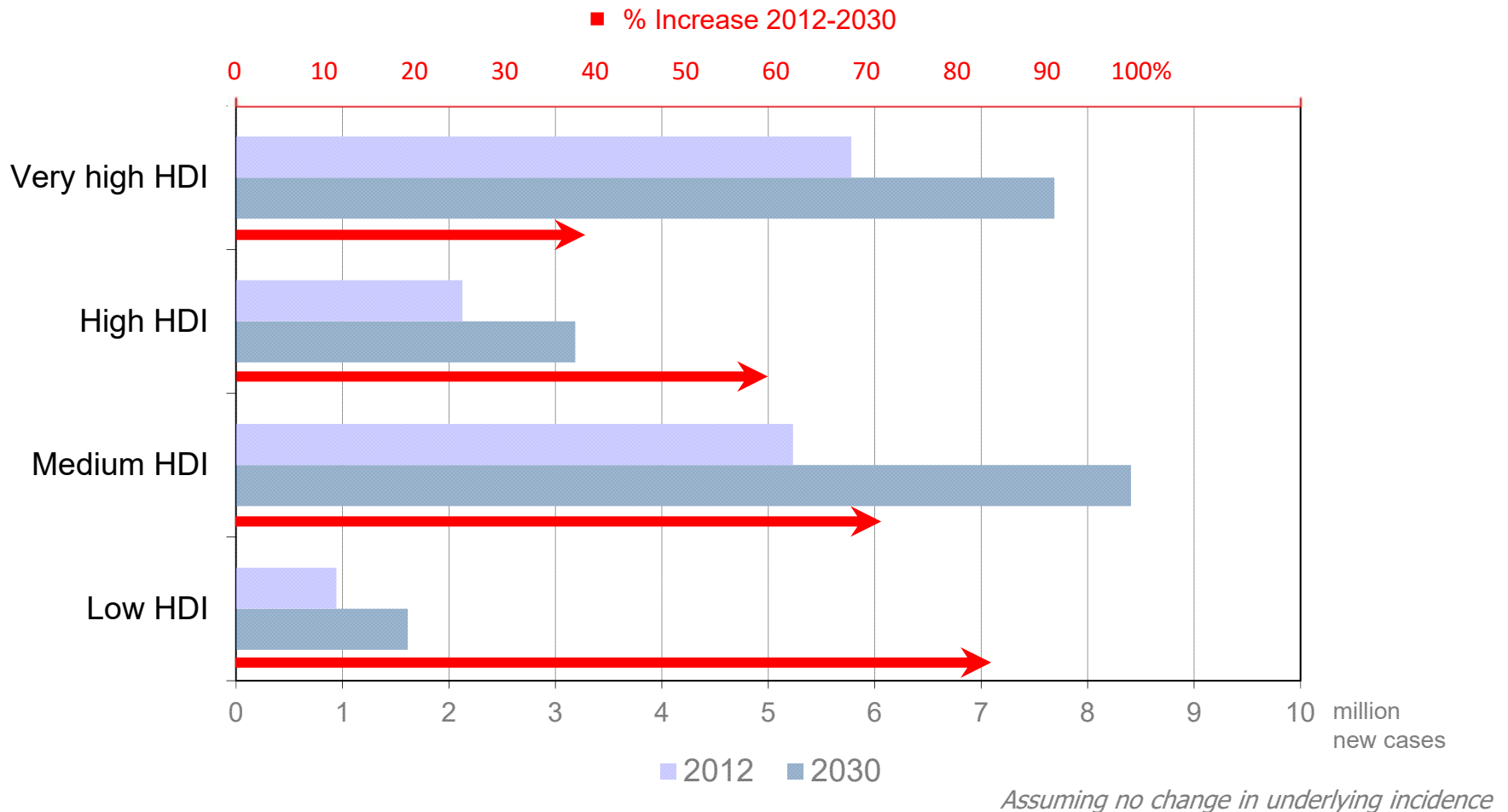


NCI Center for Global Health Update

Presentation by
Dr. Ted Trimble

Director, Center for Global Health
June 20, 2016

Where will the burden fall – development?



Bray F et al. Global cancer transitions according to the Human Development Index (2008-2030): a population based study. Lancet Oncol 2012; 13:790-801

NCI & CGH's Priorities in Global Health

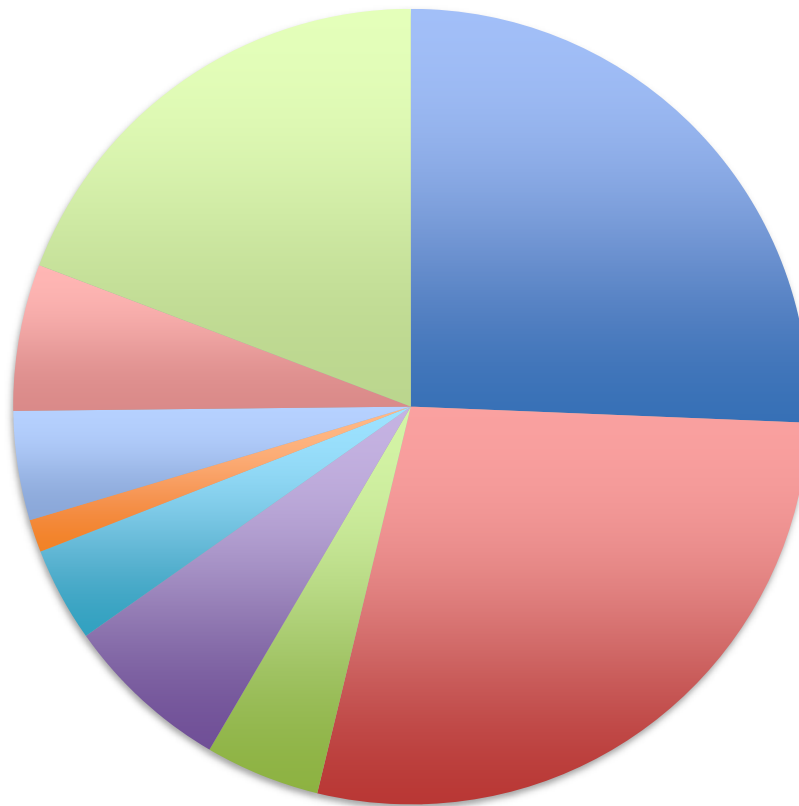
- Strengthening global cancer research
- Building a global cancer research community
- Translating research results into practice

