

Chinese Medicine: Old & New

A blend of modern and traditional medicine has proved cost-effective in treating China's one billion people

BY CRISTINE RUSSELL

Five years ago, Kao Tiansue lost both hands in an explosive accident. Today, the 25-year-old man sits happily on a bed at the Sixth People's Hospital, demonstrating the ancient Chinese art of calligraphy.

He has a new hand, reconstructed by surgeons in a grueling 12-hour operation last October. It was fashioned from two of Kao's own toes surgically attached to a prosthetic device implanted in his wrist.

While it's far from the real thing, this clawed hand is sensitive to touch—unlike a totally artificial one—as well as agile enough to paint the Chinese characters of a popular poem. Kao was “pessimistic” before the operation about the possible outcome, but now he is so excited he wants surgeons to replace his other missing hand.

A second patient, a peasant who also lost both hands in an explosive accident, underwent a similar operation last month. The surgery was even more difficult, involving the attachment of three toes to a metal “metacarpus”—or artificial palm—to create a new hand that doctors hope will prove even more functional.

The two cases are believed to be the first of their kind in the world. The chief surgeon, Yu Zhongjia, said that he was not aware of any work elsewhere in which a hand had been reconstructed in this manner, although surgeons have reconstructed individual fingers.

The Chinese work is as yet unpublished in the medical literature, but U.S. doctors—informed of the progress—agreed that it appears to be unprecedented. “This would be new. To my knowledge there are no other cases,” says James W. May Jr., director of hand surgery in the division of plastic reconstructive surgery at Massachusetts General Hospital.

The Chinese success in reconstructing a crude human hand follows pioneering efforts in reattaching hundreds of severed arms, legs, feet and fingers. While the Chinese have gained an international reputation for their work in this field, medical progress in general has fallen far behind that of their Western counterparts. Many areas are incomparable, however, since China has produced its own special blend of traditional and modern medicine.

A 15-day, five-city tour by U.S. science journalists provided an up-to-date survey of China's unusual system of medical re-

search and health care and the interwoven threads of political ideology, economics and centuries-old folk customs.

After a decade of disruption engendered by the Cultural Revolution of 1966, Chinese medicine—like all of science—is undergoing a renaissance stimulated by a new government campaign to modernize the country by the year 2000.

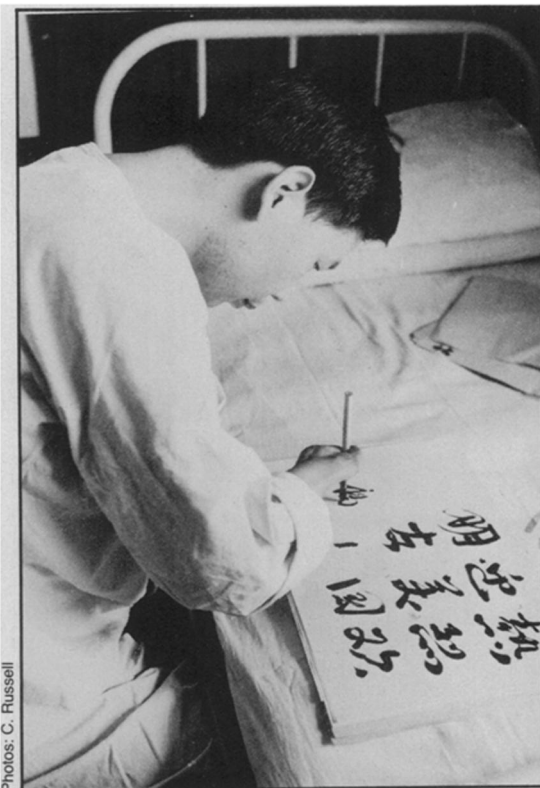
The renewed emphasis on science and technology is accompanied by an unabashed eagerness for exchange with the rest of the world, particularly the United States. Newly established relations between the two countries opened the way for cooperative efforts in a range of scientific areas, including a broad health agreement that was signed in June and finalized last month.

