



CENTER for
STRATEGIC
SCIENTIFIC INITIATIVES

NATIONAL CANCER INSTITUTE

Advancing Innovation and Convergence In Cancer Research

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Health Sciences Director

Deputy Director, Center for Strategic Scientific Initiatives (CSSI)
Office of the Director, National Cancer Institute (NCI)
National Institutes of Health (NIH)

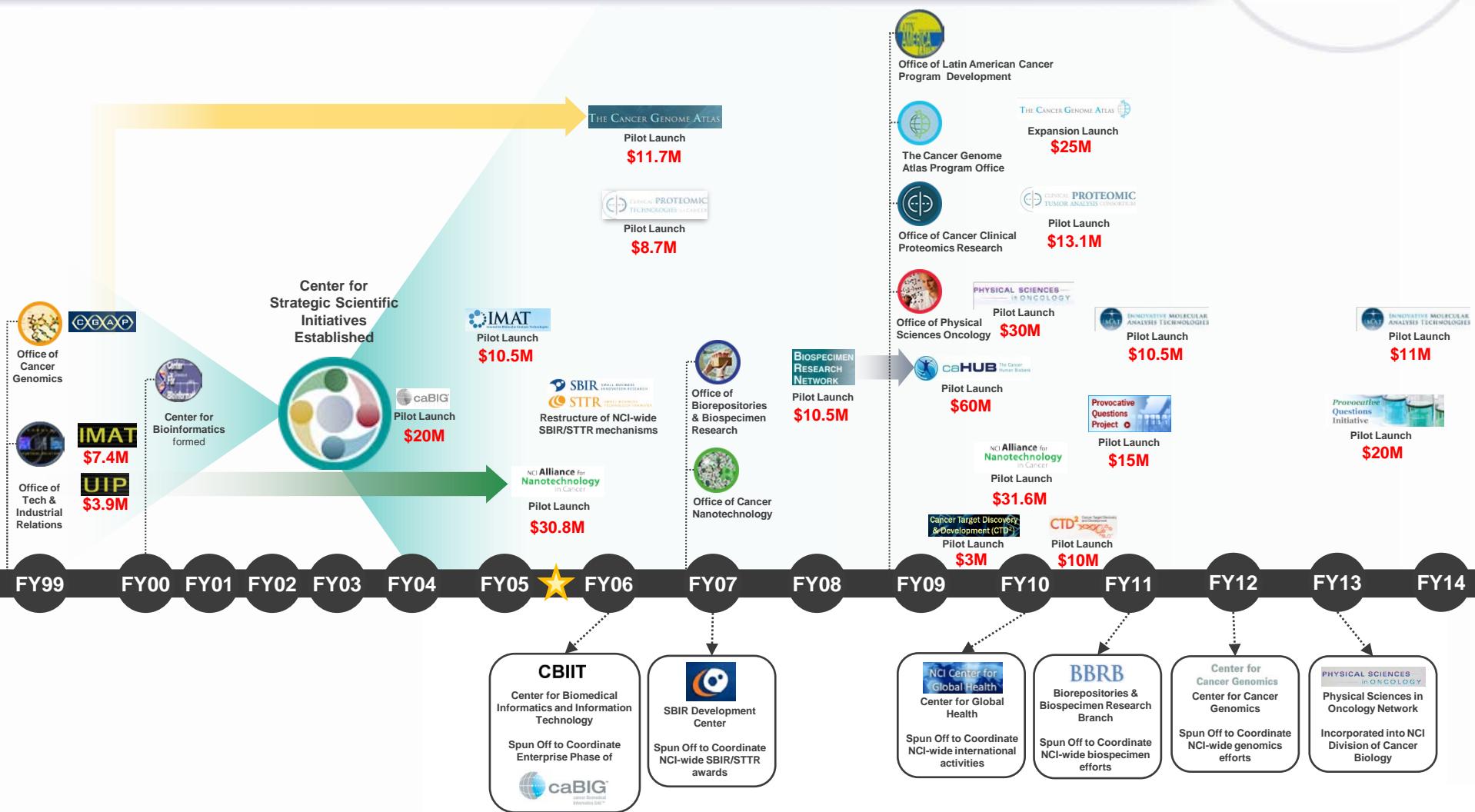


2015 ASEE Engineering Research Council Annual Meeting
Change and Research Opportunities: Perspectives from NIST, DOE, NGA, and NCI

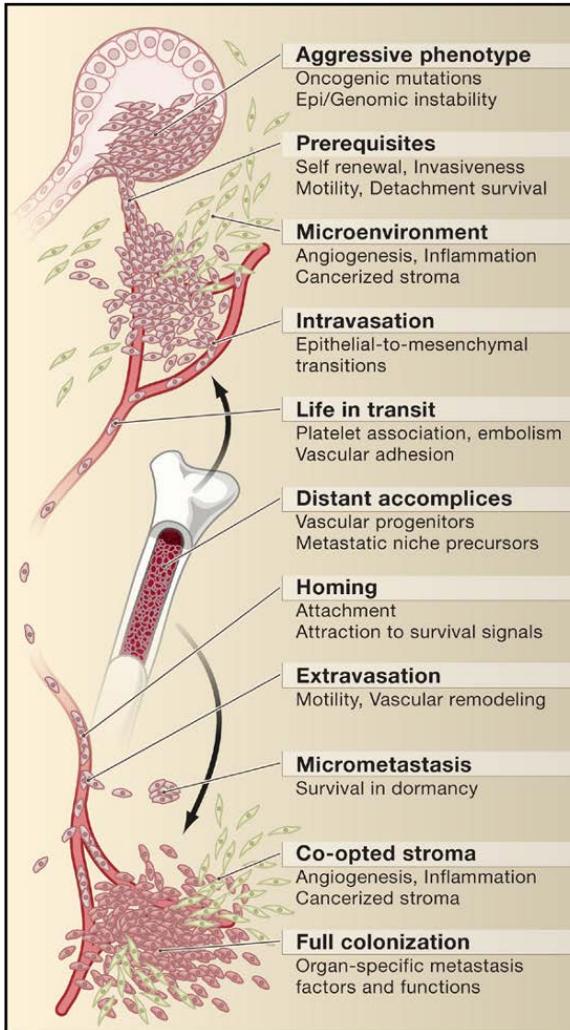


March 10, 2015

NCI Center for Strategic Scientific Initiatives (FY99 – FY14)