History of NCI CGH

- Established in 2011 by Dr. Varmus
- Intended to serve as focal point for NCI Global Cancer Research
- Merged personnel and budget from
 - Office of International Affairs
 - Office of Latin America Cancer Program Development
 - Liaison Office (Brussels)
 - China Cancer Office

CGH FY15 budget allocations

Budget



- Personnel
- Research
- Evaltauion
- Meetings
- Training
- Pathology
- Surveillance
- Travel
- Office and Fellowship support

CGH FY 15 budget: \$14,501,000

NCI FY15 Budget: \$4,950,000,000

Development of Research Program

- Landscape Analysis of NCI, NIH, HHS, USG, and NCI Designated Cancer Centers
- Stakeholder Meeting (March 2012)
- Collaboration with NCI DOCs, NIH ICs, and CDC on new and expanded research programs

Highlights of CGH Programmatic Activity

- Affordable Cancer Technologies RFA
- National case study: Kenya
- Endemic Burkitt Lymphoma research network
- APEC Cervical Cancer Initiative
- Cancer and NCDs Research Centers of Excellence

NCI & CGH's Priorities in Global Health

- Affordable Cancer Technologies
- Strengthening global cancer research
- Building a global cancer research community
- Translating research results into practice

Technology Development Pipeline

Discovery **Prototype** Multi-Site Validation in GH **Commercialization** Global Health Deployment



Academia/Small business

Pharma & device industry

Ministries of Health
NGOs

IMAT



SBIR



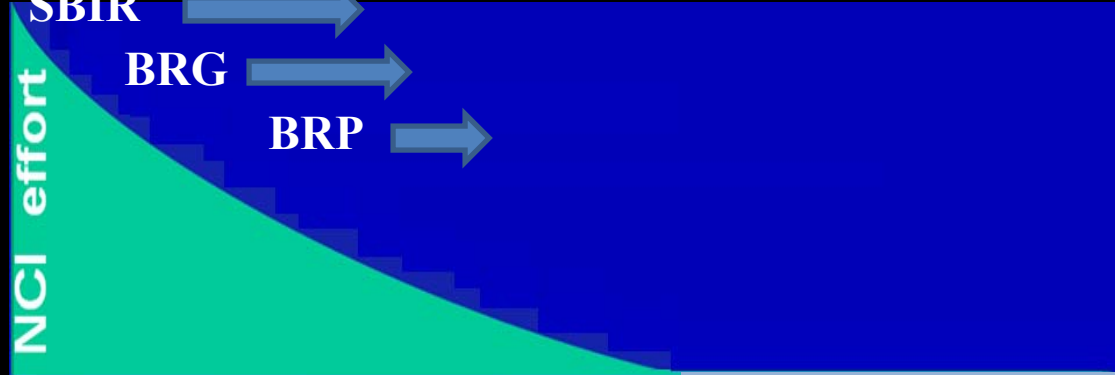
BRG



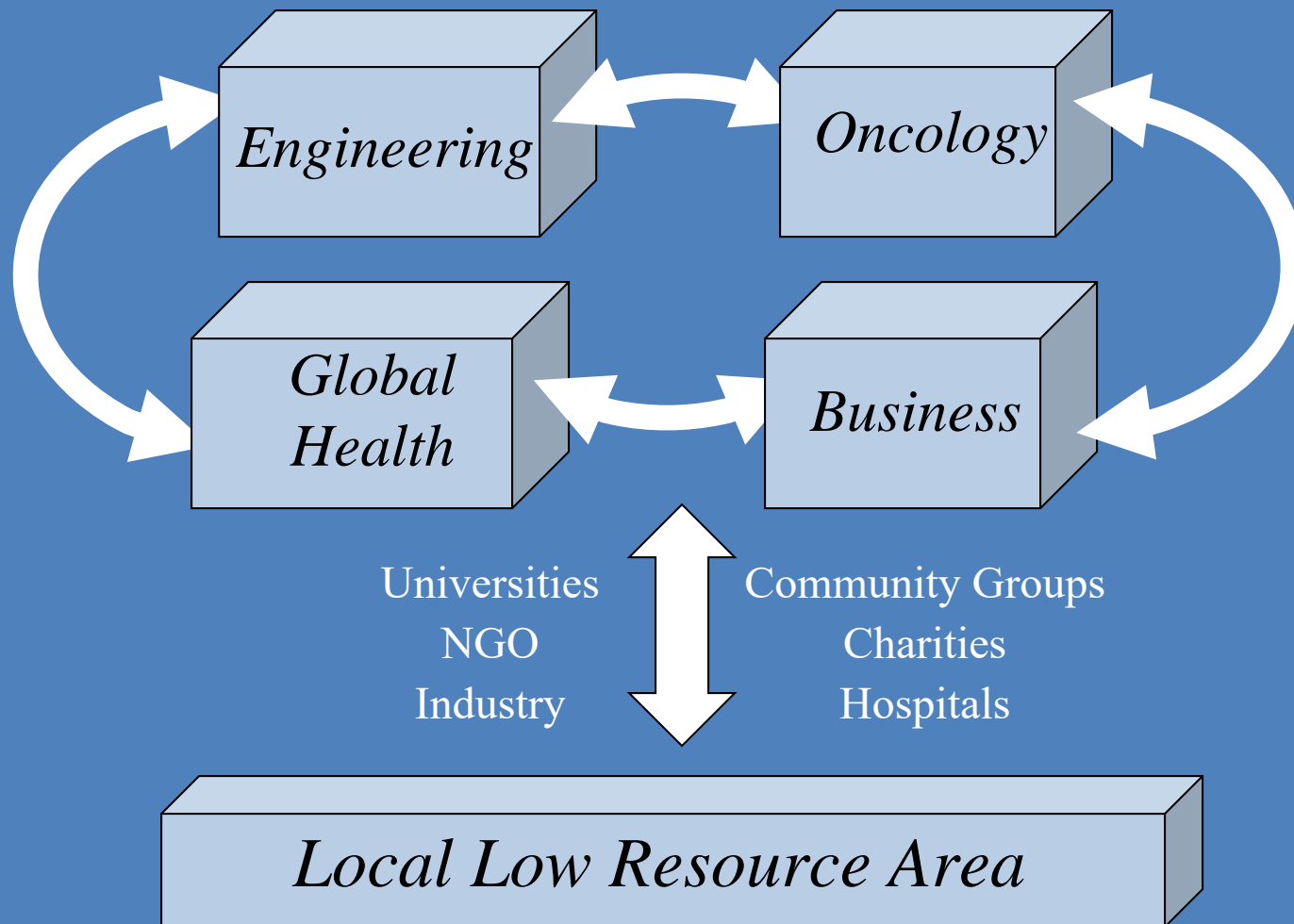
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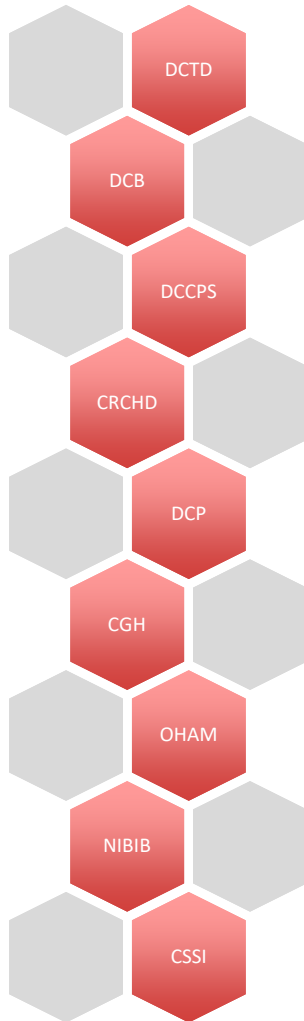
NCI effort



