Overview: NCI’s Global Cancer Research Programs – Highlighting Efforts in Specific Countries

Anna D. Barker, Ph.D.
Deputy Director, NCI
September 16, 2009
Driving NCI’s Interest and Strategies in International Partnerships/Globalization

- Emerging international human/economic cancer burden
- Progress in 21st century molecular and clinical sciences depend on global partnerships (Talent, Costs)
- Advanced technologies driving nearly exponential change in oncology
- Advances in communication – real time communication – leveling the “playing field”
- To assist in global delivery of 21st century cancer medicine (“soft” political power)
By 2020, Cancer Could Kill 10.3 Million People per Year (16 million new cases per year)

Source: World Health Organization

"Global Action Against Cancer"
An International Imperative: Address the Growing Cancer Burden

7.6 million people died of cancer in 2005

Source: Derived from International Agency for Research on Cancer, GLOBOCAN 2002 database
**NCI’s Global Cancer Research “Portfolio” and Intent**

**Leadership:** All Divisions and Centers, Fogarty International Center, Other NIH Institutes, Joseph F. Harford, Ph.D.; Jorge Gomez, M.D., Ph.D.; Julie Schneider, Ph.D.; Richard Love, M.D.

**Mission:** To provide leadership across the cancer research and training continuum to develop mutually beneficial partnerships that facilitate advances in cancer research and aid countries to address their cancer burden.

**Focus:** New partnerships that further support and expand NCI’s historical strengths, leverage resources and expertise from the NCI and target countries through mutually beneficial, culturally appropriate research and development programs; emphasis on collaborative funding and development of in-country independence.

**New Models:** Co-funding/other models that include the target countries, NIH components and philanthropic groups.
Strategic Components of NCI’s International Programs in Cancer Research

- Office of International Affairs
- Large numbers of existing research programs (Divisions, Centers and new strategic initiatives)
- Historically - scientifically outstanding programs - distributed around the globe (key strengths in epidemiology, molecular sciences, cancer control and clinical studies)
- Strong international training programs
- Collaborative efforts with the NIH Fogarty International Center
- Strategic pilot programs in Latin America, Russia and China – ongoing trials in Bangladesh
NCI’s Strategies for Global Development

- Build on significant historical strengths in international epidemiology (Dr. Joseph Fraumeni’s vision)
- Leverage existing strong base of intramural alumni, international investigator-investigator relationships, broad global focus (CCR and DCEG, FIC training programs)
- Leverage strengths in international cancer data bases and cancer control (DCCPS)
- Leverage strengths in advanced technologies (e.g., nanotechnology, genomics)
- Undertake international partnerships in both basic and clinical research that extend U.S. capabilities
- Collaboratively with FIC develop pilot programs in selected geographic areas of high interest – put people in-country
- Move strategically to coordinate efforts across the NCI
- Bring new resources into international programs - new funding models
Implementation - Developing NCI’s Global Agenda

- Understand the problems in-county
- Assess the real needs and opportunities
- Assess the capabilities – partnerships should be built on strengths
- Develop strategic pilot initiatives – meet milestones – deliver something
- Determine what works
- Integrate success - better patient management
- Contribute to advances in cancer research across the discovery, development and delivery continuum in-country
- Pursue new opportunities for new funding models
- Develop true trust-based partnerships and collaborations
Global Healthcare Policy Challenges

- Informed consent issues – genetic information in public databases; loss of privacy and risks; permission for future research; protection of family members
- Achieving synergy – reducing redundancy
- Bioethics – patient biospecimens management
- Advanced technologies (Nanotechnology - environmental constraints affecting medical applications)
- Management of intellectual property - conflict-of-interest
Example: Why Focus on Latin America

- Cancer Burden in Latin America overall reflects trends in the U.S. – cancer on the rise as population ages
- Cancers that can be prevented are prevalent – e.g. stomach cancer
- Cancers such as stomach, uterine, liver can be addressed using known approaches
- 2020 – Hispanic population will grow to ~59 million (19% of U.S. population) – largest minority population
- Shift in population make-up – 2000 80% of Hispanic population from Mexico, in 2006 had shifted to 65% from Mexico
- Increasing wealth in these countries – rise of science infrastructure
- Significant potential strengths in clinical trials
What Might We Expect from Globalization in the Next 10 Years?

