

National Cancer Institute

NCI Director's Update

Dr. John E. Niederhuber
Director, National Cancer Institute

National Cancer Advisory Board
September 15, 2009

U.S. DEPARTMENT
OF HEALTH AND
HUMAN SERVICES

National Institutes
of Health

NCI – Sept. 2009



- **Closing out FY2009**
- **The American Recovery and Reinvestment Act**
- **Using ARRA dollars to fund vital science**

Final Quarter FY2009

Appropriated budget: \$4,968,973 (2.9% increase)

Number of grants awarded for
FY2009 (as of Sept. 11) 6,239

Estimated final number of grants
to be awarded in FY009 >7,075

Number of grants awarded in
FY2008 7,010

Number of grants awarded in
FY2007 7,103

Dollars in thousands

ARRA \$ to NIH

- **\$7.4 billion: Institutes and Centers**
 - **\$1.26 billion to NCI**
- **\$1 billion: extramural construction**
- **\$500 million: NIH construction**
- **\$300 million: shared instrumentation**
- **\$400 million: comparative effectiveness research (\$400M HHS; \$300M AHRQ)**
- **\$800 million: NIH Office of the Director**

ARRA Funding: A Once in a Lifetime Opportunity

- **Careful and thoughtful planning by the NCI**
 - **Strategic foresight: minimizing the out-year (cliff) effect**
 - **Maximizing our ability to generate Congressional enthusiasm about investments in cancer research**



Payline – ARRA

- **16th percentile:** 2009 RPG payline from appropriated funds
- **16th to 18th percentile:** 4-year grants through stimulus, followed by appropriated dollars
- **18th to 25th percentile:** 4-year grants (and 4-year grants for 2 years)

369 RPGs have been funded due to the extended payline under ARRA

ARRA at NCI

Total NCI ARRA	\$1,256,517,000	% of Total
Grants	\$731,380,000	59%
Supplements to existing awards	341,796,000	
New competing awards	389,584,000	
R&D contracts for the academic community	\$493,837,000	39%
Intramural Equipment	\$6,300,000	0%
Support	\$25,000,000	2%

NIH Funded Cancer Grants

CER (27 awards)	\$61,071,697
Summer (77 awards)	4,503,782
GO (matched 18 awards)	23,802,156
Challenge (18 awards)	17,700,000
Total (140 awards)	\$106,077,635

“Blue Sheets”

- 1,151 items have been submitted
- 1,069 items have been approved
- Awaiting approval of 82 items