What is It? Tumor, Cancer, and Metastasis



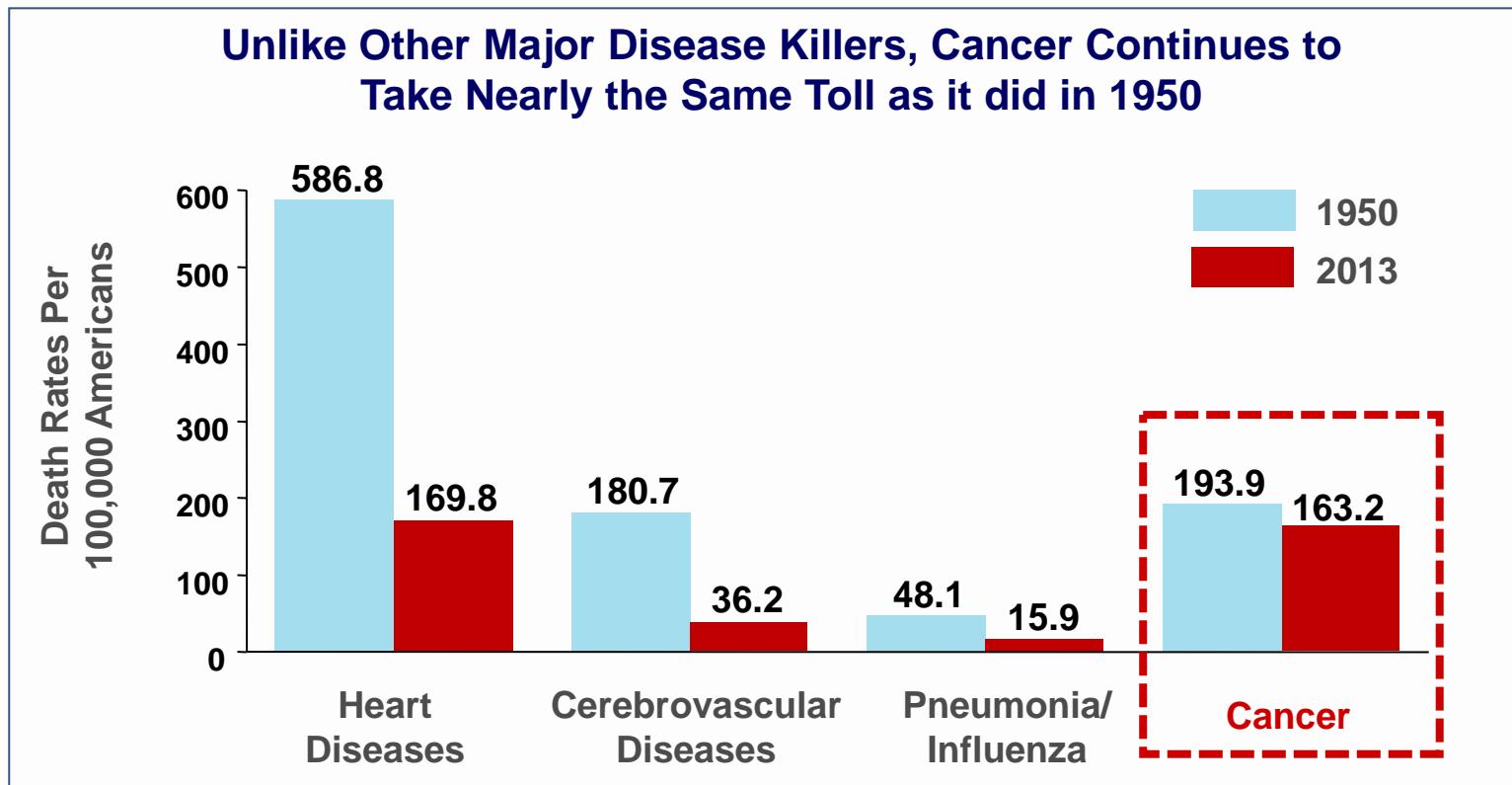
5 year Relative Survival Rates

Organ Site	All Stages	Localized	Regional	Distant
Prostate	99	>99	>99	28
Breast	89	99	85	25
Ovary	45	92	72	27
Uterine Cervix	68	91	57	16
Melanoma	91	98	63	16
Urinary Bladder	77	69	34	6
Kidney	72	92	65	12
Colon and rectum	65	90	71	13
Esophagus	18	40	21	4
Lung and bronchus	17	54	27	4
Liver	17	30	11	3
Pancreas	7	26	10	2

“...>90% of deaths are caused by disseminated disease or metastasis...”