Need for multidisciplinary teams



Affordable Cancer Technologies



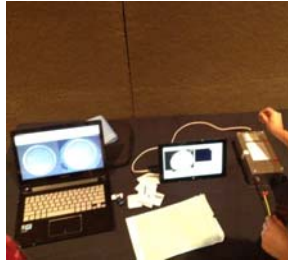
Result of collaboration by Program Directors across NCI Divisions, Offices, and Centers to identify priority areas and manage grants.

Critical Elements

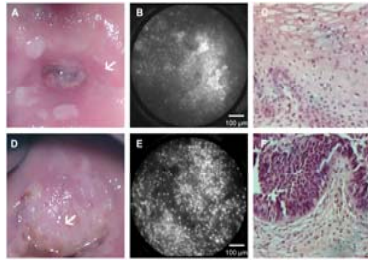
- Two-phase cooperative agreement.
- Three Rounds: Awards run until 2022.
- **Phase I (UH2) - two years:**
 - Demonstrate initial clinical potential of device/assay for application in a global health setting.
 - Adaptations/engineering to device/assay for use in LMIC setting.
- **Phase II (UH3) - three years:**
 - Validate device in global health setting
- **Progression from UH2 to UH3:**
 - Grantee must meet specified milestones
 - Milestones reviewed by NCI program staff.



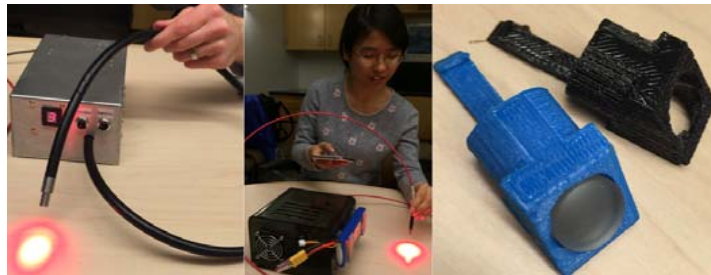
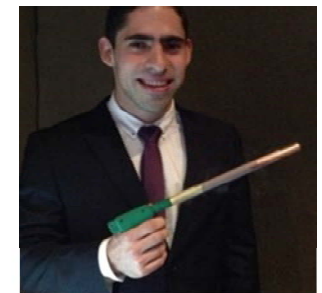
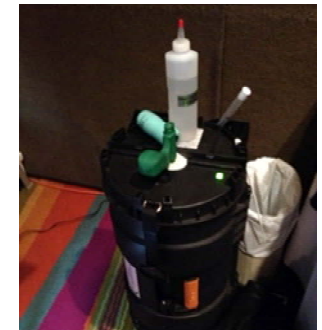
Affordable Cancer Technologies Program: Funded Projects (Round 1)



High Resolution Micro-endoscopy (HRME)
for RT Imaging of Cervical Neoplasia



GeneXpert HPV DNA Assay



Photodynamic Therapy for Oral Cancer



Cryopop



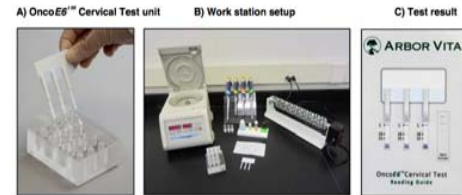
Point-of-care viral load test for HCV



Portable US Imaging of
Palpable Breast Masses

Affordable Cancer Technologies Program: Funded Projects (Round 2)

- The Radiation Planning Assistant for Radiation Planning in Low- and Middle-Income Countries
- Smartphone for Molecular Cancer Diagnostic In Africa
- Cytology-Free POC Cervical Cancer Diagnostics for Global Health
- Low-cost Mobile Oral Cancer Screening for Low Resource Setting
- Development, field testing and evaluation of the efficacy of a hand-held, portable and affordable thermo-coagulator to prevent cervical cancer in low- and middle-income countries
- Development and clinical validation of a multi-type HPV E6/E7 oncoprotein test for cervical cancer screening and triage in low- and middle-income countries
- Early Stage Diagnosis of Kaposi's Sarcoma in Limited Resource Settings Using KS-Detect



The OncoE6™ Cervical Test unit is moved from rack to rack to account for the different steps of the work flow: lysis, run, wash, and development (A). Equipment and reagents needed to run the test (B). Interpretation via visual inspection, aided by the Reading Guide. Line "C" represents a control for proper lateral flow run performance (C).