AMIA-Transp Y10A	AMIA-Transp Y9A	AMIA-Transp Y8A	AMIA-Transp Y7A	AMIA-Transp Y6A	AMIA-Transp Y5A	AMIA-Transp Y4A	AMIA-Transp Y3A	AMIA-Transp Y2A	AMIA-Transp Y1A		
Grant No.	IC	Congressional District	PI	Institution	Location (City/State)	Project Title	Summary/Public Health Relevance	Total FY 2009 Obligations	Type Award	Anticipated Start Date	Year
10CAT10AC001	MD	0418	GAIL STEVEN J	UNIVERSITY OF MICHIGAN AT ANN ARBOR	ANN ARBOR, MI	Quality of Cancer Care Evaluation and Research	Development of a research agenda to evaluate cancer care and service delivery in underserved and underserved populations. The project will investigate the mechanisms of dissemination of care and how these mechanisms affect the quality of care for underserved populations. The project will also investigate the mechanisms of dissemination of care and how these mechanisms affect the quality of care for underserved populations.	\$ 138,261	Admin Support	9/15/09	
10CAT10AC002	MD	0403	JEE ROBERT RAY	VIRGINIA COMMONWEALTH UNIVERSITY	RICHMOND, VA	Development of Cancer Screening Agents	The project will investigate the mechanisms of dissemination of care and how these mechanisms affect the quality of care for underserved populations. The project will also investigate the mechanisms of dissemination of care and how these mechanisms affect the quality of care for underserved populations.	\$ 257,715	Grant	9/15/09	
10CAT10AC003	MD	0483	BESSIEE SAVIORA	UNIVERSITY OF CALIFORNIA SAN DIEGO	SAN DIEGO, CA	Use of Biomarkers to Improve Outcomes of Cancer Treatment	The project will investigate the mechanisms of dissemination of care and how these mechanisms affect the quality of care for underserved populations. The project will also investigate the mechanisms of dissemination of care and how these mechanisms affect the quality of care for underserved populations.	\$ 147,482	Grant	9/15/09	
10CAT10AC004	MD	0504	ROBIN ROBERT	SOUTH CAROLINA STATE UNIVERSITY	COLUMBIA, SC	Targeted Therapy for Metastatic Ovarian Cancer	The project will investigate the mechanisms of dissemination of care and how these mechanisms affect the quality of care for underserved populations. The project will also investigate the mechanisms of dissemination of care and how these mechanisms affect the quality of care for underserved populations.	\$ 223,834	Grant	9/15/09	
10CAT10AC005	MD	0403	DORIS RUTKA	TOBEE FREEPORT FOR	LAURENS, SC	Regulation and Control of the	The project will investigate the mechanisms of dissemination of care and how these mechanisms affect the quality of care for underserved populations. The project will also investigate the mechanisms of dissemination of care and how these mechanisms affect the quality of care for underserved populations.	\$ 373,282	Research	9/15/09	
10CAT10AC006	MD	0507	MARKET CLAUDIA ROSE	UNIVERSITY OF MARYLAND BALTIMORE	BALTIMORE, MD	The National Cancer Community Based Program	The project will investigate the mechanisms of dissemination of care and how these mechanisms affect the quality of care for underserved populations. The project will also investigate the mechanisms of dissemination of care and how these mechanisms affect the quality of care for underserved populations.	\$ 89,984	Admin Support	9/15/09	
10CAT10AC007	MD	0518	ANGEL MATTHEW D	OHIO STATE UNIVERSITY	COLUMBUS, OH	Genetic and Signaling Pathways in Epithelial Tumor	The project will investigate the mechanisms of dissemination of care and how these mechanisms affect the quality of care for underserved populations. The project will also investigate the mechanisms of dissemination of care and how these mechanisms affect the quality of care for underserved populations.	\$ 428,488	Admin Support	9/15/09	
10CAT10AC008	MD	0511	JU ZHONGDONG	CASE WESTERN RESERVE UNIVERSITY	CLEVELAND, OH	Highly Stable Nanoparticles for Diagnostic Cancer Imaging	The project will investigate the mechanisms of dissemination of care and how these mechanisms affect the quality of care for underserved populations. The project will also investigate the mechanisms of dissemination of care and how these mechanisms affect the quality of care for underserved populations.	\$ 352,016	Admin Support	9/15/09	
10CAT10AC009	MD	0402	REBECCAH TAMAR K	UNIVERSITY OF BRIDGE ISLAND	FOSTERVILLE, VA	Use of Nanotechnology Platform for Cancer Imaging and Therapy	The project will investigate the mechanisms of dissemination of care and how these mechanisms affect the quality of care for underserved populations. The project will also investigate the mechanisms of dissemination of care and how these mechanisms affect the quality of care for underserved populations.	\$ 381,288	Admin Support	9/15/09	
10CAT10AC010	MD	0407	DANNY COOPER	UNIVERSITY OF TEXAS MD ANDERSON CANCER	HOUSTON, TX	Development of a Novel Therapeutic Approach for the Treatment of Advanced Stage Cancer	The project will investigate the mechanisms of dissemination of care and how these mechanisms affect the quality of care for underserved populations. The project will also investigate the mechanisms of dissemination of care and how these mechanisms affect the quality of care for underserved populations.	\$ 117,418	Admin Support	9/15/09	
10CAT10AC011	MD	0403	COLLEEN ANNE ADAM	UNIVERSITY OF MASSACHUSETTS BOSTON	BOSTON, MA	Development of a Novel Therapeutic Approach for the Treatment of Advanced Stage Cancer	The project will investigate the mechanisms of dissemination of care and how these mechanisms affect the quality of care for underserved populations. The project will also investigate the mechanisms of dissemination of care and how these mechanisms affect the quality of care for underserved populations.	\$ 154,880	Admin Support	9/15/09	
10CAT10AC012	MD	0203	REBECCA SARKIS E	UNIVERSITY OF TEXAS AT DALLAS	DALLAS, TX	Development of a Novel Therapeutic Approach for the Treatment of Advanced Stage Cancer	The project will investigate the mechanisms of dissemination of care and how these mechanisms affect the quality of care for underserved populations. The project will also investigate the mechanisms of dissemination of care and how these mechanisms affect the quality of care for underserved populations.	\$ 257,484	Admin Support	9/15/09	
10CAT10AC013	MD	0401	WILL WALKER	UNIVERSITY OF TEXAS AT AUSTIN	AUSTIN, TX	Development of a Novel Therapeutic Approach for the Treatment of Advanced Stage Cancer	The project will investigate the mechanisms of dissemination of care and how these mechanisms affect the quality of care for underserved populations. The project will also investigate the mechanisms of dissemination of care and how these mechanisms affect the quality of care for underserved populations.	\$ 148,752	Admin Support	9/15/09	
10CAT10AC014	MD	0507	FRANCIS LOUISE E	UNIVERSITY OF TEXAS MD ANDERSON CANCER	HOUSTON, TX	Development of a Novel Therapeutic Approach for the Treatment of Advanced Stage Cancer	The project will investigate the mechanisms of dissemination of care and how these mechanisms affect the quality of care for underserved populations. The project will also investigate the mechanisms of dissemination of care and how these mechanisms affect the quality of care for underserved populations.	\$ 178,488	Admin Support	9/15/09	
10CAT10AC015	MD	0404	SMITH RICHARD D	WISCONSIN STATE UNIVERSITY	MADISON, WI	Development of a Novel Therapeutic Approach for the Treatment of Advanced Stage Cancer	The project will investigate the mechanisms of dissemination of care and how these mechanisms affect the quality of care for underserved populations. The project will also investigate the mechanisms of dissemination of care and how these mechanisms affect the quality of care for underserved populations.	\$ 267,788	Admin Support	9/15/09	
10CAT10AC016	MD	0504	ISLAN ANTHONY	OSION RESEARCH INSTITUTE	LOS ANGELES, CA	Development of a Novel Therapeutic Approach for the Treatment of Advanced Stage Cancer	The project will investigate the mechanisms of dissemination of care and how these mechanisms affect the quality of care for underserved populations. The project will also investigate the mechanisms of dissemination of care and how these mechanisms affect the quality of care for underserved populations.	\$ 148,884	Admin Support	9/15/09	
10CAT10AC017	MD	0103	RODRIGUEZ MARIANA V	YALE UNIVERSITY	NEW HAVEN, CT	Development of a Novel Therapeutic Approach for the Treatment of Advanced Stage Cancer	The project will investigate the mechanisms of dissemination of care and how these mechanisms affect the quality of care for underserved populations. The project will also investigate the mechanisms of dissemination of care and how these mechanisms affect the quality of care for underserved populations.	\$ 254,288	Admin Support	9/15/09	
10CAT10AC018	MD	0407	BRONKHORST MARCEL J	UNIVERSITY OF ARIZONA	TUCSON, AZ	Development of a Novel Therapeutic Approach for the Treatment of Advanced Stage Cancer	The project will investigate the mechanisms of dissemination of care and how these mechanisms affect the quality of care for underserved populations. The project will also investigate the mechanisms of dissemination of care and how these mechanisms affect the quality of care for underserved populations.	\$ 138,288	Admin Support	9/15/09	
10CAT10AC019	MD	0514	SPRATT HESS	UNIVERSITY OF TEXAS MEDICAL BRANCH	DALLAS, TX	Development of a Novel Therapeutic Approach for the Treatment of Advanced Stage Cancer	The project will investigate the mechanisms of dissemination of care and how these mechanisms affect the quality of care for underserved populations. The project will also investigate the mechanisms of dissemination of care and how these mechanisms affect the quality of care for underserved populations.	\$ 127,288	Admin Support	9/15/09	
10CAT10AC020	MD	0503	RODRIGUEZ ALEXANDER KARLA	MARQUETTE UNIVERSITY	DANNING, WI	Development of a Novel Therapeutic Approach for the Treatment of Advanced Stage Cancer	The project will investigate the mechanisms of dissemination of care and how these mechanisms affect the quality of care for underserved populations. The project will also investigate the mechanisms of dissemination of care and how these mechanisms affect the quality of care for underserved populations.	\$ 138,288	Admin Support	9/15/09	
10CAT10AC021	MD	0403	ROBIN NEW MICHAEL	MASSACHUSETTS GENERAL HOSPITAL	BOSTON, MA	Development of a Novel Therapeutic Approach for the Treatment of Advanced Stage Cancer	The project will investigate the mechanisms of dissemination of care and how these mechanisms affect the quality of care for underserved populations. The project will also investigate the mechanisms of dissemination of care and how these mechanisms affect the quality of care for underserved populations.	\$ 103,812	Admin Support	9/15/09	
10CAT10AC022	MD	0507	JOHNSON SPARON MICHAEL	UNIVERSITY OF TEXAS MD ANDERSON CANCER	HOUSTON, TX	Development of a Novel Therapeutic Approach for the Treatment of Advanced Stage Cancer	The project will investigate the mechanisms of dissemination of care and how these mechanisms affect the quality of care for underserved populations. The project will also investigate the mechanisms of dissemination of care and how these mechanisms affect the quality of care for underserved populations.	\$ 48,884	Admin Support	9/15/09	
10CAT10AC023	MD	0218	LA ROSE	COLUMBIA UNIVERSITY HEALTH SCIENCES	NEW YORK, NY	Development of a Novel Therapeutic Approach for the Treatment of Advanced Stage Cancer	The project will investigate the mechanisms of dissemination of care and how these mechanisms affect the quality of care for underserved populations. The project will also investigate the mechanisms of dissemination of care and how these mechanisms affect the quality of care for underserved populations.	\$ 84,488	Admin Support	9/15/09	