In the U.S., Cancer Continues to Represent an Enormous Burden

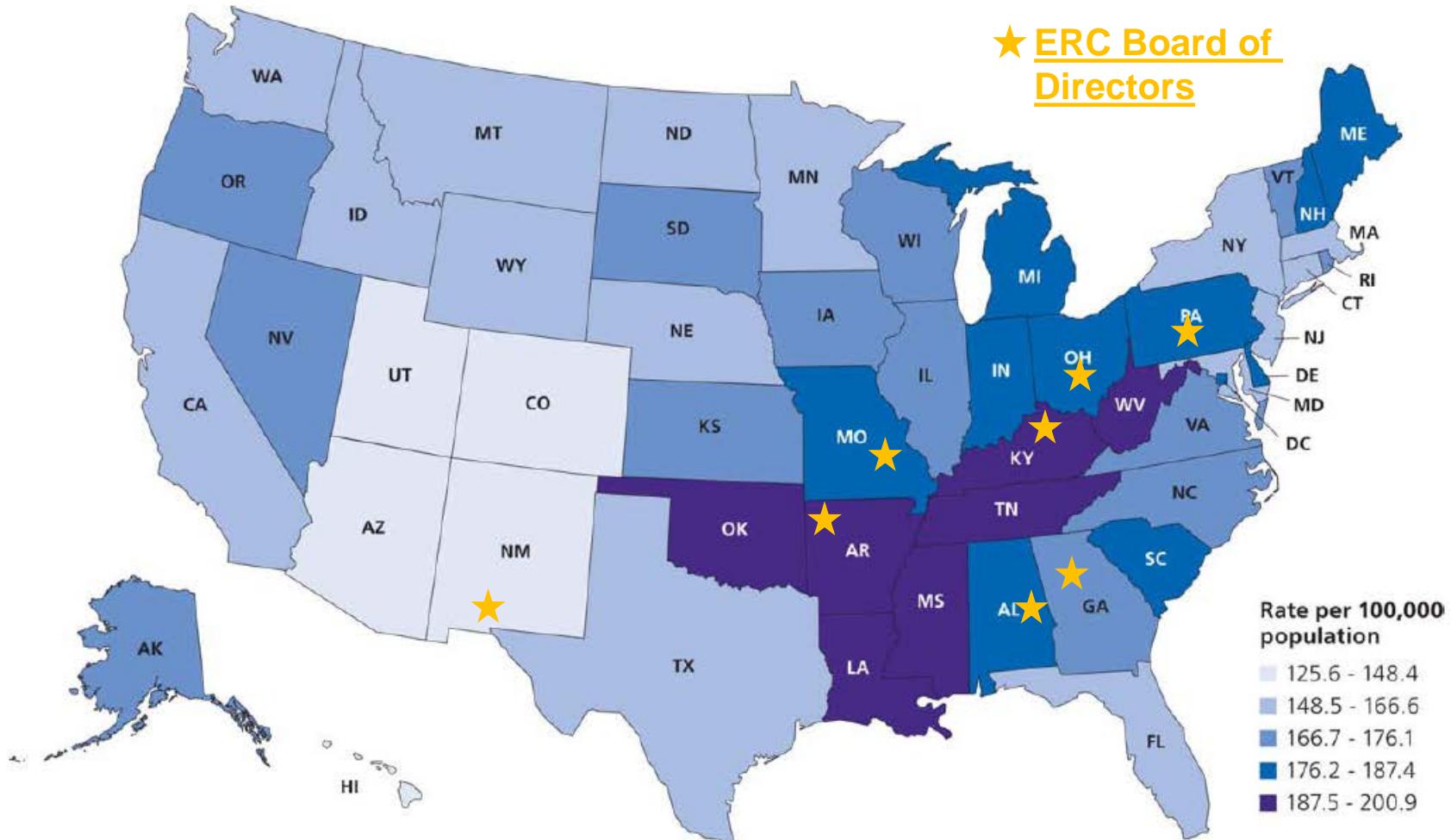
- **576,691** Americans died of cancer in 2011 (**589,430** projected for 2015)
- **1,658,370** Americans will be newly diagnosed with cancer in 2015 (projected)
- **\$157 billion** in 2010 for cancer healthcare costs (**\$173 billion** projected in 2020)



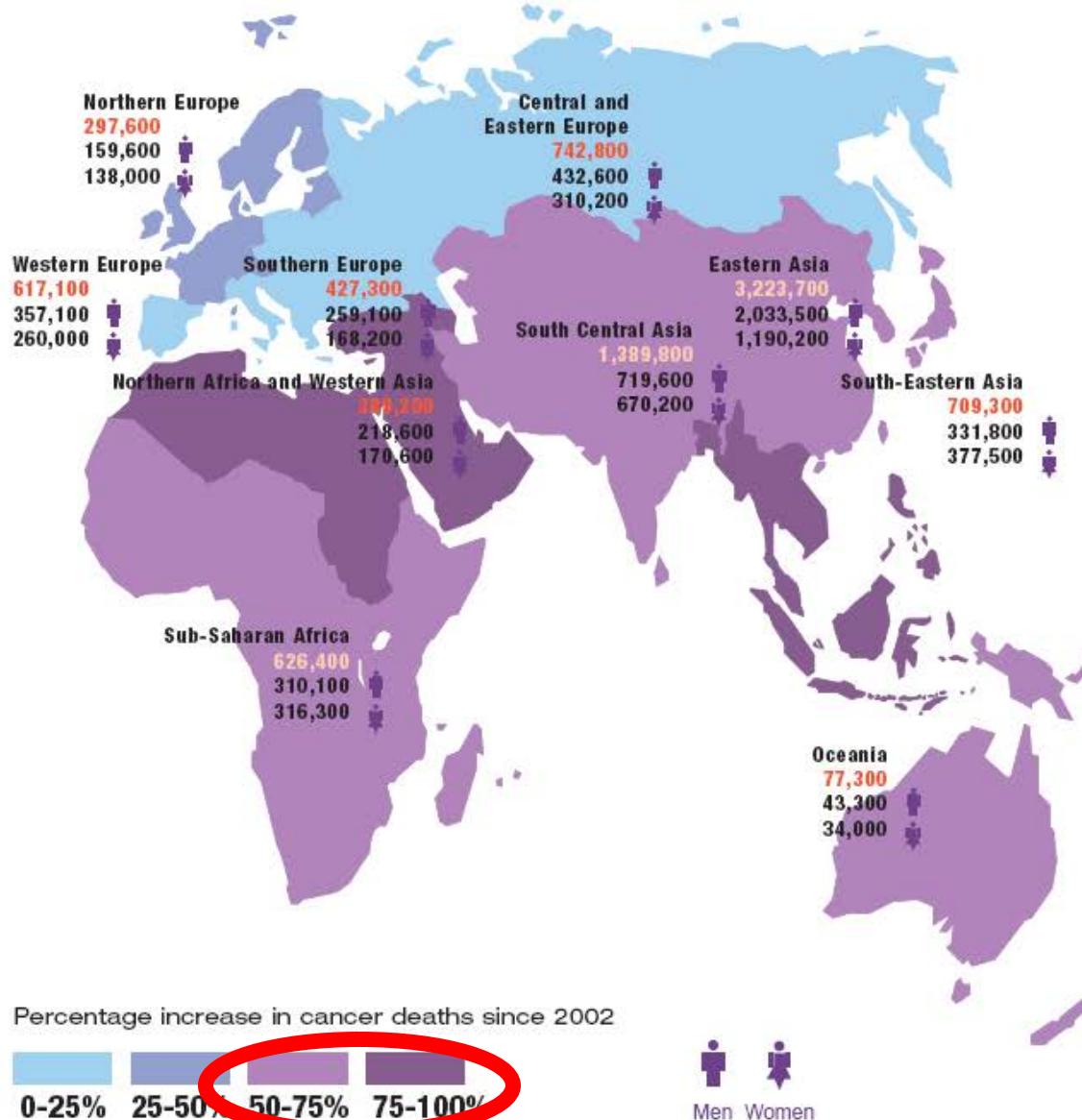
Source for 2015 projected deaths and diagnoses: Siegel et. al, Cancer Statistics, 2015; Source for cost and projections: <http://costprojections.cancer.gov>