Fig. 1. Photos of an iPhone hologram system (top) and its current control App (bottom).

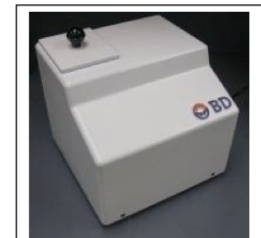


Figure 4: Lab-bench HNW instrument prototype that performs magnetic pelleting and Raman read on a single sample. Instrument is controlled via an attached laptop.

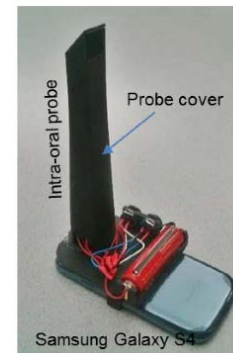
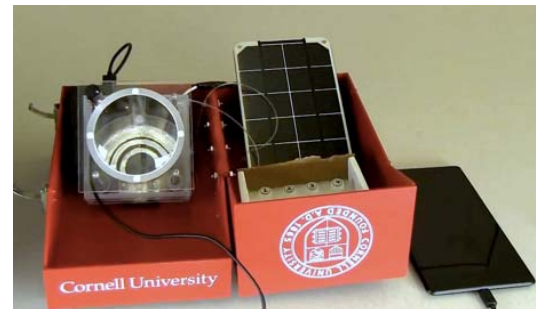


Figure 5: BD's POC HNW instrument for low resource settings. Instrument is controlled via an on-board CPU.



NCI & CGH's Priorities in Global Health

- National case study: Kenya
- Strengthening global cancer research
- Building a global cancer research community
- Translating research results into practice

Case Study: Kenya

- Request from Government of Kenya for help with cancer control and cancer research
- Major USG investment with CDC and USAID
- Cancer Centers and US universities working in Kenya; numerous other NIH ICs
- Political will in Kenya to prioritize cancer control
- Regional cancer research opportunities

Research Opportunities in Kenya

- Esophageal cancer (with DCEG)
- Burkitt Lymphoma (trans-NCI)
- Diagnosis of breast cancer via FNA (with DCEG)
- Women's cancers and stigma (trans-NCI, NCI CCC)
- Delay from diagnosis to treatment (NCI CCC)



Joining Forces to Overcome Cancer: The Kenya Cancer Research and Control Stakeholder Program

CGH portfolio analysis identifies significant investment in Kenya, but lack of coordination among stakeholders and the national government. 8 NCI-designated Cancer Centers investing in cancer research.

NCI-Kenya establishes technical working groups as a direct result of the meeting tracks;
Government of Kenya matches NCI-US investment in cancer registries and surveillance.

CGH convenes National Stakeholder Meeting with more than 40 organizations and 80 individuals, across 4 key technical areas.

CGH conducts evaluation showing that efforts have resulted in research capacity building, increased grant submissions, and increased collaboration.

2013

2014

2015

2016 - 2017

Direct Impact/Outcomes by NCI/CGH Priority Areas

Strengthening Global Cancer Research

- Strengthening of cancer research core functions including cancer registry and pathology;
- Resultant funding applications to NCI covering identified gaps in region-associated cancers;
- Increased collaboration between researchers and with MoH

Building a Global Cancer Research Community

- Increased coordination among 6 NCI-designated Cancer Centers to leverage investments and best practices;
- MOU between NCI-Kenya and US NCI to expand on research and training collaboration;

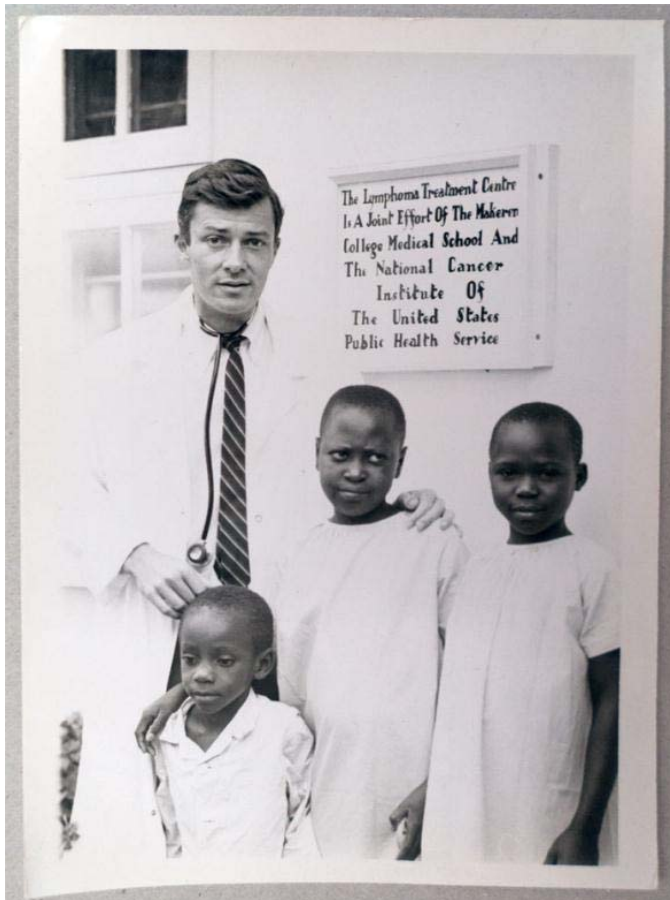
Translating Research Results into Practice

- Evaluation of implementation of National Cervical Cancer Prevention Program to inform future policy;
- Resources made available for evidence-based cancer strategies (e.g. World Bank, Government of Kenya).