As of 9/14/09

Supplements

Examples of programs/projects funded via administrative and competitive supplements (current estimate of ARRA funds: \$342 million)

- Promote re-entry into biomedical & behavioral research careers
- Diversity programs
- Faculty startup and re-entry
- Cancer research training, career development and education
- Cohort studies
- Phase I/II therapeutic & imaging clinical trials
- General needs and small equipment needs for active grants
- Summer students
- SBIR/STTR workforce enhancement
- NCI Alliance for Nanotechnology
- Cancer Genome Characterization
- Centers new faculty appointments
- Cancer Center Partnerships
- Activities to Promote Research
- TARGET childhood cancer
- NCI Clinical Proteomic Technology

Equipment (admin.) = 16.6%

General support (admin.) = 15.0%

Payline for competitive supplements set at 23 (based on priority score)

R&D Contracts

- **Examples of programs and projects funded under contracts (current estimate of ARRA funds: \$494M)**
 - Cohort studies
 - Phase I/II therapeutic & imaging clinical trials
 - DCTD expansion of Chemical Biology Consortium & overall therapeutics program
 - **caBIG – Cancer Cloud**
 - DCTD clinical assay development & molecular characterization centers
 - **TCGA/TARGET**

Contract Example: CBC

- Goal: accelerate new therapies
- Government-academic collaborations
- Subcontracting
 - Identified qualified pool of academic contractors
 - Solicitation went to ~30 bidders
 - 11 awards made
 - 8 academic labs
 - 3 commercial labs

Challenge Grants

- NIH opted to fund **18 cancer Challenge Grants (\$17.7M)** of the 37 NCI sent forward
- **NCI selected an additional 41 high priority grants (\$38M)**
- **Pending availability of ARRA funds, NCI may select additional grants**
- **Comparative effectiveness research: NIH funded 15 NCI grants for \$13.2M**
- **Overall success rate 20% of grants reviewed**

GO Grants

- NIH **matched** NCI's funding of 18 cancer GO Grants (\$24M)
- NCI funded 33 additional GO Grants (\$64M)
 - AIDS: 21 awards, \$21M
 - Functional biology: 5 awards, \$24M
 - Translational: 5 awards, \$16M
 - Viruses and cancer: 2 awards, \$3M
- Comparative effectiveness research: NIH fully funded 12 NCI grants for \$48M
- Overall success rate 17% of grants reviewed

ACTNOW

- Accelerating Clinical Trials of Novel Oncologic Pathways
 - 37 early phase clinical trials of new treatment regimens
 - Awards contingent on IRB approval and opening to patient enrollment within 90 days; completion in 2 years