Source for 2013 age-adjusted death rate: National Center for Health Statistics, National Vital Statistics Report, Dec 2014

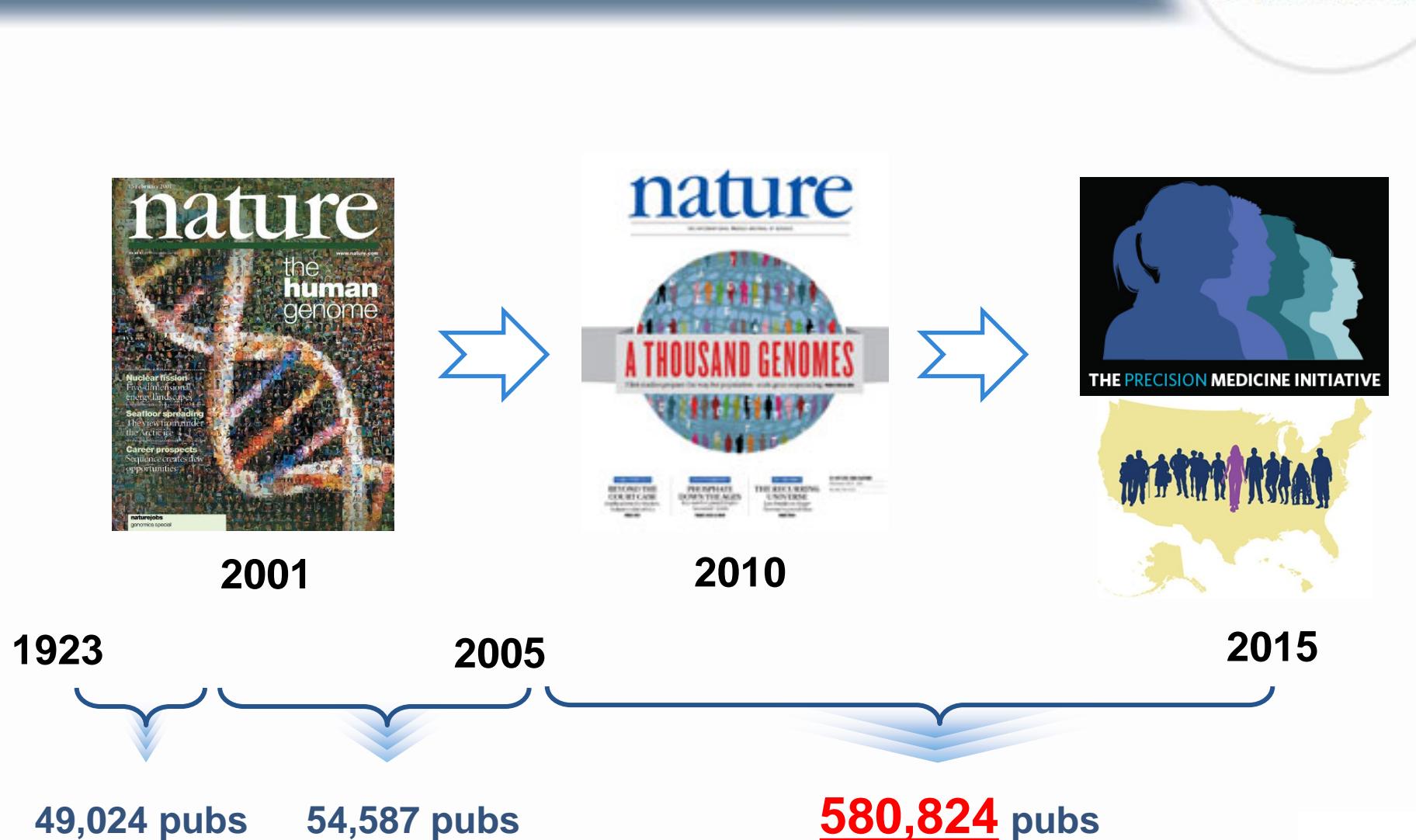
US Geographic Patterns in Cancer Death Rates in 2011



Global Burden: By 2020, Cancer Incidence 16 M/yr (Mortality 10 M/yr)

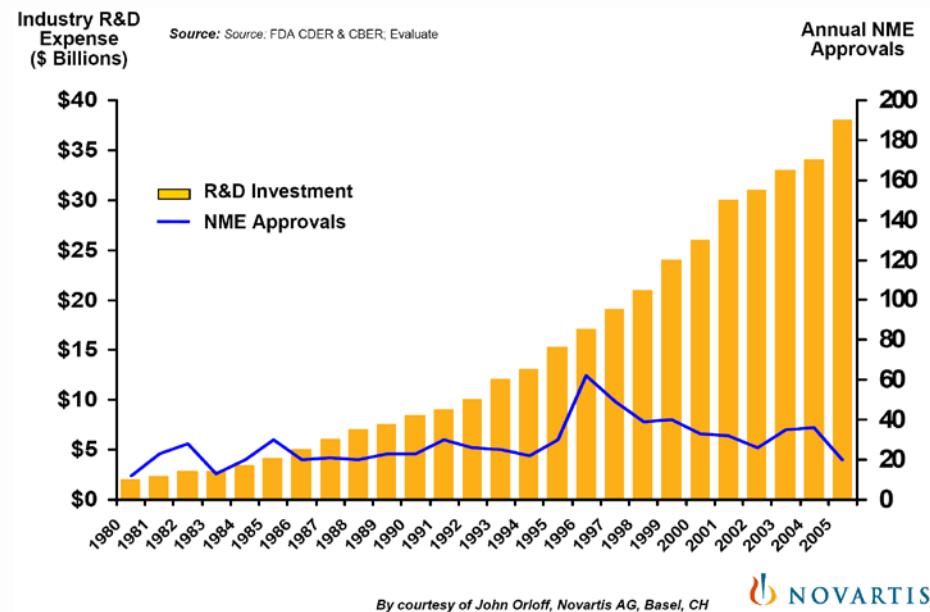


Unprecedented Amount of Scientific Knowledge: Omics(ssss)