Joint research activities are being planned initially in infectious and parasitic diseases, cancer, heart disease, public health and medical genetics, with later cooperative efforts in family planning, pharmacology, environmental health, organ transplantation, biomedical engineering and mental health.

While China will undoubtedly benefit considerably from U.S. technical expertise and equipment, it also has something to offer, particularly in the medical area. Presidential science adviser Frank Press, one of the first Carter administration officials to visit China, emphasized this in an interview: “There are a number of important health experiments in China that can be important for the whole world. They lead the world in microsurgical attachment of limbs. In cancer there are extremely important phenomena we would like to know about. Their whole health care system will be extremely important for other developing countries and their traditional medicine could make an important contribution to new drug development.”

John H. Bryant, a Department of Health, Education and Welfare official who was instrumental in setting up the health exchange protocol between the two countries, was similarly enthusiastic about Chinese health care, particularly the “cost-effective approach.”

As an expert in international health in developing countries, he's been amazed at what the Chinese have been able to accomplish with so little. Bryant estimated China's health care expenditures to be only \$4 to \$20 a person each year, as compared with the \$800 per person spent an-



Calligraphy by “hand” from grafted toes.

nually on health in the United States. Yet China has still been able to reduce malnutrition dramatically (Western observers have seen little evidence of the undernourishment commonly found in other Asian countries), prevent many once-common infectious diseases and improve health care delivery to the largely rural population.

Here is a closer look at some of China's medical accomplishments—and problems—as seen by visiting reporters and other Western observers:

LIMB REATTACHMENT

The Chinese were not the first to succeed in reattaching a severed limb. That medical honor went to Boston doctors at Massachusetts General Hospital in 1962, when they saved a 12-year-old boy from losing an arm severed by a freight train. U.S. work in this area moved slowly after that, although renewed interest has cropped up in recent years. Meanwhile, the Chinese surgeons jumped ahead, reattaching limbs and fingers with surprising success, considering their less sophisticated surgical equipment. Industrial accidents provided a ready supply of subjects, and the Chinese went on to set their own medical records.



Patient has recently had toes attached to reconstructed hand. Three former patients (inset) provide graphic proof of successful limb reattachment.

At Shanghai's Sixth People's Hospital, the leading center, a limb was reattached 36 hours after being severed in a diesel-engine accident in the countryside. Doctors were aided by the December cold, which helped keep the peasant's forearm viable while he traveled to the hospital.

A total of 287 operations to reattach limbs were done at this hospital between 1963 and 1978, with an 86 percent survival rate, according to surgeon Yu. From 1966 to 1978, 238 operations to reattach severed fingers were conducted — more than half of them successful. Since 1973, when the surgical microscope was introduced in China, the survival rate for reattached fingers has soared to greater than 90 percent, he said.

In addition to survival, doctors assess success on the basis of four types of functioning: "working ability," "range of joint motion," "sensation" and "muscular power." Yu said that more than 60 percent of the hospital's patients had good functional recovery, with about one-third able to resume their original jobs.

He passed around somewhat gruesome before-and-after snapshots of accident victims and the subsequent surgical successes. Far more dramatic, however, was the arrival of three former patients who demonstrated in person just how successful their operations had been.

Chen Yenfeng shook hands forcefully with her somewhat shortened left arm. She was a former cancer patient whose arm had been reattached below the shoulder following major surgery to remove a "giant cell tumor."

Qin Longchong, whose severed hand was saved six years ago after a machine shop accident, had an even stronger grip. He's regained full function, although his fingers "feel cold" when he washes clothes in the wintertime.

Chin Chungyen hopped nimbly around on a foot that was cut off in an industrial accident 14 years ago. "I am normal now," he proclaimed proudly.

TRADITIONAL MEDICINE

Legend has it that the traditional therapies of herbal medicine and acupuncture date back to a prehistoric chieftain of the Yi tribe in eastern China.