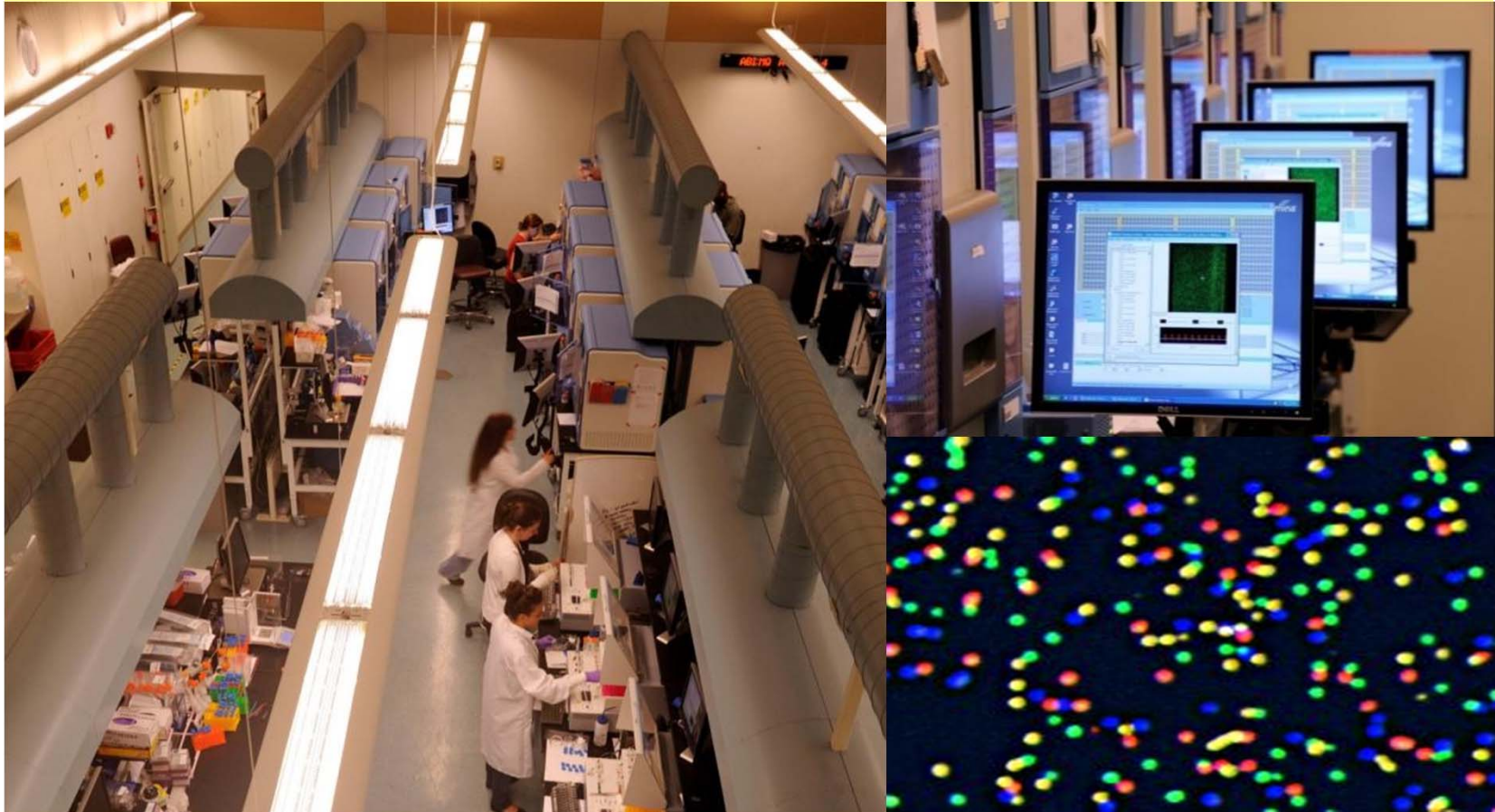
ARRA Funding for Cancer Research by Organ Site

Breast cancer	76 grants	\$14,735,425
Prostate cancer	54 grants	\$ 7,415,299
Colorectal cancer	40 grants	\$ 7,284,159
Lung cancer	35 grants	\$ 6,045,434
Pancreatic cancer	17 grants	\$ 2,969,897
Ovarian cancer	8 grants	\$ 1,430,823

As of July 2009

The Power of Technology

- Search for all gene defects
- Isolate proteins

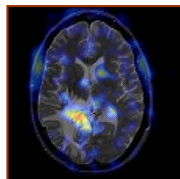




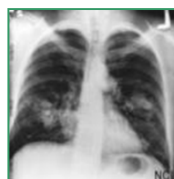
TCGA: Connecting multiple sources, experiments, and data types

Three Cancers - TCGA Pilot

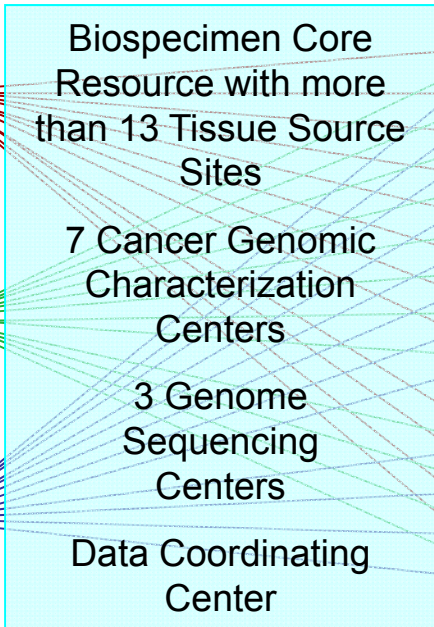
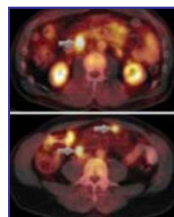
glioblastoma multiforme (brain)



squamous carcinoma (lung)