- Leadership in science and medicine – distributed – and driven by talent base – ability to access and leverage information and investment

- Medicine: shift toward understanding disease mechanisms – diagnosing earlier – down staging; moving toward global standards

- Health care system changes – knowledge base combined with new bioinformatics tools and broadband will enable access to unprecedented information, tools and strategies – conceivably anywhere on the globe

- Healthy populations becomes critical – and will define stability and economic capability

- Economics – rapid rise of knowledge based economies – shift of economic strength
Some Questions

- Is global health (perhaps personalized – but yet to be defined) a viable long-term collaborative goal?
- Can we capitalize globally on the convergence of advances in biomedical research, technologies, bioinformatics and broadband to realize global health and drive knowledge based economies?
- Can we achieve unprecedented connectivity - new HIT systems - information management?
- If so, will information be a revolutionary “leveler” – and enable delivery on the promise of 21st century global health?
- Can we hope to connect biomedical research to physicians and electronic medical records to consumers across the globe?
- Can we develop the business models and policies to ensure delivery beyond the developed world?
Today’s Presentations

- Overview – Anna D. Barker, Ph.D.
- China – Anna D. Barker, Ph.D.
- Latin America – Jorge Gomez, M.D., Ph.D.
- Middle East – Russia – Joseph F. Harford, Ph.D.
- Bangladesh – Richard Love, M.D.
The NCI’s Office of China Cancer Research Programs

(Dr. Julie Schneider, Ph.D., Director)

(Building on U.S. – China History of Successful Cooperative Programs in Cancer Research)

Anna D. Barker, Ph.D.
Deputy Director, NCI
September 16, 2009
An International Imperative: Address the Growing Cancer Burden

7.6 million people died of cancer in 2005

Source: Derived from International Agency for Research on Cancer, GLOBOCAN 2002 database
Overview and Rationale for Expanding Cancer Partnerships in China
Number of Deaths in China by Cause and Age in 2003

Cancer Deaths in the U.S. and China

**U.S.**

- Lung: 38%
- Colon and Rectum: 28%
- Breast: 21%
- Prostate: 19%
- Pancreas: 13%
- Non-Hodgkin Lymphoma: 5%
- Other Cancers: 4%

**China**

- Lung: 22%
- Liver: 21%
- Stomach: 19%
- Esophagus: 18%
- Colon and Rectum: 13%
- Leukemia: 5%
- Other Cancers: 2%

Source: GLOBOCAN 2002 combined data for males and females.
Cancer in China

- 2008 national mortality survey estimates that cancer is #1 killer in Chinese cities and #2 killer in countryside
  - Accounts for 25% urban deaths, 21% rural deaths
- Contributing factors include:¹
  - Aging population
    - 23% of Chinese population will be >60 years by 2035
  - Dietary changes
    - 23% population is overweight
  - Environmental/occupational hazards
  - Hepatitis B
  - Smoking
    - 350 million Chinese smoke

¹WHO Country Health Information Profiles (2008).
Unique Scientific Opportunities in China

- Access to large numbers of cancer patients
  - An estimated 1.9 million Chinese died of cancer in 2005\(^1\)
  - Key differences in most common types of cancer
  - Rapid increases in certain cancers common in the developed world
- Access to populations exposed to chemical and/or infectious agents that increase cancer risk not observed in the U.S.
- Access to cohorts with unique dietary habits not observed in the U.S.
- Opportunities to use Western scientific approaches to evaluate Traditional Chinese Medicine techniques

\(^1\)World Health Organization
Rationale: Expanding Partnerships in China Now

- Growing burden of chronic disease in China
  - Highlighted in Fogarty International Center Strategic Plan 2008-2012

- China’s investment in science and technology nearly tripled between 2000 and 2005\(^1\) to an estimated 1.1% of GDP,\(^2\) and continues to increase
  - Opportunity to partner for mutual benefit during the development of China’s cancer research capabilities during growth phase

- Large numbers of U.S.-trained scientists are returning to leadership positions in China’s biomedical research sector\(^3\)

Summary: Range of Reasons for NCI’s Active Role in China

- “Affording” the cost of 21st century cancer research – and taking advantage of major scientific talent pools
- Build on 30 years of cooperation
  - Currently, NCI supports more than 50 China-related projects (basic research, epidemiology, occupational/environmental health, tobacco control)
- Build on network of NCI/NIH alumni in China
  - More than 500 Chinese work in the NIH intramural program each year
- Continue to encourage talented Chinese researchers to work in U.S. cancer research laboratories
- Promote health diplomacy, “soft power,” and maintain open channels of communication with China’s leadership
  - Theme highlighted in Dr. Francis Collins’ August 17, 2009 inaugural lecture as NIH Director
History and Background: NCI-China Programs
Atlas of Cancer Mortality in China

- In the 1970’s China completed a 3-year mortality retrospective investigation of 850,000,000 individuals
- In 1976 an Atlas of Cancer Mortality was published that identified several cancer “hot spots”
1979: A Key Year in the History of NCI-China Cooperation