Today these ancient folk remedies are being updated throughout China, as scientists seek new or improved uses for them, as well as modern scientific answers as to how they do — or do not — work.

Acupuncture has traditionally been used as a cure-all for a variety of illnesses, but Chinese researchers are making the most progress in researching its possible pain-killing effects on surgery patients (see page 296). Some studies have concluded that it is "safer and less liable to incur complications" than Western anesthetic drugs, which put patients "to sleep." But the needle technique is valuable for another reason: It is an economical alternative.

The Chinese generally cannot afford to purchase the complicated and expensive equipment that has become standard in U.S. operating rooms. Machines to monitor vital functions during a lengthy operation are crucial if a patient is unconscious under anesthetic medication. The relatively simple administration of acupuncture analgesia allows the patient to remain awake instead.

Herbal medicine preparations offer a similar advantage: They are readily and cheaply available from home-grown Chinese plants, in contrast to the more costly manufactured pharmaceutical products developed in Western countries.

In response to former Chairman Mao Zedong's directive to merge traditional and modern medicine, Chinese researchers are attempting to sort through the myriad herbal concoctions for signs of true medical activity. At the Shanghai Institute of Materia Medica, for example, scien-

tists have been seeking drugs for cancer, birth control, heart disease, hepatitis and tropical diseases. They have isolated about 200 principal ingredients — 30 of them with novel structures — from more than 80 types of herbs. Synthetic versions were developed in 12 cases and more than 30 compounds have been put into production and use.

Investigators at the Shanghai Institute of Organic Chemistry studied an ancient Chinese abortion potion and found an active chemical called "trichosanthin." It has been synthesized and used on about one million women desiring late-pregnancy abortions.

At the Beijing Institute for Cancer Research, patients have received a water extract of Chinese medicinal herbs and ground poisonous toads, in addition to Western therapeutic drugs. Doctors there credited the Chinese herbs with "curing" some urinary and gastric cancers, but the preliminary animal and human evidence presented to reporters was not convincing.

Combined use of traditional and modern drugs for treating heart attack victims is also underway at the Cardiovascular Institute in Beijing. Doctors at the Fu Wai Hospital there maintained that the combination appeared to be more effective than Western medicine alone.

Wu Yingkai, a sophisticated, English-speaking scientist who once studied in the United States, noted that the reexamination of traditional Chinese medicine has been valuable for Western-trained doctors like himself. "Ten years ago, I thought it was rubbish ... I would not look at this business," he said. Now Wu is convinced that many herbal preparations deserve a place in medical care.



The 70-year-old physician is not a total convert, however. For high blood pressure patients, he still prescribes modern drugs to control the hypertension itself, adding herbal medicine to control symptoms like headache.

Does the herbal treatment really work better than aspirin? he was asked. Wu responded diplomatically: "It's useful. You cannot say fish is better than steak."

CHANGING DISEASE PATTERNS



The ravages of war, famine, floods and infectious diseases once took a heavy toll in death and disability among China's enormous population. But the government's recent achievements in developing a better health care system for the country's peasant population as well as increased emphasis on preventing diseases have greatly improved the average Chinese citizen's prospects for a longer and healthier life.

As infectious diseases have decreased, however, they have been replaced by the chronic "diseases of civilization" — heart disease and cancer — which are the number one killers in advanced countries like the United States.

There is not yet a national system for keeping such statistics, so the Chinese health picture is still a jigsaw puzzle with many missing pieces. But Cardiovascular Institute director Wu presented figures for the past twenty years indicating a "marked change" in disease patterns.

In "old China," he said, "acute infectious disease, tuberculosis, [and] malnutrition were prevalent. The average life span of the people was about 40 years."

Since the communists came to power in 1949, maintained Wu, "the living condition of our people has been progressively improved. The life span has been markedly extended [to more than 60 years]. Acute infectious diseases and tuberculosis are under control. As a result of these changes, cardiovascular disease has become one of the most important health problems in our country."

