

# The Great Struggle Against Carcinoma

China emphasizes massive early detection and data collection programs, but basic research lags

BY JULIE ANN MILLER AND GREGORY McQUERTER

Last fall a group of U.S. medical scientists stood in a courtyard in north China's Taihang Mountain Range and watched two schoolgirl sisters dramatize the early warning symptoms of a cancer prevalent in that area. One stanza of their singing skit, epidemiologist Chou-chik Ting of the National Cancer Institute recounts, went like this:

*Esophageal cancer must be thoroughly conquered.*

*The pernicious influence of the Gang of Four must be wiped out.*

*Putting prevention first is very important.*

*We prevent and treat cancer for the revolution.*

The song exemplifies the close opposition of political and medical issues in China. Not only does it stress the necessity of combatting disease epidemic in the rural community, it also reflects a change in China's health policy. In past years China has improved the collective health of its farmworkers with basic advances in sanitation and treatment. Now, after the fall of the "Gang of Four," interest is returning to largely neglected basic research.

Ten U.S. cancer specialists, including Ting, visited China for a month to observe and discuss cancer research and treatment. "Because Chinese physicians seldom publish within their own country, and never outside, one must go to China to learn of activities there in medical research," explains one member of the group, Robert W. Miller, head of the clinical epidemiology branch at the National Cancer Institute. The visit was sponsored by the Committee on Scholarly Communication with the People's Republic of China and hosted by the Chinese Medical Association.

Although some members of the American group admit to expecting no more than a staged tour of kindergartens and ballets, once there they received more medical information than tourism. And that information included both new knowledge about cancer and tantalizing glimpses of a massive data collection program that might answer crucial questions by analyzing "natural" experiments. Statistics on large numbers of people who do not often move individually from one community to another can provide insight into foods, customs, soil conditions and



Chou-chik Ting, National Cancer Institute

"Barefoot" doctors (in white coats) take blood samples for liver cancer screening.

viruses that may relate to specific cancers.

The independence of eastern and western culture has for millenia spawned independent discoveries in many fields. Cancer study is no exception. For example, the visitors to China learned that in steel mills there, coke-oven workers have a high risk of lung cancer. That result agrees with findings in the United States.

Another independent discovery is the uneven geographic distribution of different types of cancer. While the U.S. cancer institute was mapping cancer mortality county-by-county (SN: 5/3/75, p. 286; 1/15/77, p. 38), the Chinese were making similar maps, commune-by-commune (A commune has 8,000 to 100,000 people). In both countries, for example, lung cancer varied dramatically, suggesting unidentified environmental carcinogens in locales other than urban areas, Miller reports.

Massive screening programs for early detection of cancer impressed the visiting scientists. They attribute Chinese emphasis on screening programs to two political forces. The first is enthusiasm for mass activities, particularly benefiting the peasants. "The Great Wall, the Red Flag Canal and the Great Struggle Against Carcinoma are all part of the same approach," says Miller. "The emphasis is on great social programs instead of person-by-person solutions." The other political incentive is Mao Tze-tung's health teaching, "Put prevention first." Because Chinese cancer experts generally believe cancer has multiple causes that will be difficult to identify, they have translated "prevention" into early detection.

Ingenious simple techniques have been invented in China to screen millions of people for early signs of cancer. A tube with a net-covered balloon on the end is the instrument for detection of esophageal

carcinoma. Where that cancer is a major killer, in the mountainous regions bordering on Ho-nan, Shen-si and Shan-si provinces, paramedics lower the tube down a patient's throat and then inflate the small balloon. When the balloon is pulled out slowly, it carries mucosal cells that are examined under a microscope. About 100,000 people have been tested by this method.

Another screening test, used extensively in central China, is a blood test for alpha-fetoprotein. High levels of that protein are an early indication of liver cancer. The small tumors uncovered by this method can usually be removed surgically. Paramedics also use mirrors to scrutinize sinus areas for nasopharyngeal cancer, which attacks thousands in south China.