- **June**: U.S. and Chinese Governments sign the Health Protocol
- **September**: Annex 1 of Health Protocol specifies areas of cancer research for increased cooperation
- **November**: NCI Director, Arthur Upton, meets with Chinese Academy of Medical Sciences (CAMS) Cancer Center Director in Beijing
## Examples of NCI-Supported Critical China Studies (1980’s)

<table>
<thead>
<tr>
<th>Study</th>
<th>Partners</th>
</tr>
</thead>
<tbody>
<tr>
<td>Benzene</td>
<td>DCEG-China CDC</td>
</tr>
<tr>
<td>Esophageal cancer</td>
<td>DCEG-CAMS Cancer Institute</td>
</tr>
<tr>
<td>Liver cancer</td>
<td>CCR- CAMS Cancer Institute, Qidong Liver Cancer Institute</td>
</tr>
<tr>
<td>Lung cancer</td>
<td>DCEG-China CDC</td>
</tr>
<tr>
<td>Xuan Wei (indoor cooking)</td>
<td></td>
</tr>
<tr>
<td>Cancer in textile workers</td>
<td>University of Washington-Shanghai Textile Industry Bureau</td>
</tr>
</tbody>
</table>
### Examples of Later NCI-Supported Studies (1990’s and 2000’s)

**Study:**
- Clinical trials - luteal adjuvant oophorectomy
- Gastric cancer
- Lung cancer and indoor radon exposure
- Lung cancer screening
- Nasopharangeal carcinoma
- Shanghai cohorts
- Tobacco control
- Traditional Chinese Medicine

**Partners:**
- Ohio State University - multiple Chinese inst.
- DCEG - Peking University
- DCEG-EPA-China CDC
- DCP-CAMS Cancer Institute, Yunnan Tin Corp.
- Vanderbilt-DCEG-Shanghai Cancer Institute
- Various U.S. institutions - China CDC, others
- MD Anderson-Fudan University
NCI-Supported Extramural Institutions - Expanding China-Related Initiatives

- Asia Cohort Consortium
  - ACC coordinating Center located at Fred Hutchison Cancer Research Center
- Duke-Peking University Cancer Clinical Trials Initiative
- Johns Hopkins Institute for Global Tobacco Control
- MD Anderson Global Academic Programs Sister Institution Program
- National Comprehensive Cancer Network April 2009 Conference in Beijing
Brief Overview of Cancer Research System in China
Sources of Government Cancer Research Funding in China

Ministry of Finance

- Ministry of Science and Technology
  - 973 (Basic Research)
    - 863 (Hi-Tech)
    - State Key Labs
  
- National Natural Science Foundation
  - General Projects
    - Key Projects
    - Major Projects

- Ministry of Education
  - 211 Program
  - 985 Program
  - Chanjiang Scholars Program

- Ministry of Health
  - China National Center for Biotechnology Development
Major Organizations in China Involved in Cancer Research

- Chinese Academy of Medical Sciences
  - Cancer Institute/Hospital recently designated as China’s National Cancer Center

- Chinese Academy of Sciences
  - Approximately 20 out of 90 CAS Institutes focus on biological research

- China CDC
  - Focuses on disease control and prevention
  - Cooperates with hundreds of provincial, city and county CDCs throughout China as well as township health centers and clinics

- Universities
  - Leading cancer research universities include: Fudan University, Tianjin Medical University Cancer Institute and Hospital, Peking University, and Zhongshan University
Distribution of CAS and CAMS Biomedical Institutions

- CAMS: 12 Research Institutes; 4 Hospitals
- CAS: 6 Research Institutes

- CAMS: 3 Research Institutes; 1 Hospital
- CAS: 1 Research Institute

- CAMS: 1 Research Institute
- CAS: 5 Research Institutes

- CAMS: 1 Research Institute
- CAS: 2 Research Institutes
Overview and Goal of NCI Office of China Cancer Programs
Building on past scientific alliances, Chinese alumni (nearly every cancer institution in China is led by someone trained at NCI), scientific opportunities and advantages of having a presence in-country in 2007, as part of a broader global strategy, the NCI:

- Posted Dr. Julie Schneider to Beijing
- Began a due-diligence process to understand both opportunities and needs in China
- Elected to locate in the U.S. Embassy – where several other federal agencies are located:
  - HHS - NIH/NIAID - U.S. Centers for Disease Control - Food and Drug Administration - National Science Foundation - NCI
### Timeline for Establishing Position Overseas