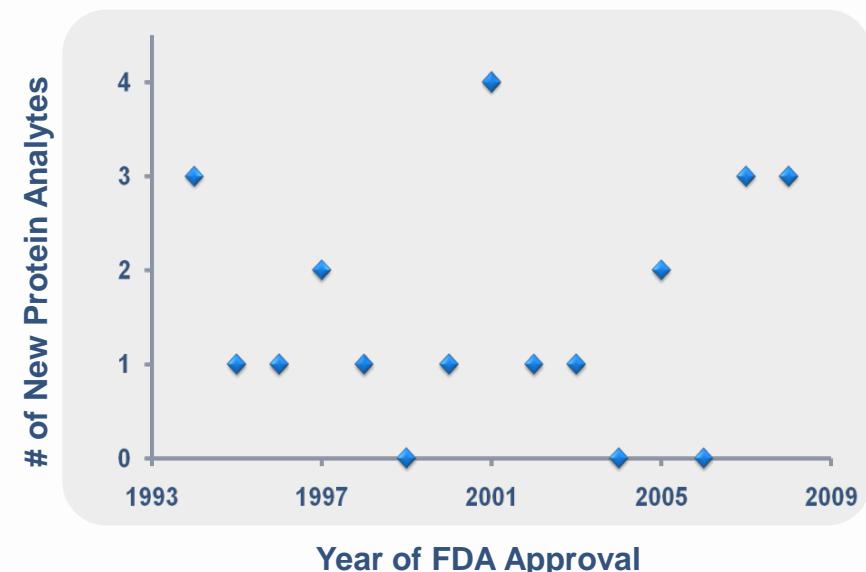
Is More Knowledge Yielding More Solutions for Patients?

Drug Discovery and Development



- 10 – 15 years at ~ \$1.8 billion*
- 2007: 19 NMEs [lowest since 1983]
- 2008: 21 NMEs [29% new-in-class]
- 2009: 24 NMEs [17% new-in-class]

Diagnostic Biomarkers

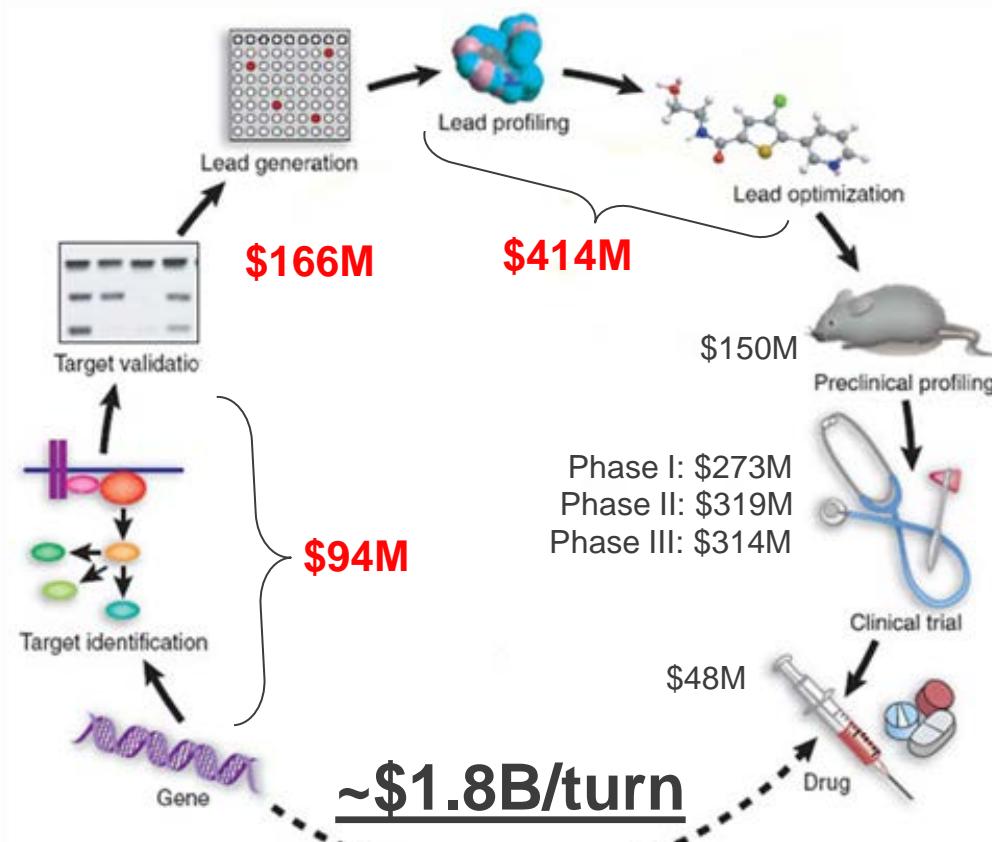


- Averaging 1.5 FDA approvals per year†
- 1000's of samples
- Balancing complexity of biology against heterogeneity of patients

Maybe...but can it be more efficient?

*Paul et. al, *Nature Rev. Drug Discovery*, March 2010; †Leigh Anderson, *Clin Chem*, 2010

Translation Pace: How To Break Out of Current Paradigm?



Turning the Crank...

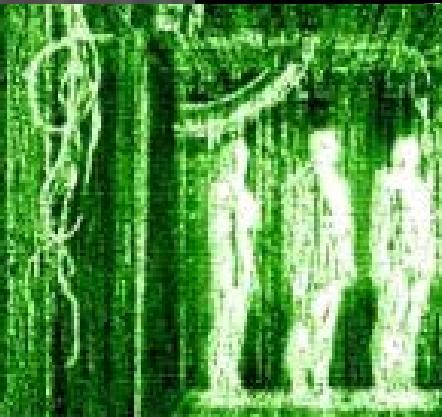
Key Needs (from community '02)

- Standards and protocols
- Real-time, public release of data
- Large, multi-disciplinary teams
- Pilot-friendly team environment to share failures and successes
- Team members with **trans-disciplinary training**

