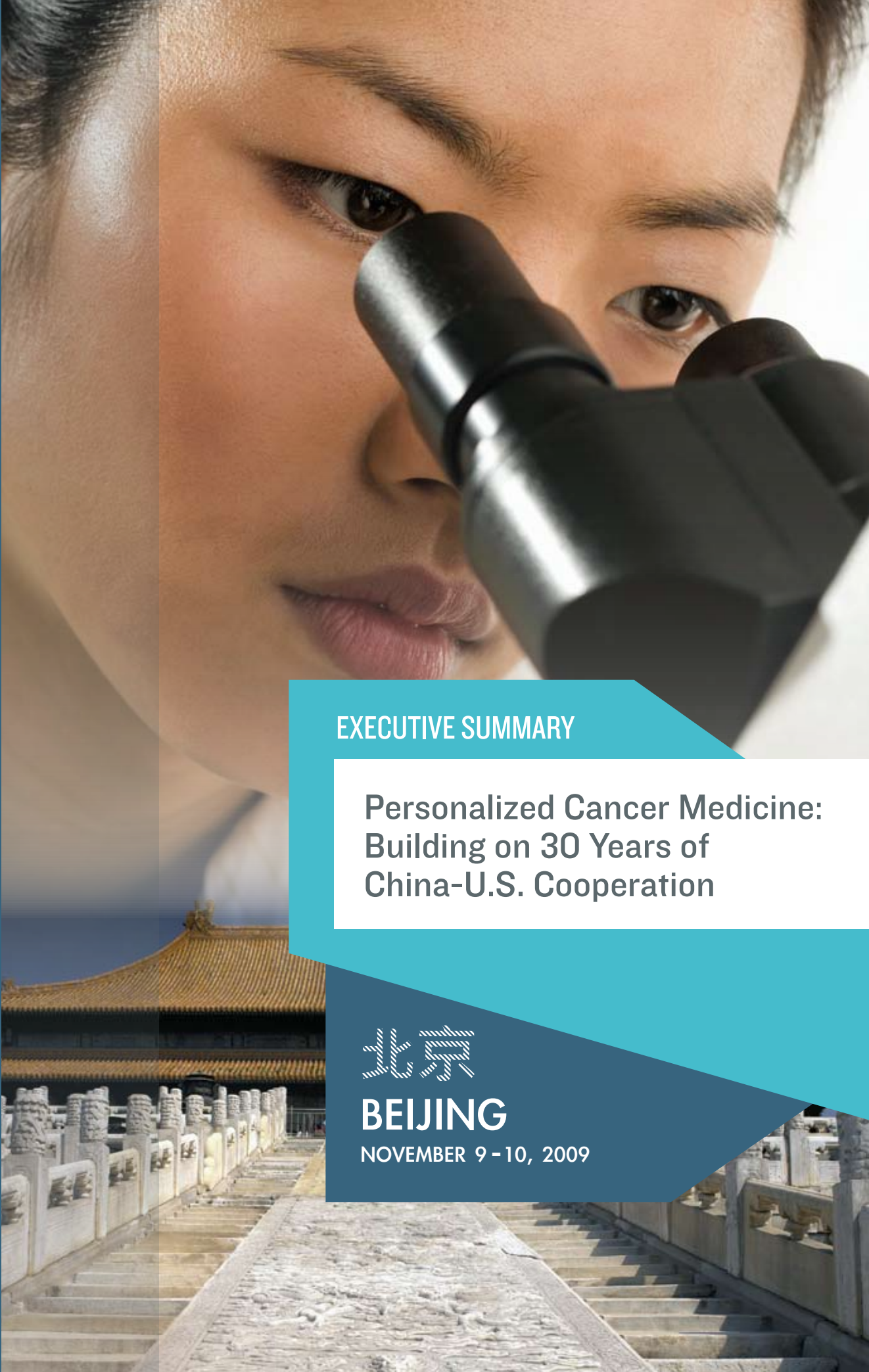


National Cancer Institute



EXECUTIVE SUMMARY

Personalized Cancer Medicine:  
Building on 30 Years of  
China-U.S. Cooperation



BEIJING

NOVEMBER 9 - 10, 2009

U.S. DEPARTMENT  
OF HEALTH AND  
HUMAN SERVICES

National Institutes  
of Health

## History


This symposium commemorated the 1979 meeting of the former Director of the U.S. National Cancer Institute (NCI) and the Director of the Cancer Institute/Hospital of the Chinese Academy of Medical Sciences (CICAMS) several months after President Jimmy Carter and China's leader Deng Xiaoping signed

the United States–China Agreement on Science and Technology. The discussion between the NCI and CICAMS directors launched the start of government-to-government research and exchange programs and established a framework for cancer research collaboration between the United States and China.

## Purpose

The purpose of the symposium was to highlight the accomplishments of several past and ongoing United States–China cancer research studies, and bring together thought leaders from both countries who are working in several scientific and technology areas driving

the development of personalized cancer medicine. Participants at the meeting identified several grand challenges and opportunities for the United States and China to work together to enable a future of personalized cancer medicine.

An aerial photograph of a dense urban cityscape, likely Shanghai, featuring a prominent tower with a spherical structure in the background. The image is overlaid with semi-transparent geometric shapes in shades of green, red, and blue. A dark red semi-transparent box is positioned in the center, containing white text.