Although he calls the early detection programs "remarkable," Henry S. Kaplan, who was chairman of the visiting delegation and is director of Stanford University's Cancer Biology Research Laboratory, points out that this screening is currently applied to only a small part of the population. Kaplan said in a panel discussion that he felt extrapolating the model programs to the entire population, in its sheer enormity, is a feat beyond China's capability.

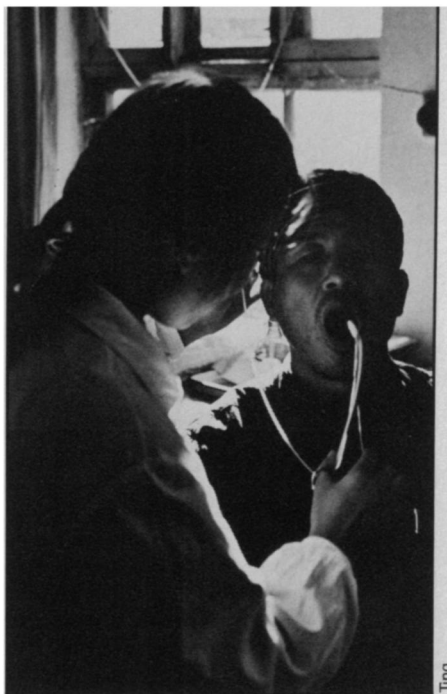
The backbone of the early detection program are the paramedics, or barefoot doctors. (Miller points out that the first one he met wore sandals.) They screen large numbers of people for cancer in the rural communities and in the factories, as well as dispense herbal and modern medicines and birth control pills. In fact, Kaplan believes that the Chinese health authorities are cleverly using the anticancer campaign to bolster the general program of public health. Entrusted with the important tasks of identifying and educating

people about life-threatening diseases, the barefoot doctors sustain greater interest and alertness in day-to-day health care.

The immense population, while presenting a huge challenge for screening programs, can provide a wealth of statistics. The American scientists learned that the Chinese National Cancer Control Office, headed by Li Ping, is conducting a nationwide retrospective study of deaths caused by malignant tumors. So far, several hundred million cases from death certificate registries have been investigated. The data are not computerized, but recorded by hand. China is also developing a system for national collection of data on current cancer cases. Each major cancer hospital will provide reports from the field stations in its province.

The American scientists are eager to help their Chinese colleagues organize and analyze that mass of data, and perhaps get a chance to ask some questions of their own. Miller says he found China an "etiological wonderland." Virginia Wang of Johns Hopkins University, a 1973 visitor to China, pointed out that China might provide a natural laboratory to examine the relationship between breast cancer and early pregnancy. Bernard Fisher of the University of Pittsburgh School of Medicine says that although breast cancer in China is overshadowed by other cancers, it does occur frequently. U.S. statistics have shown that women who become pregnant while young have a lower risk of breast cancer than those whose first pregnancy is delayed. The puzzle is whether early pregnancy is protective, or whether a hormone condition both delays pregnancy and causes cancer. Neighboring communes, Wang says, may differ in family planning. One may allow early marriage and pregnancy, while another, only 30 miles away, may insist upon later marriage and birth control, so that women do not become pregnant until they are much older. Thus, comparisons of breast cancer rates between communes might distinguish between current hypotheses.

Another natural experiment may provide the key to a cancer that has ravaged selected pockets of the Chinese population. Cancer of the esophagus affects not only people, but also their chickens. Two