Wu said that in many provinces and districts, "cardiovascular disease" — heart disease and stroke — now account for 40 to 50 percent of all deaths. This compares with about half of all deaths in the United States.

Statistics gathered in the Shihchingshan

Wu Yingkai, showing heart disease statistics. A cancer ward at the Tumor Institute in Guangzhou, where nasopharyngeal cancers are at epidemic proportions.



district of Beijing, for example, showed that heart disease was the third leading cause of death in the mid-1950s, but by the 1970s it had become number one, increasing by 40 percent during that time.

The rate of stroke doubled, moving it from the seventh cause of death twenty years ago to second place today. The cancer death rate more than doubled, making it the third leading cause of death in this district. But during the same period of time the death rate from infectious diseases such as typhoid, cholera and diphtheria dropped dramatically — to about one-tenth that of the mid-1950s.

Wu called these "very crude figures" and admitted that improvements in diagnosis may account for some of the increases. He also noted that death statistics from other areas of China sometimes varied considerably: One survey found stroke to be the leading cause of death in 8 of 12 Chinese cities, while heart disease led in two and cancer in the other two. Wu could not account for the differences.

Finding an explanation for why disease occurs where it does is far more difficult than keeping track of it. Chinese investigators, however, are increasingly attempting to track down environmental or genetic causes that might be responsible for differences in disease patterns between geographical areas.

Cancer is of particular interest, since

different forms of this disease are far more prevalent in certain areas of the country. For example, doctors at the Zhongshan Tumor Institute in Guangzhou (Canton) are studying cancers of the nose and throat ("nasopharyngeal"), which strike in epidemic proportions in southern China.

One area of investigation is a virus (the "Epstein-Barr" virus) that apparently infects people in the Guangzhou area from childhood into adulthood at rates higher than those in Beijing, where nose and throat cancers are less common. Researchers are also looking at environmental factors, such as trace elements in the food and drinking water, that might play a role in cancer development. "We haven't reached a conclusion as to whether ge-

netic factors or environmental factors such as life-style" are responsible, said Chen Hwa-shieh.

In the Shanghai area, scientists are seeking clues to help explain the high incidence of liver cancer, while other scientists are studying the strikingly high levels of cancer of the esophagus in Linxian County, a rural area inland from Beijing and Shanghai. In this country, the esophageal cancer rate is about 50 times that of the United States and equal to that of all cancers found in Shanghai itself. There are some signs that food preparation methods may be at least partially responsible, with "pickled vegetables" under suspicion (SN: 11/19/77, p. 343). Visiting U.S. researchers took two samples of this favorite Linxian dish home and found both to be "positive" for the Ames test, suggesting that cancer-causing substances may well be present.

Nitrates in the water, vitamin C deficiency and a lack of the trace element molybdenum in the soil are other possible suspects for the high esophageal cancer rate.

Another cancer of increasing concern in China is lung cancer, which has been on the upswing in areas such as Shanghai. Until recently the Chinese have ignored evidence linking lung cancer with cigarettes, but the government launched an anti-smoking campaign earlier this year.

PUBLIC HEALTH CAMPAIGNS

With limited resources available for treating disease, China has emphasized nipping it in the bud, before it is in full bloom. Disease prevention efforts, which are also attracting more attention in the United States, have depended to a large degree on "barefoot doctors"—paramedics—working with hospital-based medical doctors, with the socialistic political system also playing a critical role.

To help prevent heart disease, health care teams have been established in factories, communes and other institutions throughout the country in an attempt to identify and treat high blood pressure, an important risk factor for heart disease.

Barefoot doctors also have been active in mass screening for cancer. And in Linxian County, for example, they have encouraged peasants to avoid eating suspicious foods and to add vitamins to their diets in hopes of preventing esophageal cancer.