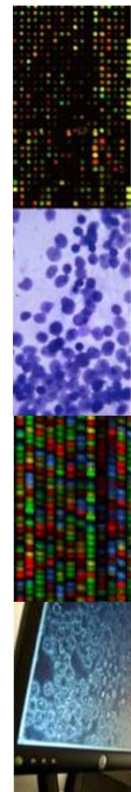


serous cystadenocarcinoma (ovarian)

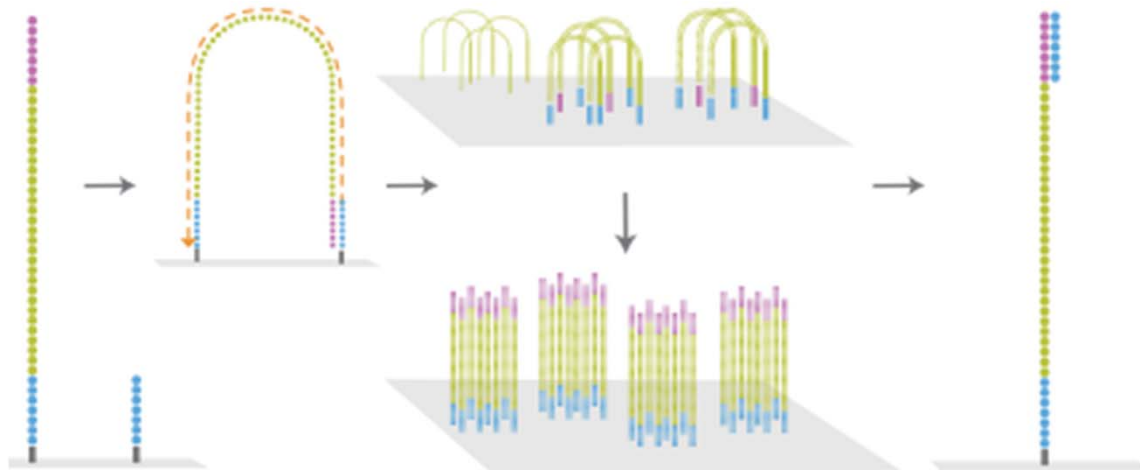


Multiple data types

- Clinical diagnosis
- Treatment history
- Histologic diagnosis
- Pathologic status
- Tissue anatomic site
- Surgical history
- Gene expression
- Chromosomal copy number
- Loss of heterozygosity
- Methylation patterns
- miRNA expression
- DNA sequence



“Next Gen” Sequencing Technology

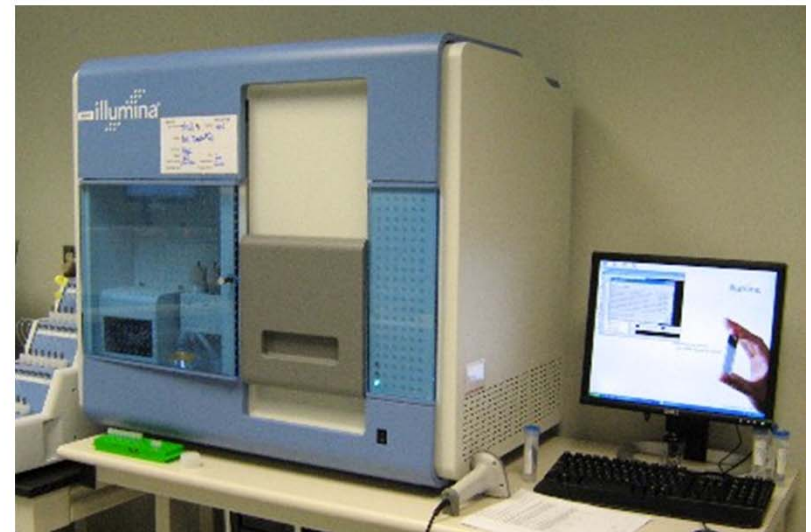
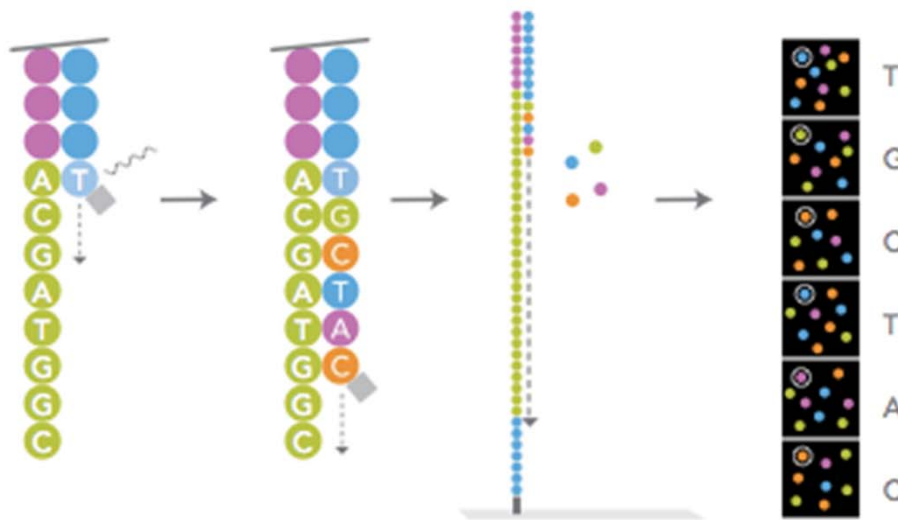


“Solexa” (2006)