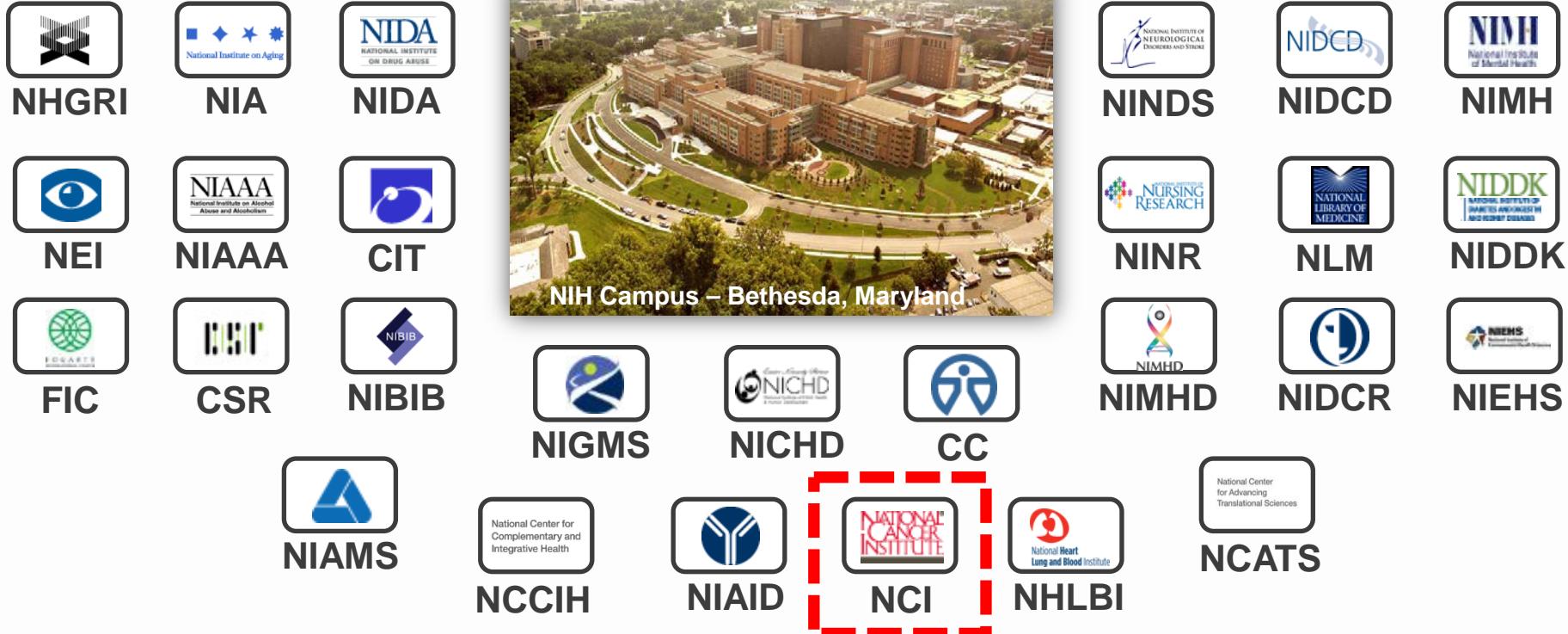
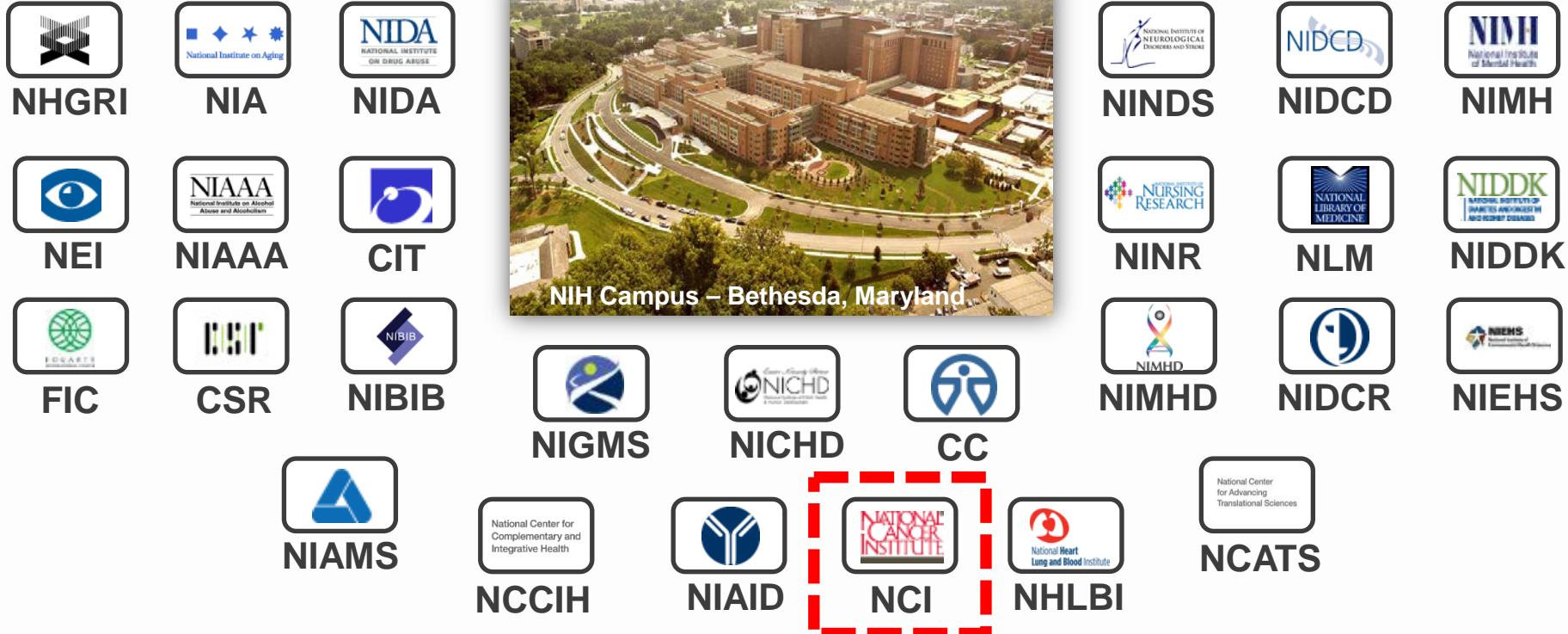
The potential to transform cancer drug discovery and diagnostics