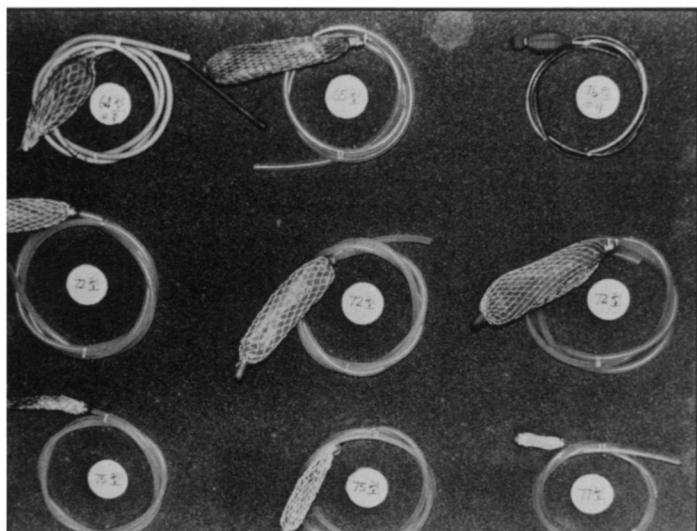


*Inserting balloon for cancer detection.*

other types of domestic animals in China are known to have cancers similar to the human population of the regions. Several pigs in a survey in the Kwangtung province have cancers similar to nasopharyngeal carcinoma, and ducks have been found with liver cancer.

Miller suggests that these animal models have been identified in China both because animals are often kept for their full life-spans, rather than just during their breeding or egg-laying years, and because the cancer symptoms are so well known that people recognize them in their animals. "Discovery of gullet cancer in chickens was made when a barefoot doctor asked a peasant if he had signs of esophageal cancer," Miller explains. "He said he did not, but his chicken did."

The chickens fit into the story of how "pickled" vegetables became implicated in esophageal cancer (SN: 11/19/77, p. 342), through the experience of 50,000 workers transferred from a high-incidence area to dig an irrigation canal in a low-incidence area. The workers bought new chicken flocks that were free of the cancer. Within several years, the chicken cancer again appeared. The cancer-causing agent thus seems to have moved with the people.



*Net-covered balloons on the ends of tubes sample mucosal cells in esophageal cancer screening.*

Table scraps were suspect, especially a dish prepared by boiling vegetables, then letting them sit growing mold for several months.

Bernard Weinstein of Columbia University suspects that interaction of nitrate from the environment and mold degeneration products might together produce a potent nitrosamine. He convinced the Chinese to give him samples of the "pickled" vegetables which he passed on to Takashi Sugimura, head of the National Cancer Research Institute in Tokyo. In an Ames test, Sugimura found that, once activated by a liver preparation, the food caused mutations in each of two bacterial systems sensitive to different types of mutagens. That result, Weinstein says, suggests the active chemical is a polycyclic aromatic ring.

How potent is the carcinogen? Weinstein and Miller did a rough calculation and estimate that daily consumption of 6 ounces of the vegetables would be equivalent in mutagenic potential to smoking two to three packages of cigarettes a day. "This is a key opportunity to evaluate the role of nitrosamine as a human carcinogen," Weinstein says. When asked the next step, he said, "Get more pickles."

The sample of "pickled" vegetables was taken out of China because no laboratory there is set up to do Ames tests, although the scientists are aware of the test's potential. The biggest disappointment of the cancer researchers' visit was the limited laboratory science. "Functionally basic science is operating at a low level," says William D. Terry, an immunologist at the National Cancer Institute. For both the clinical treatment and epidemiological studies, the laboratory back-up seemed insufficient.

The weakness of the basic science, the visitors say, stems from the period when academics were ordered to leave their books and work in the fields. A Chinese medical journal wrote that intellectuals "were devoting too much time and resources to esoteric problems not immediately solving the needs of the people." This policy left a gap, which Kaplan describes as "an 11-year rent in the flow of people through the scientific system." Now, he says, the Chinese must bring together the old group who are still well-trained in research and enthusiastic young people. While in recent years there has been almost no scientist training, China is beginning to plan postgraduate research in various fields. The Americans met a few young scientists who had gone to Europe for training, and were told of a few others sent there and to Canada.

Another sign of increasing commitment to basic science is the "marvelous-looking" plans for a 15-story cancer institute to be built in Peking. The project includes detailed mechanisms for interweaving clinical and research work. Miller says that the Chinese hope to build "a bridge of heaven between the labs and the wards." □