NCI & CGH's Priorities in Global Health

- Burkitt Lymphoma Research Network
- Strengthening global cancer research
- Building a global cancer research community
- Translating research results into practice

Little Change in African Burkitt Lymphoma (BL) Outcomes Over 40 Years



Dr. John Ziegler of the US National Cancer Institute with BL patients at the Lymphoma Treatment Centre in Kampala in 1968

- 1968: cure rate of African BL in Uganda was 50% with cyclophosphamide, vincristine, low-dose methotrexate, predisone – the best outcomes in the world
- 2016: cure rate of pediatric BL in US is >90% with aggressive chemotherapy, rituximab and supportive care
- 2016: cure rate of African BL in Uganda still 50% with same therapy
- Burkitt Lymphoma Research Network
 - Leverage existing partnership US centers/LMIC
 - Cooperative agreement (U01) – to leverage and maintain “cross talk” between extramural and intramural expertise

Burkitt Lymphoma Research Network

- **P30 supplements** (June 2016)
 - 6 LMIC centers \$100K x 2 yrs
- **U01** (2018) supporting the network

Research Projects for Burkitt Lymphoma Research Network

1. **Implementation Science project** – Develop resource-appropriate diagnostic and treatment platforms (**OCC**)
2. **Biology of regional associated cancer** – comparison of molecular biology/genomics of Burkitt lymphoma - endemic (Africa vs. Latin America) vs. EBV(-) vs. HIV associated (**CCR** and **OCG**)
3. **Precision Cancer Prevention** – Africa in optimal platform to test potential EBV vaccines (**NIAID/NCI**)

NCI & CGH's Priorities in Global Health

- APEC Cervical Cancer Initiative
- Strengthening global cancer research
- Building a global cancer research community
- **Translating research results into practice**

Asia-Pacific Economic Cooperation

- 21 economies bordering Pacific Ocean
 - Americas: Canada, Chile, Mexico, Peru, US
 - Asia: Brunei, China, Hong Kong, Indonesia, Japan, Korea, Malaysia, Philippines, Russia, Singapore, Taiwan, Thailand, Vietnam
 - Oceania: Australia, PNG, NZ
- Founded in 1989
- Yearly meetings, initial focus on trade and economy

Asia-Pacific Economic Cooperation

- Health Working Group
 - Ministers of Health
- Committee on Trade & Investment
 - Life Sciences Innovation Forum; interaction between government, academia & industry
- Policy Partnership on Women and the Economy

Asia Pacific Economic Cooperation (APEC) Cervical Cancer Initiative

Organized Workshop I – China, 2014

Shared evidence, national experiences, and best practices for HPV vaccination and cervical cancer screening

Facilitated development of evidence-based recommendations by and for APEC member economies

Participated in Health Working Group – Philippines, 2015

Working Group and APEC approval of recommendations

Developing Workshop II – Peru, August 2016

Develop implementation plan for key recommendations
Identify and/or develop tools to assist evidence-based policymaking



NCI & CGH's Priorities in Global Health

- Cancer and NCDs Centers of Research Excellence
- Strengthening global cancer research
- Building a global cancer research community
- Translating research results into practice



Ghana

**Johns Hopkins
University
Cervical Cancer
Prevention Program**

**University of
Michigan
Intervention study
with traditional
healers**

**Thomas Jefferson
University
Prostate cancer
study**

**Stanford
University
Prostate cancer
screening study**

**University of
Chicago
Breast cancer
treatment study**

**Vanderbilt
University
Colorectal
cancer study**

UK Universities Working in Ghana

- University of Bristol
- University of Cambridge
- University of London, Imperial College
- University of Glasgow
- University of Manchester
- University of Reading
- University of Oxford
- University of Southampton
- University of Surrey
- 10. Barts Cancer Institute
- 11. Institute for Cancer Research, London
- 12. Kings College, London
- 13. Leeds
- 14. NICE
- 15. Queens University, Belfast
- 16. Royal Marsden Hospital
- 17. University College, London
- 18. University of Warwick

AMPATH Model

Founders:

- **Goal:** To create a sustainable research program including Research Program Office; Research and Sponsored Programs; Institutional Review Board; and ISO certified laboratory
- **Overarching Principle:** Each Research Project must have both a North American and a Kenyan principal investigator
- **Established:** In 1998; based in El Doret, Kenya

www.ampathkenya.org



*Indiana University, Moi University SOM
Moi Teaching & Referral Hospital*

AMPATH Model

- **Current Leadership:** Dr. Rachel Vreeman, Indiana University and Dr. Winstone Nyandiko, Moi University
- **Kenya Partners:** Moi University School of Medicine and Moi Teaching and Referral Hospital
- **USG Partner:** USAID-PEPFAR and five NCI-designated Cancer Centers
- **North American Partners:** Indiana Univ., Brown Univ., Duke Univ., Lehigh Valley Hospital, Provident Portland Medical Center, Purdue Univ., Univ. of Massachusetts, Univ. of Toronto, and Univ. of Utah

AMPATH Program Structure

- **5 Co-Field Directors for Research**

3 are full-time in Kenya

- **9 Research Working Groups**

Adult medicine, Basic science, Behavioral & social science, Cardiovascular and pulmonary disease, Oncology, Pediatrics, Public health & primary care, Reproductive health, and Tuberculosis

- **7 Core Facilities**

Operations, Data management, Biostatistics, Clinical informatics, Pharmacy, Laboratory, and Bioethics

AMPATH Outcomes, 17 Years Later

- Over 90 active research projects
- More than \$83.4M in research funding
- Collaborators from > 19 universities and academic institutions in Africa, Europe, and North America
- More than 275 publications

Regional Centers of Excellence NCD Research

- Non-communicable diseases in low- and middle-income countries
 - Broad definition of NCDs, includes mental health, trauma, surgery, hematology, palliative care, etc
- Planning grants (P20), \$200,000 per year for 2 years
- Consortia of HIC and LMIC institutions working in selected region or country

Regional Centers of NCD Research Excellence

- NCI developed FOA with input from other NIH institutes; we will ask them to consider co-sponsoring
- NCI plans follow-up FOA to build the Centers of Research Excellence
- NCI will ask other countries to fund the participation of their universities in relevant consortia
 - Australia, China, Denmark, France, Germany, Ireland, Japan, Korea, NZ, Netherlands, Norway, Sweden, etc

Questions?