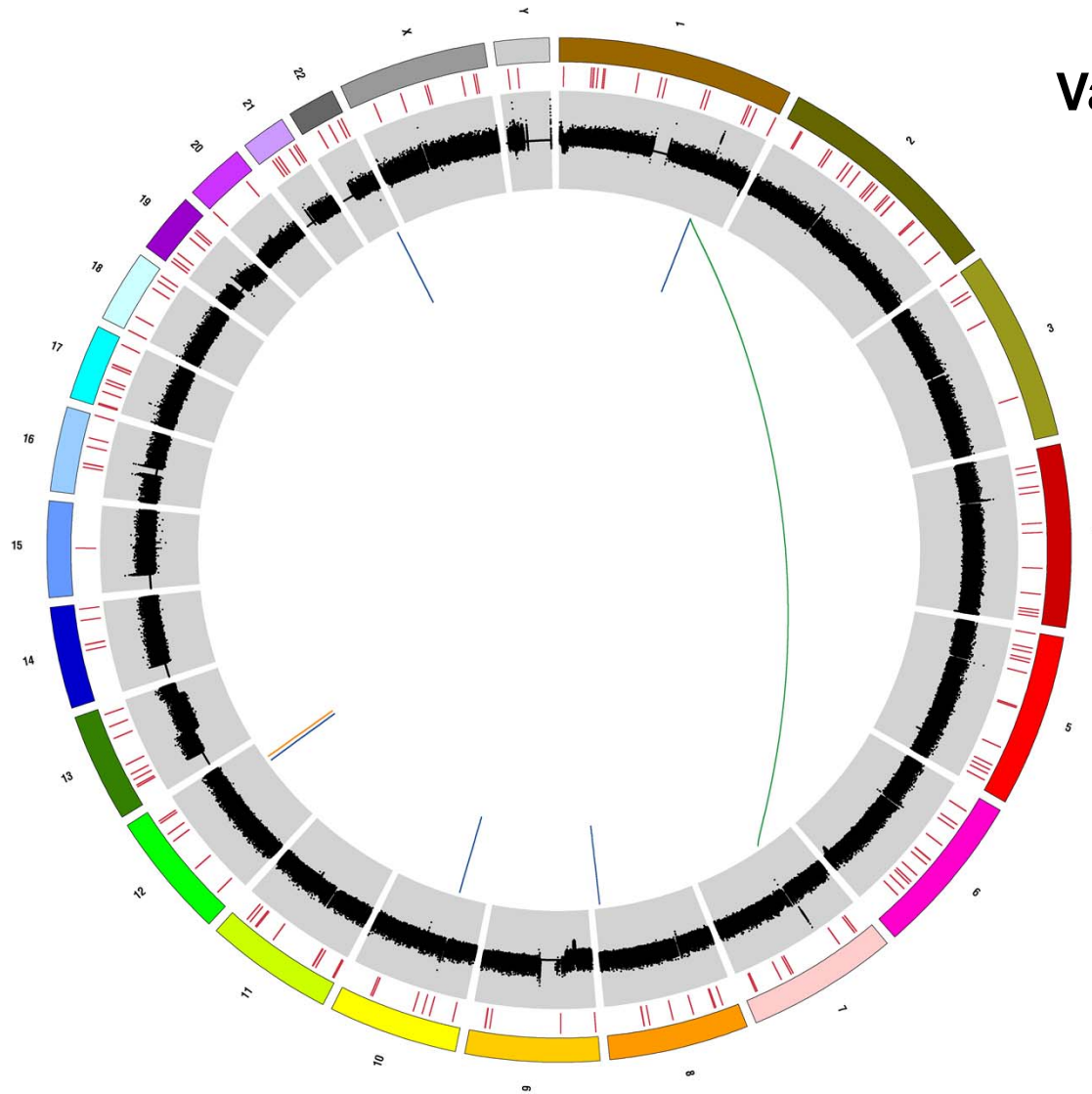
~1 Gb/wk

..
Illumina GA IIx (2009)

20-25 Gb/wk



Power of Whole Genome Sequence: “GBM1” Genome



Validated Somatic Changes:

- 185 mutations (40 Tier 1)
- 6 large indels
- 1 translocation

OVARIAN

Coverage(T/N) Callable Purity Ploidy
31x / 30x **81%** **90%** **2.8**

Name TCGA-13-0751
 Alias OV-0751
 Issued By Broad Institute
 Issue Date July 8, 2009

Point Mutations

Rate/Mb **0.75**
 Total **1786**
 Coding **9**

MIS 5
 STOP 1
 INDEL ---

HIGHLIGHTS

GENE	MUTATION	FUNCTION
TP53	Insertion	Tumor suppressor
EXOC6B	Missense	protein transport, exocytosis
ANKRD6	Missense	ankyrin
AHNAK	Missense	CNS development
C11orf52	Nonsense	?
GABRB3	Missense	GABA receptor