<table>
<thead>
<tr>
<th>Task</th>
<th>Estimated Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>HHS Approval</td>
<td>1-2 months</td>
</tr>
<tr>
<td>State Department Approval (NSDD-38)</td>
<td>2-3 months</td>
</tr>
<tr>
<td>Medical Clearance</td>
<td>2-5 months</td>
</tr>
<tr>
<td>(Immunizations)</td>
<td>2 months before travel</td>
</tr>
<tr>
<td>Security Clearance</td>
<td>3-5 months</td>
</tr>
<tr>
<td>Security Training</td>
<td>1-2 weeks</td>
</tr>
<tr>
<td>(Travel Arrangements)</td>
<td>2-3 months</td>
</tr>
<tr>
<td>(Moving Arrangements)</td>
<td>2-3 months</td>
</tr>
<tr>
<td>Assignment and Arrival Cables</td>
<td>1-2 weeks</td>
</tr>
</tbody>
</table>
Mapping the Cancer Research Landscape in China

**Chinese Institutions**
- Government representatives
  - MOST/CNCBD, MOH, MOE, NSFC, SFDA, China CDC
- Researchers
  - CAMS, CAS, and several top universities
- Private sector representatives
  - CROs, biotechnology and pharmaceutical companies
- Medical research ethics experts

**U.S. Institutions**
- International Organizations
  - CMB, Clinton, Gates, IARC, WHO, World Bank, NRDC, NFCR
- Fogarty International Center
- NCI Program Directors with China activities
- NCI-supported (intramural and extramural) PI’s working in China
- Science/Health experts at U.S. Embassy Beijing
Observations to Date from “Due Diligence”

- There are effective models of international research collaboration in China: Joint research funding; jointly organized institutes (virtual) and computational Biology.
- There are significant challenges in increasing our partnerships and collaborations to conduct cancer research in China:
  - Biospecimen Export
  - Human Subjects Protection
  - Research Integrity
  - Intellectual Property
  - Further Development of Informatics Infrastructure
Early Areas Identified as Highly Promising for Future NCI-China Research Partnerships

- Advanced Technologies
  - Cancer Genomics
  - Nanotechnology and Cancer
- Environmental Pollution and Cancer
- Cancer Treatment Clinical Trials
Access large populations of patients with common cancers in China (e.g. esophageal, gastric, liver)

- Study rare cancers
- Investigate genetic differences in Chinese populations that may affect drug response
- Build on existing expertise in cancer research and genomics in China
  - Completed 1% of Human Genome Sequence
  - Launched Chinese Cancer Genome Project
- Build on interest of top Chinese organizations
  - Co-organizing 30th Anniversary meeting with CAMS
Nanotechnology and Cancer

- Build on capacity and expertise in China
  - Chinese Central Government invested an estimated $240 M USD from 2004-2007, and local governments another $360 M USD\(^1\)
  - China has the second largest world share of publications in nanotechnology after the U.S.

- Build upon interest of top Chinese organizations
  - Organized first Joint U.S.-China Symposium on Nanobiology and Nanomedicine with the National Center for Nanoscience and Technology of China (NCNST), CAS


Environmental Pollution and Cancer

- Study levels and types of environmental exposures not observed in the U.S.
  - 16 of the world’s top 20 most polluted cities are in China¹
- Build on strong history of NCI epidemiology and occupational health studies
- Build upon interest of top Chinese research organizations to develop new partnerships in this area
  - Environmental pollutants and cancer meeting to be co-organized with CAS, FIC and NIEHS
- Leverage partnership opportunities with U.S. CDC, State Department experts, and International NGOs in Beijing

¹Source: World Bank

Cancer Treatment Clinical Trials

- Potential for faster patient enrollment
- Study cancers that are more common in China than the U.S.
- Build on international activities of the NCI Clinical Trial Cooperative Groups, Cancer Centers, and SPOREs
- Build on China central and local government support for globalizing clinical research in China
  - Examples include: Shanghai Clinical Research Center, China Medical City, Taizhou
- Influence the development of China’s clinical trial infrastructure
  - Key issues include: data quality control, implementation of human subjects regulations, developing informatics systems
Plans to Develop NCI Presence in China

- **Phase 1 (2007-2010)**
  - Complete Due Diligence, Knowledge Building, Feasibility Assessment, and Pilot Project Design

- **Phase 2 (2010-2012)**
  - Develop and Launch Collaborative Mutually-Beneficial Pilot Studies

- **Phase 3 (2012-2014)**
  - Based on Pilot Studies, Launch Scientific Programs Based on a Broader NCI Research Agenda
Upcoming Activities

- A 30th Anniversary Symposium to mark the signing of the MOU between NCI/HHS and the Chinese Academy of Medicine (November 2009)
- Environmental Pollutants and Cancer Meeting (January 2010)
- Finalize and Distribute Strategic Plan for the Office of Cancer China Programs, Launch Web Site - (First Quarter 2010)
- Joint U.S.-China Symposium on Nanobiology and Nanomedicine (Spring 2010)
- Potential Workshop to Review the State of Cancer Treatment Clinical Trials in China (Autumn 2010)