CGH Contact Information

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www.cancer.gov/globalhealth

Telephone number:

+1-240-276-5810

Office street address:

9609 Medical Center Drive, Rockville, MD
(near Shady Grove Adventist Hospital)

Email:

NCIGlobalHealth@mail.nih.gov

Twitter Handle:

@NCIGlobalHealth

GCPM:

www.gcpm.globalonc.org



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INSTITUTE

Supplemental Material

Ongoing Evaluations

1. Research

- 2013 Cancer Centers RFP and 2015 Cancer Centers Supplements
- 2015 P20 Regional Centers for Research Excellence
- NCI Affordable Cancer Technologies (UH2 and UH3)
- CGH Small Grants Program (BIGCAT and CARPHA)

2. Training

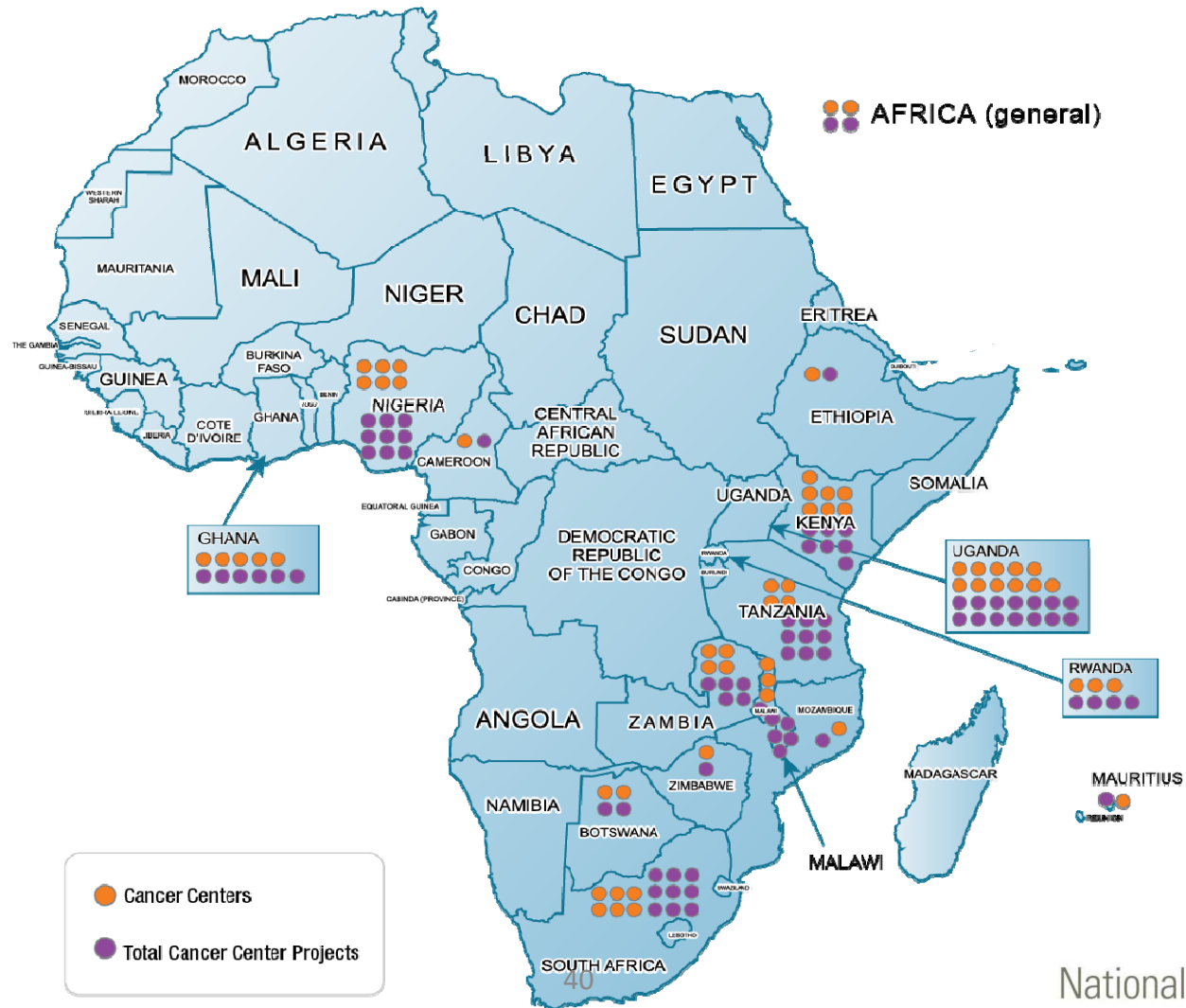
- Summer Curriculum in Cancer Prevention
- Grant Writing/Scientific Writing Workshops
- Short Term Scientist Exchange Program