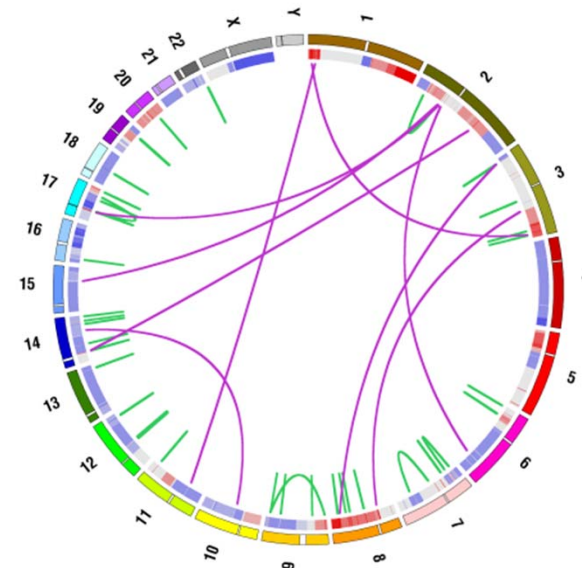
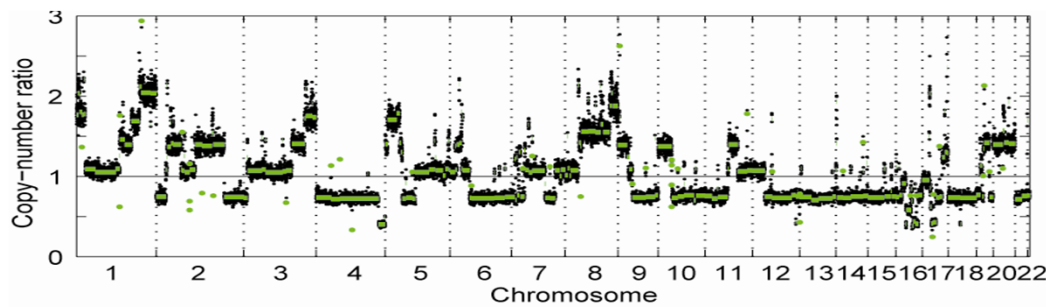
Lost BRCA1 germline indel

Chr. Aberrations

CNA Breaks ---
 TX-Inter **9**
 TX-Intra **15**

HIGHLIGHTS

**NF1-EFCAB5 fusion gene
 probably inactivating
 validated by RNA-seq**



Courtesy of Gaddy Getz – Unpublished, Analysis in Process

Cost of Sequencing

ABI 3730XL



454



Illumina



ABI SOLiD



Cost of human genome (30x coverage)

\$100,000 by late 2009

\$30,000 by late 2010

- Costs in samples; cost in analysis
- Optimizing density
- Whole-genome vs. whole-exome

