate practical application. An example is the use of luliberin (luteinizing hormone-releasing factor) to increase the supply of edible fish. They have found that some edible river fish do not lay eggs unless they are in a pond. Therefore, people put the fish from the Yangtze River into a fish pond and feed
them with luliberin. Within 10 to 20 hours the fish start to produce young. At this rapid reproduction rate, the large demand for fish can be supplied.

When I traveled to Peking, I met my colleagues from Ohio State University, and also had an opportunity to see a high-school friend. She is now also a clinical chemist and country doctor, working in Northeast China with a special research interest in asthma, mostly in older persons. She is experimenting with a herb treatment for asthma that is very successful.

Peking University is situated on a beautiful campus and is one of the largest and oldest schools in China. I was the guest of professors from the Biochemistry Department and the Physics Department. I learned that they are experimenting with certain programs that cover a variety of fields over a three-year academic period. In order to shorten one school year, they do not repeat and overlap courses. Courses are specialized and concentrated in particular fields. The summer vacation is rather short (4–5 weeks). For science and engineering students, they combine equal parts of theory and practical experiments by letting students actually work in the course-related shops. Students in these shops have built the schools’ computers and instruments. If three years are not enough for science and engineering majors, they extend their learning period until the student is ready to finish his major. I understand that there is no degree granted to anyone, but rather an evaluation and assignment. The recently built university library contains a great deal of Chinese history and culture, including reference books on medicine and pharmacology dating back two to three thousand years.

I had a chance to join three doctors in a tour of a Tz Tan cancer hospital. The director of the research lab, a very knowledgeable woman doctor, told us about their research projects, one of which is population mass screening for the liver cancer that occurs among people living in the farm communes.

They have been using the “rocket” electrophoresis method to assess \( \alpha_1 \)-fetoprotein. Because the electrophoresis system is a very small system, it is easily transported to the commune hospital laboratory. Because there are hundreds of communes in China, the screening data from farms are massive; more than 400,000 cases are now on file. A report on this project was published and reported at a European cancer meeting last year. A project on esophageal carcinoma is also in progress. One doctor demonstrated how esophageal samples are collected from volunteers. He used a very efficient, yet very simple device. This study has also been reported and published.

At the Peking Biophysics Institute I was shown the prototype of a liquid-scintillation counter by a group of scientists from the institute (Figure 4). The instrument is being built by 30 members from the physics, chemistry, and biochemistry departments and the hospitals. I was told that it has taken them 20 months to complete this instrument from the drawing-board stage to the evaluation stage. The instrument has a background of 22 cpm in the \( ^5\)H channel and 24 cpm in the \( ^14\)C channel. Their \( ^5\)H counting efficiency is 54.4%, their \( ^14\)C counting efficiency 92.8%.

I went to the Chinese Medical Association headquarters and met with Dr. Tow, the Vice Secretary, and Dr. Chen, the Director of Foreign Affairs. As a representative of Dr. Martin Rubin, President of IFCC, I delivered a copy of the IFCC annual report and newsletter to Dr. Tow. We discussed the state of the art of clinical chemistry and various related organizations in the United States and abroad. It was there that I learned about the Chinese method of treating patients with burns over 95% of their body by use of traditional Chinese herbs as well as Western drugs, by mouth and as dressings. Equally important are the spiritual persistence, years of experience,
and patience of the nurses and doctors. I learned more about acupuncture applications, such as single-needle acupuncture anesthesia in pulmonary resection, and about deaf mutes cured by acupuncture treatment.

In a group discussion, I had an opportunity to meet a few scientists from the Drug and Biological Products Control Institute. They have done many research projects dealing with the relation to clinical chemistry of patients, traditional herbal medicine, and metabolic functions after the patient has taken certain herbs, and with discovering the exact essential and active compound in different herbs. Chinese doctors work closely with farmers and workers. Many of the doctors are well-trained, college science graduates with two years of medical training followed by extensive experience, literally "in the field." They work as laborers in between doctoring, combining first-hand factory or farm job knowledge with their academic training.

All these people that I met seem to have one goal: "to serve the people." Self-reliance is their slogan; they always manifest a hardworking and eager spirit and are proud of their work.

The "barefoot doctors" are actually technicians who have received six months' specialized training after completing one or two years of junior college. They are able to do some basic examinations and perform simple laboratory tests after much observation and practice under supervision.

In the Peoples Republic of China, Chinese herbal medicine and acupuncture are undergoing extensive clinical use and research. Western-trained doctors and herbal doctors are working together and combine their best talents in teaching, research, and patient care. This is contrary to the situation that existed 26 years ago when herbal and Western medicines never mixed together.

The current upsurge of interest in acupuncture in the United States is generated by increasing reports from scientifically-trained Western observers visiting China. As one Chinese doctor told me in Shanghai, "Acupuncture is a very complex subject to study and understand, especially for those without any knowledge of the Chinese old science culture." He also emphasized that even in China, the science of acupuncture is still not completely understood, and more intensive research is required.

China has a great future in clinical chemistry. Perhaps someday, China will find the answer to the number-one enemy, cancer.

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