3. Evidence to Policy

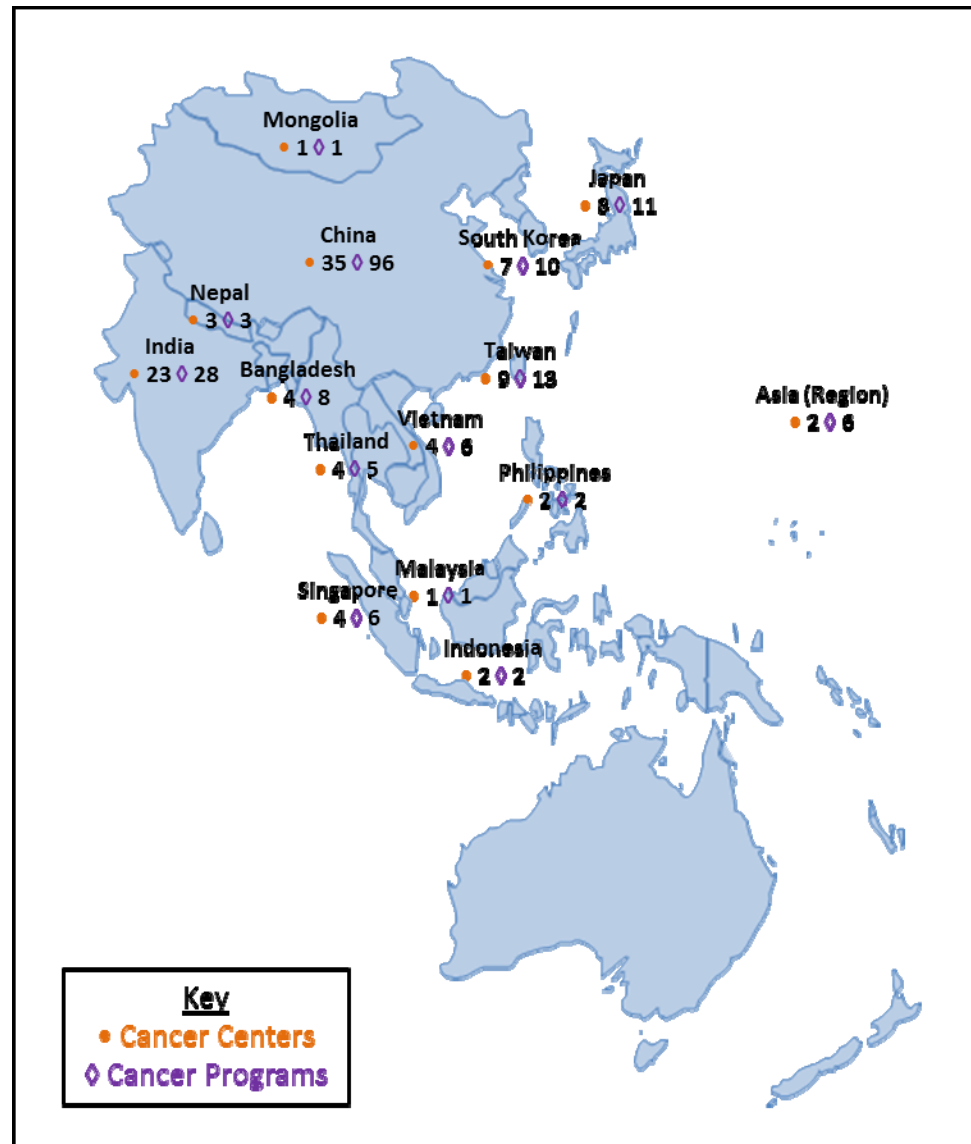
- Leadership Forums in Cancer Control Planning
- International Cancer Control Partnership
- Kenya Country Stakeholder Engagement Program

Cancer Center Activities by selected regions

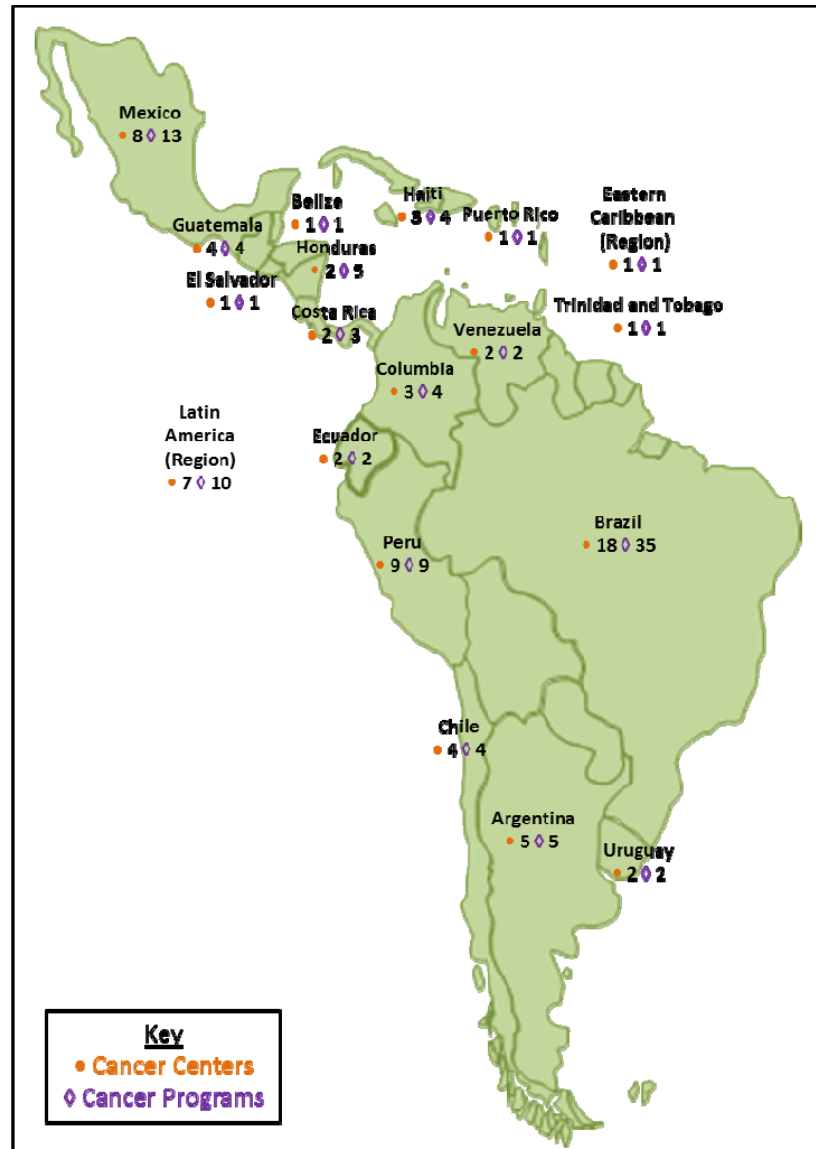
NCI-Designated Cancer Centers – African Projects