In the past, well-orchestrated prevention efforts have been launched to eliminate venereal disease and combat poor hygiene practices, as well as reduce the numbers of disease-carrying pests such as rats and flies.

Perhaps the most crucial public health campaign currently underway is a push to control population, a key element in China's effort to catch up with advanced countries by the end of the century. With one billion people — one-fourth of the world's population — as well as limited agricultural land (China is only slightly larger than the United States), China is intent on reducing the annual birth rate to less than one percent.

Again, although there are no firm statistics, experts estimate the current rate of growth to be between 1.5 and 2 percent. The population has roughly doubled in size in the thirty years of communist rule.

The latest "rules and regulations" outlined by the government would limit families to only two children, with intervals between children of at least four years. In addition to persuasive measures to encourage compliance, a system of rewards and punishments has been instituted for those who do or do not obey.

Xie Gundie, a "barefoot" doctor who heads the women's brigade at the July 1 People's Commune outside of Shanghai, explained that those families who have only one child now receive an additional monetary bonus each month for food (4 yuan or roughly \$2.50 a month, which doesn't sound like much but may be as much as one-tenth of many workers' incomes).

A family of three may also be granted a private plot equal to that of a family of four or receive similar housing privileges. And a single child may also receive advantages in education and health care.

Should a woman become pregnant with

a third child, she is urged, said one commune member, to get an "artificial abortion. Very few persist. Then they will be punished."

Xie, a forceful young mother of two, said that starting in March of next year, parents having a third child will receive a 10 percent reduction in wages and "won't enjoy free-of-charge schooling and care."

At the July 1 Commune, there had been 120 births and 50 abortions by August of this year. The commune is also keeping track of the birth control measures used by its 3,000 married women of child-bearing age (sexual activity among unmarried women is still proscribed and said to be "very rare").

While birth control pills (the most common is simply called "Oral Contraceptive Pill No. 1") are widely used in urban areas, Xie said that the IUD (intrauterine device) is the principal birth control device in rural areas like this.

In what California birth control expert Carl Djerassi has called the Chinese "con-

used there for cooking. Further investigations found men to be more susceptible than women, and animal experiments in 1971 confirmed that the responsible agent was gossypol.

Experimentation on 4,000 healthy men suggests that gossypol may be more than 99 percent effective in controlling fertility. The "Chinese Medical Journal" reported last November that it usually took about two months to induce temporary infertility and about three months for the sperm count to return to normal after the pill was discontinued. Reported side-effects included short-term "weakness," appetite changes, nausea and "some decrease in libido" (sex drive apparently recovered following "reassurance or symptomatic treatment").

Concluding that gossypol was "reliable and relatively safe," the study called it an "agent of promise." Follow-up research is continuing, but some observers wonder whether men in the United States—or any other country—will be eager to accept what has traditionally been a female responsibility.

Huang Liang, a scientist at the Beijing



Play at factory day-care center. New rules would limit families to two children.

traceptive supermarket," there are also a variety of other available measures, from long-lasting injections to "vacation pills" for couples living in different parts of the country. The less stringent safety requirements of China allow for more rapid testing and distribution of new drug products.

One of the more recent developments is a male birth control pill undergoing final testing in China. The active ingredient is a chemical called "gossypol" (SN: 3/3/79, p. 136), the birth control potential of which was discovered after peasants in one province suffered increased infertility. Chinese scientists finally located the culprit — the crude form of cotton seed oil

Institute of Materia Medica, concluded an informal discussion on this point by noting that the side effects of the male pill appeared to be less than those seen with oral contraceptives now taken by women. "Why not let the men take it?" she asked.

Whether the birth-control campaign succeeds according to plan will be one of the many areas of Chinese medicine that the rest of the world will be watching with interest. If it should not succeed as soon as China's new leaders had hoped, it won't be for lack of trying. As with the other ambitious science and technology goals, the main constraint will be the Chinese attempt to accomplish so much in so little time. □