THE

NH



National Institutes of Health (NIH): 27 Institutes and Centers



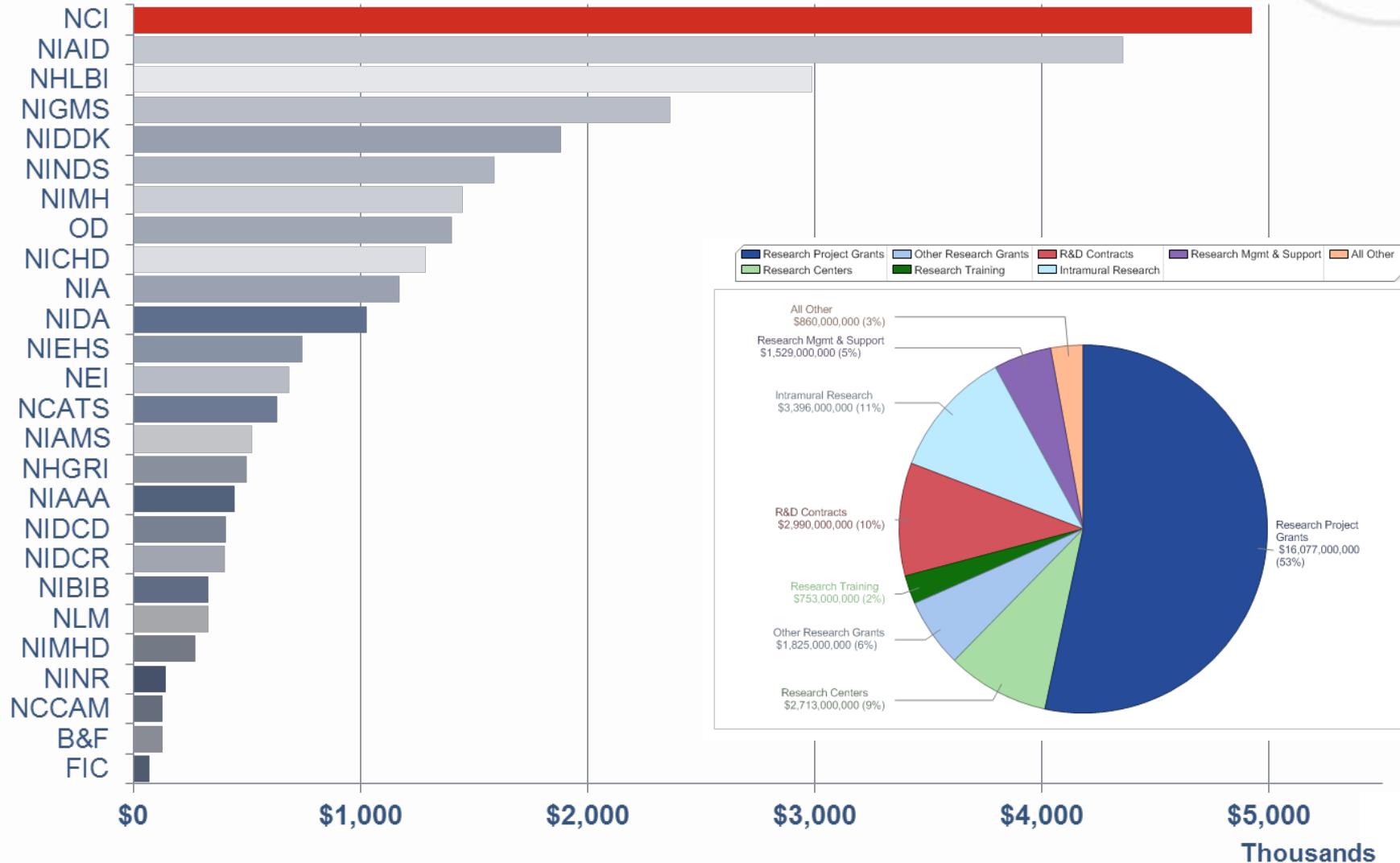
NIH Budget ~ \$30.14 Billion (FY14)

- ~81% for extramural support
- ~60,000 grants and contracts

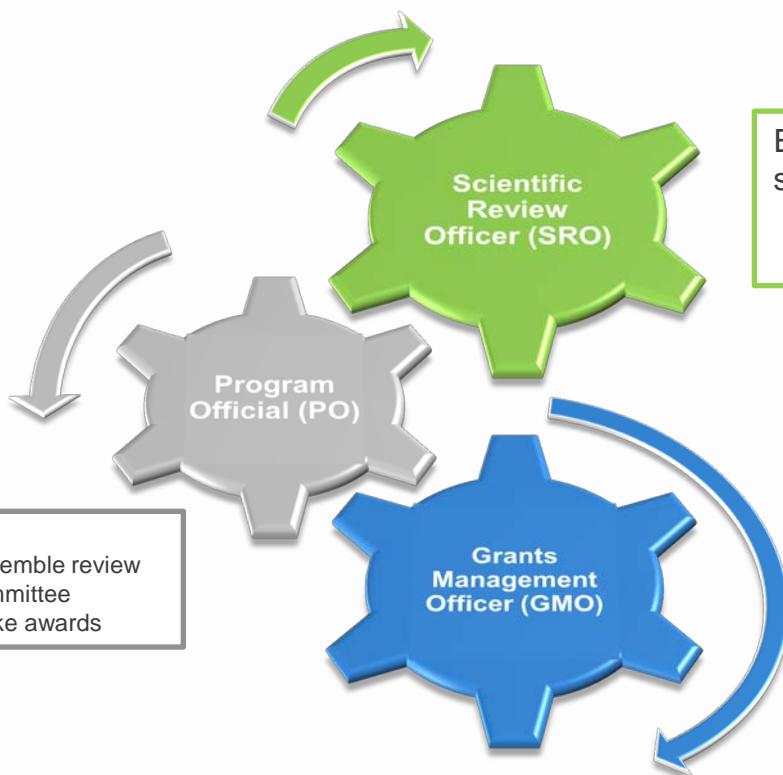
NCI Budget ~ \$4.92 Billion (FY14)

- ~ 75% for extramural support
- ~ 7,500 grants and contracts

National Institutes of Health (NIH): 27 Institutes and Centers [FY14]



The NIH Extramural Team: Checks & Balances



Ensure **fair** and **unbiased** evaluation of the scientific and technical merit of proposed research

- Manages study sections
- Prepares/issues summary statements

Ensure all required business management actions are performed by the grantee and federal government

- Participates in budget negotiations
- Prepares/issues **Notice of Awards (NoA)**

NIH: Types of Funding Announcements (FOAs)



http://grants.nih.gov/grants/planning_application.htm



- Non-specific, investigator-initiated **“unsolicited” research**
- May submit **any topic** within the breadth of the NIH mission.
- **No money set-aside**
- Competition tied mainly to an **IC's overall payline**