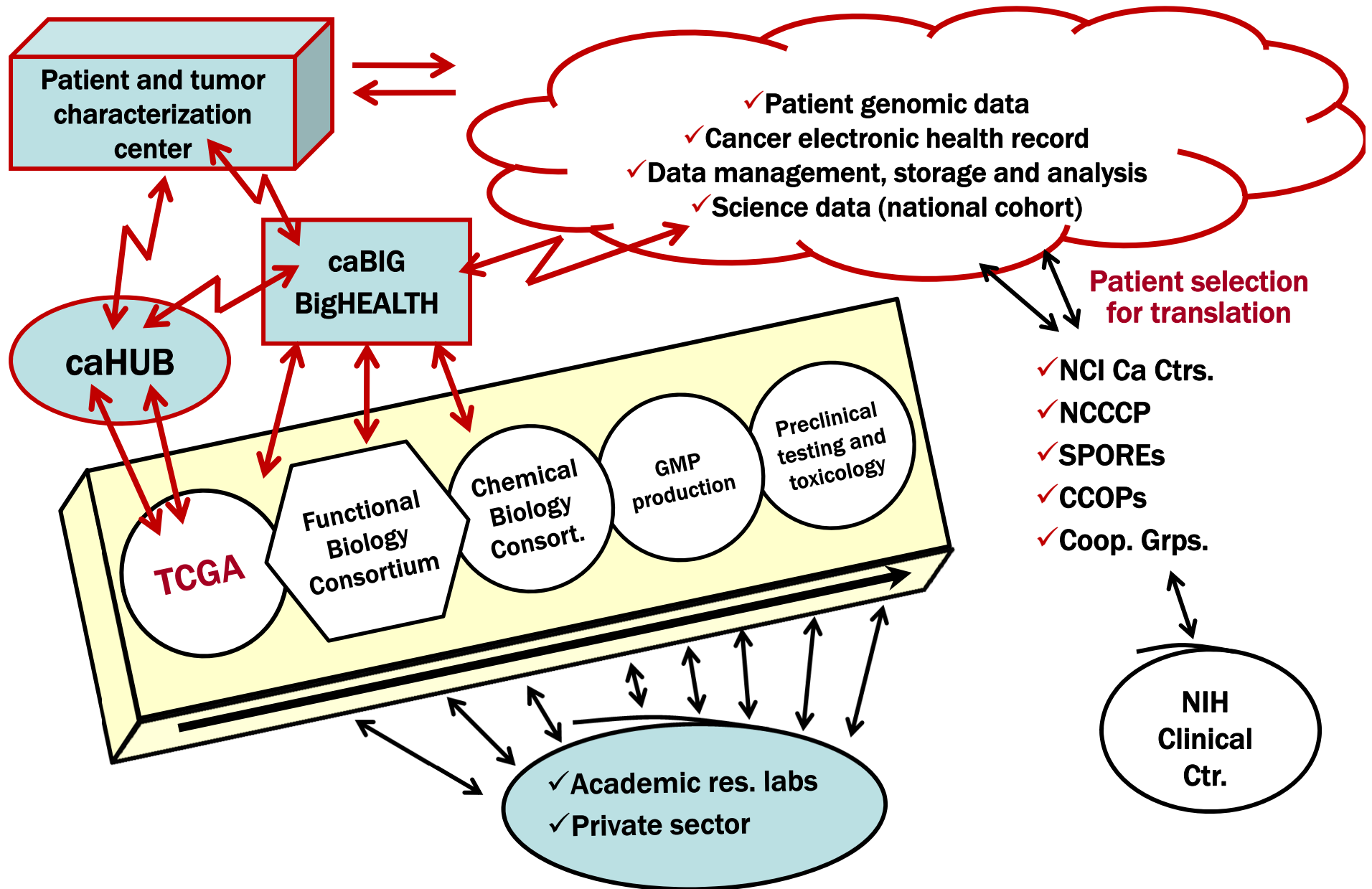
TCGA and TARGET

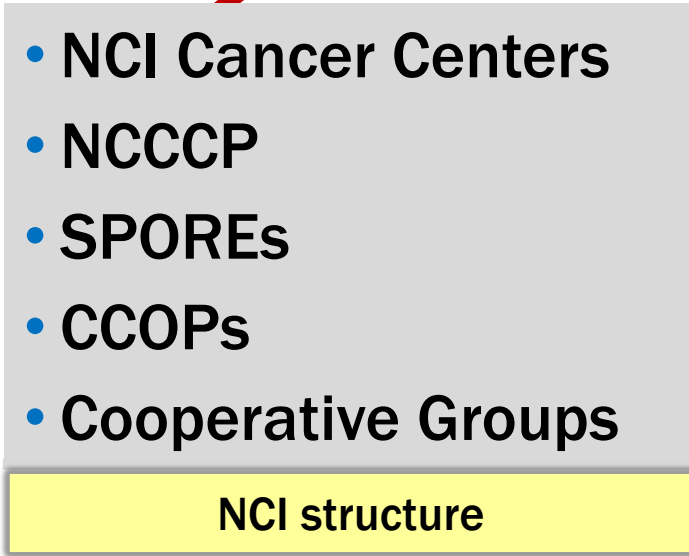
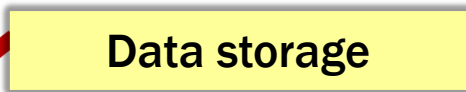
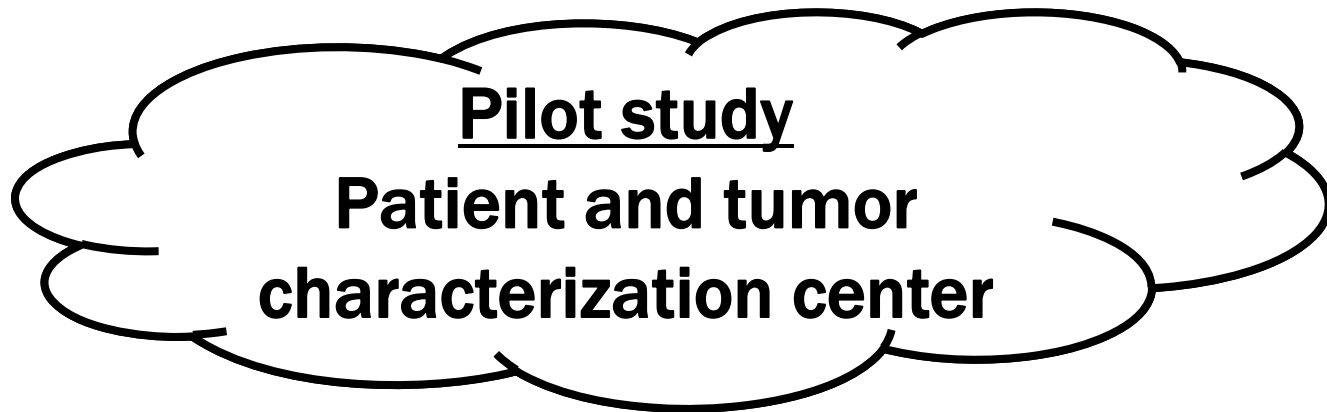
- NIH Signature Project (one of seven)
- Identification of relevant genetic alterations in cancer
- Involves >24 institutions and >100 scientists
- ARRA funding has allowed expansion up to 25 tumors
- Long-term goal of including all major cancer types and subtypes
- TARGET utilizes the TCGA approach in childhood cancers

caHUB

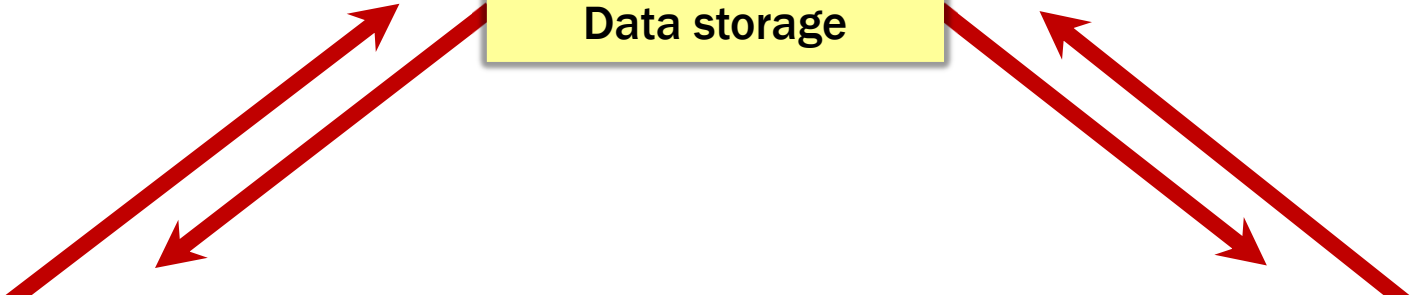
- A unique, centralized, public resource to ensure the adequate and continuous supply of human biospecimens and associated data
- caHUB Implementation
 - Tissue procurement (tumor and normal)
 - Pathology reference center/core biospecimen resource
 - Biospecimen R&D
- ARRA funds: \$60M

TCGA: Informing Science and Medicine





Point of Care Diagnostics



Dr. Francis Collins' Five Themes as NIH Director

- Apply high-throughput technologies to understand fundamental biology and uncover causes of specific disease states
- Translation: develop diagnostics, preventive strategies, and therapeutics
- Put science to work for healthcare reform
- A greater focus on global health
- Reinvigorate and empower the biomedical research community