**Urban areas such as Shanghai are experiencing rapid increases in cancers that are most common in Western countries such as breast and colon cancer.**

## Background

Presenters summarized the burden of cancer to both countries, and how U.S.–China cooperation provides unique opportunities to advance research that will ultimately benefit cancer patients around the world. Speaking by video message, U.S. Department of Health and Human Services (HHS) Assistant Secretary for Health Dr. Howard Koh emphasized that cancer is a major public health issue in the developing world, because more than 50% of new cancer cases and nearly two-thirds of cancer deaths occur in developing countries. Chinese Minister of Health (MOH) Dr. Zhu Chen highlighted his nation's recent efforts in health care reform, and noted that the complexity and threat of cancer requires a global perspective and participation. He further noted that enhancing collaboration in many areas of biomedical research will deepen the relationship between

the United States and China and foster the development of new generations of scientists.

Chinese speakers—including Professor Qian Liu, Vice Minister, and Professor Wei He, Director General, MOH Department of Science and Education, and Ping Zhao, Director of CICAMS –reviewed the cancer problem in China. Professor Liu noted that there are more than 2.2 million deaths from cancer in China each year. Director Zhao referred to the situation in China as a cancer epidemic, now that cancer is the leading cause of death in urban and rural areas. NCI Deputy Director Anna Barker noted that although lung cancer has the highest mortality rate in both the United States and China; in China, liver, stomach, and esophagus are the next most deadly cancer types as contrasted with colon, breast, and prostate cancer in the United States. Several Chinese speakers explained that a series of factors in China will likely contribute to increases in cancer rates such as an aging population, dietary changes, environmental hazards, hepatitis B, and smoking.

Several Chinese experts emphasized the importance of cancer prevention and control. MOH published a plan of cancer prevention and control in 2004 that included enhancing the country's cancer registration system, as well as providing health education, screening, and early diagnosis and treatment for patients. MOH is currently devising a new plan of action which will span from 2010 to 2020

**More than 50% of new cancer cases and nearly two-thirds of cancer deaths occur in developing countries.**

and will further enhance the country's cancer registration system.

U.S. National Institutes of Health (NIH) Director Dr. Francis Collins, speaking by video message, noted China's contributions to the Human Genome Project and the International Haplotype Map Project, and affirmed that China is poised to be an important player in the development of personalized cancer medicine. Drs. Depei Liu, President of the Chinese Academy of Medical Sciences (CAMS), and Qimin Zhan, Vice President of CAMS, strongly supported building cooperation in the area of personalized cancer medicine. President Liu cautioned that many cancers in China occur in low-income populations and expressed the hope that advances in personalized medicine

**There are more than 2.2 million deaths from cancer in China each year.**

will inform the development of adaptive technologies that are affordable for middle- and lower-income families.

## Achievements to Date

In the first part of the meeting, speakers highlighted achievements from past and existing studies in China that NCI has supported and/or participated in, particularly in the area of cancer epidemiology.

### Existing NCI-Supported Studies in China: Building on Unique Research Opportunities

Several speakers discussed the advantages to conducting cancer research in China. Professor Yu-Tang Gao, Shanghai Cancer Institute and Dr. Wei Zheng, Vanderbilt University, summarized unique opportunities for epidemiology research in China including:

unique cancer patterns, high participation rate of study subjects, low attrition rates, and different population characteristics relative to Western cohorts. For example, Chinese populations exhibit several key lifestyle differences relative to American populations that may affect cancer risk, such as diet and exercise.

Relatively low levels of admixture among Han Chinese—and the opportunity to replicate scientific findings generated in American populations—are particularly valuable for genetic studies, including genome wide association studies (GWAS). As described by

NCI's Dr. Ann Hsing, cancers such as biliary tract cancers are more common in Asian populations and are increasing rapidly in Shanghai. In addition, urban areas such as Shanghai are experiencing rapid increases in cancers that are most common in Western countries such as breast and colon cancer.

NCI's Dr. Curtis Harris reported that the high rates of hepatocellular carcinoma in Qidong, Jiangsu Province provided an opportunity to discover an unusually high frequency of G-to-T (AGG->AGT) nucleotide transversions in codon 249 serine of the p53 gene. Further analysis revealed that that exposure to dietary aflatoxin B1 was the likely cause of these mutations during liver carcinogenesis.

**Chinese populations exhibit several key lifestyle differences relative to American populations that may affect cancer risk.**

## Epidemiological Investigations

NCI's Dr. Philip Taylor reported how earlier NCI-supported studies in China targeted geographical areas with high incidences of certain cancers based on data from the 1976 *Atlas of Cancer Mortality in China*. Results from the Nutrition Intervention Trial in Linxian, Henan Province, showed that the supplement containing selenium, vitamin E, and beta-carotene decreased total mortality, cancer mortality, and gastric cancer mortality. Beneficial effects of a supplement were evident up to 10 years after cessation of supplementation. Studies of gastric cancer in Linqu, Shandong Province, reviewed by Professor Wei-cheng You, Peking University, found that treatment of *H. pylori* infections reduced the prevalence of precancerous gastric lesions. Other studies, such as those addressing cervical cancer in Shanxi Province described by Professor Youlin Qiao, CICAMS, focus on introducing cost-effective screening technologies in China. All three of these studies identified cancer prevention strategies of public health significance.

Other NCI-supported studies in China have investigated populations that have experienced unique environmental or occupational exposures. Professor Youlin Qiao described screening studies of tin miners in Yunnan Province with unusually high rates of lung cancer, and NCI's Dr. Qing Lan described studies of the effect of benzene exposure on factory workers in different parts of China. The benzene studies informed the development of new regulations to lower benzene occupational exposure in China and influenced the risk

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