Cancer Center projects in SE Asia



Cancer Center projects in LA



FY13 RFP to NCI-Designated Cancer Centers informed future funding opportunities

15 awards (of 43 applications)

- **4** proposals awarded 2nd round funding
 - *Administrative Supplement to Promote Cancer Prevention and Control Research in Low and Middle Income Countries*
- **2** proposals received other NCI funding
 - UH2 CA189910 *“Point-of-care Diagnostic Tools To Improve Global Cervical Cancer Control Programs”*
 - U54 CA190152 *“Malawi Cancer Consortium”*

FY13 RFP to the NCI-Designated Cancer Centers

Strengthening Global Cancer Research

Cancer Control Planning & Implementation

Dana-Farber Cancer Institute | Healis-Sekhsaria Institute for Public Health, India

Tobacco Free Teachers: Pilot Study to Assess Program Adoption in Schools in India

Outcomes:

1. **Improved** understanding of Indian Departments of Education infrastructure
2. **Submitted** R01 grant informed by study findings in 2015

Affordable Cancer Technology Development

MD Anderson Cancer Center | Barretos Cancer Hospital, Brazil

A Low Cost Optical Imaging Tool for Cervical Cancer Prevention

Outcomes:

1. **Fostered** collaboration at *Cervical Cancer Prevention & Treatment in Latin America Research Symposium*
2. **Awarded** UH2 grant: Cancer Detection, Diagnosis, & Treatment Technologies for Global Health

FY13 RFP to the NCI-Designated Cancer Centers

Strengthening Global Cancer Research

Region-specific Cancer Research

UCSF | Muhimbili University of Health and Allied Sciences, Ocean Roads Cancer Institute, Tanzania

Outcomes:

1. **Fostered** collaboration to identify possible genetic, molecular, and infectious determinants of EC
2. **Applied** for P20 RCRE “To enhance capacity for population health research by developing career tracks for independent researchers focusing their careers on cancer and CVD”

Creating Productive Research Collaborations

UNC | Center for Infectious Disease Research, Zambia; Ministry of Health, Malawi

Outcomes:

1. **Awarded** U54 CA190152 “Malawi Cancer Consortium”
2. **Applied** for P20 RCRE “To increase the collaboration among cancer, injury, and cardiovascular researchers by planning an RCRE that serves the health needs of the Malawian partners.”

Collaborative Research Activities (by division)

Collaborations within NCI

- CCR: Hepatitis and Liver Cancer
- DCCPS: TOBAC (with FIC), Implementation Science, Cancer Stigma, Cancer Control Planning
- DCTD: ACT, Global Radiation Oncology/IAEA
- DCEG: Esophageal Cancer Research, Biostatistical and Epidemiology Training
- DCP: International Cancer Screening Network, Summer Curriculum

Collaborative Research with FIC

- PAR 13-027: International Research Ethics Education and Curriculum Development Award (2014)
- PAR 16-052: Global NCD and Injury Across the Lifespan: Exploratory Research (2016)
- Global Scholars
- Training grants for US and non-US residents

Affordable Cancer Technologies Program: Funded Projects (Round 1)

- Adapting the Cepheid GeneXpert test to detect HPV (Louise Kuhn, Columbia)
 - Country proposed for UH3: South Africa
 - Technology: PCR with automated sample prep.
- High resolution micro-endoscopy for cervical cancer diagnosis
(Kathleen Schmeler, MD Anderson and Rebecca Richards-Kortum, Rice)
 - Country proposed for UH3: Brazil
 - Technology: Optical endoscopy for real-time imaging of cervix at very high resolution.
- Adaptation and testing of the CryoPen cryotherapy device for treating cervical neoplasia for use in LMICs
(Miriam Cremer, Magee-Women's Research Institute)
 - Countries proposed for UH3: Peru & Columbia
 - Technology: Cryotherapy device relying on linear compression-based cooling instead of liquid nitrogen.
- Assessing the performance, safety and efficacy of a new cryotherapy device using liquid CO₂
(Jean Anderson, Hopkins)
 - Country proposed for UH3: Philippines
 - Technology: Cryotherapy device that uses beverage-grade CO₂ to produce dry ice core to achieve necessary cooling.

Affordable Cancer Technologies Program: Funded Projects (Round 1)

- Low-cost enabling technology for image-guided photodynamic therapy of oral leukoplakia
(Jonathan Celli and Tayyaba Hasan, Massachusetts General Hospital)
 - Country proposed for UH3: India
 - Technology: Battery-powered PDT activated by high intensity LEDs
- A low-cost test for hepatitis C virus to identify patients at risk for developing hepatocellular carcinoma
(Robert Murphy, Northwestern University)
 - Country proposed for UH3: Nigeria
 - Technology: RNA viral load test for screening at-risk patients and monitoring treatment outcomes.
- Low-cost, portable computer-aided detection and diagnostic (CADD) tools for non-invasive triage of breast cancer patients with palpable masses
(Susan Love, Dr. Susan Love Research Foundation)
 - Country proposed for UH3: Mexico
 - Technology: CADD algorithm development combined with portable ultrasound. Goal is to enable minimally-trained health care workers to hold the probe over the palpable lesion and tell the woman whether she should obtain a biopsy.