- Often broadly defined or a **reminder of a scientific need**
- Investigator-initiated **“unsolicited” research**
- **No money set asides (unless PAS)**
- Competition tied mainly to the **IC's overall payline**
- **High-priority** applications may be **funded beyond the payline**

- **NIH-Requested Research**; Well-defined scientific area
- **Specifies funds** and targets **number of awards**
- Competition depends on **number of applicants** and **dollars set aside**

NIH Research Portfolio Online Reporting Tools (RePORT) [FY14]



U.S. Department of Health & Human Services

NIH Research Portfolio Online Reporting Tools (RePORT)

QUICK LINKS RESEARCH ORGANIZATIONS WORKFORCE

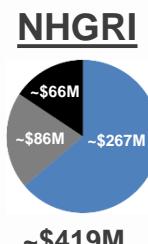
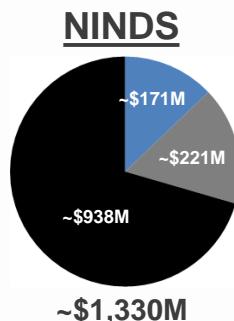
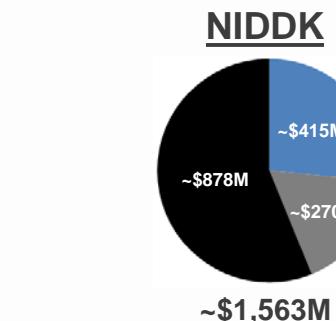
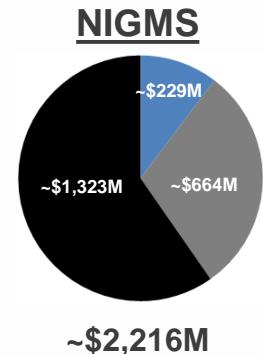
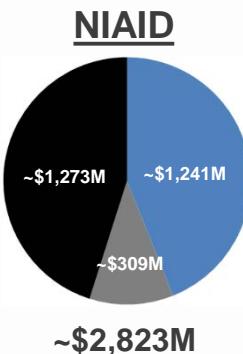
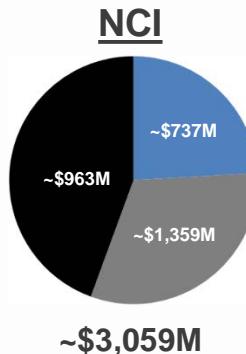
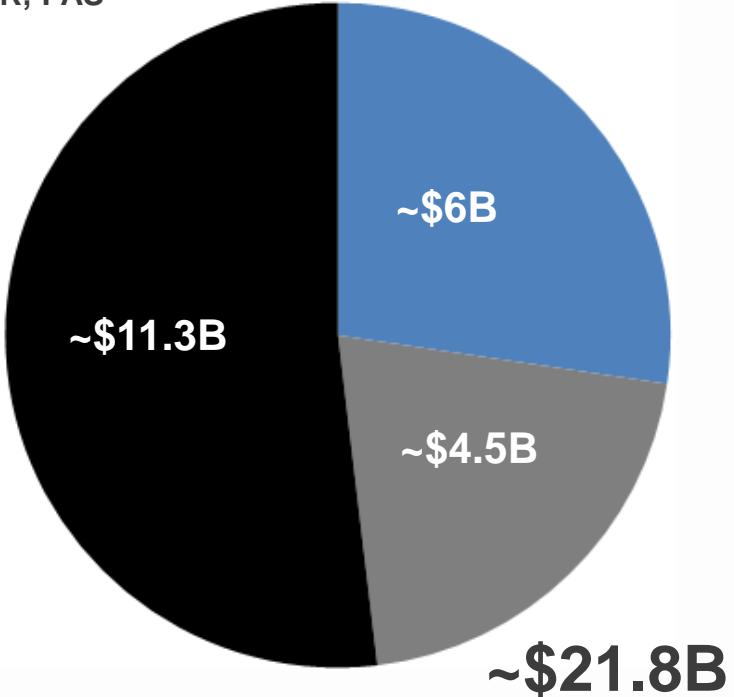
Home > RePORTER > Project Search Results

■ PA (Parent)

■ PA, PAR, PAS

■ RFA

NIH



NIH Research Portfolio Online Reporting Tools (RePORT) [FY04]



U.S. Department of Health & Human Services

NIH Research Portfolio Online Reporting Tools (RePORT)

QUICK LINKS RESEARCH ORGANIZATIONS WORKFORCE

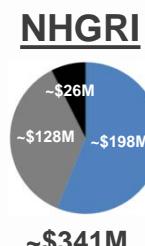
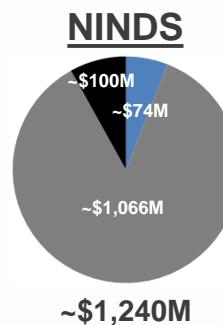
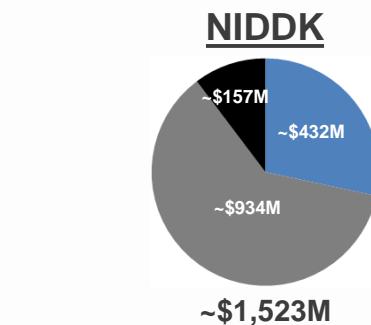
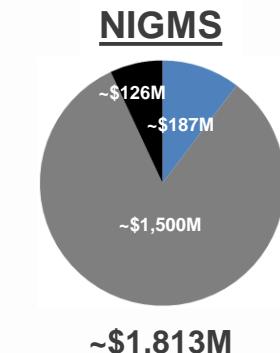
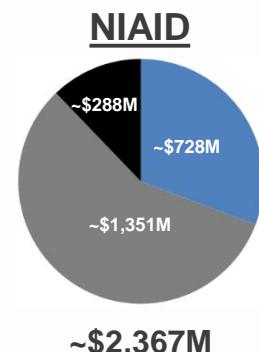
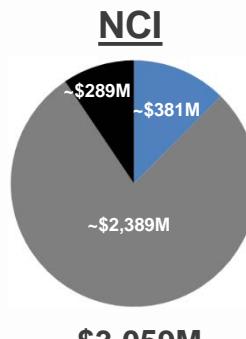
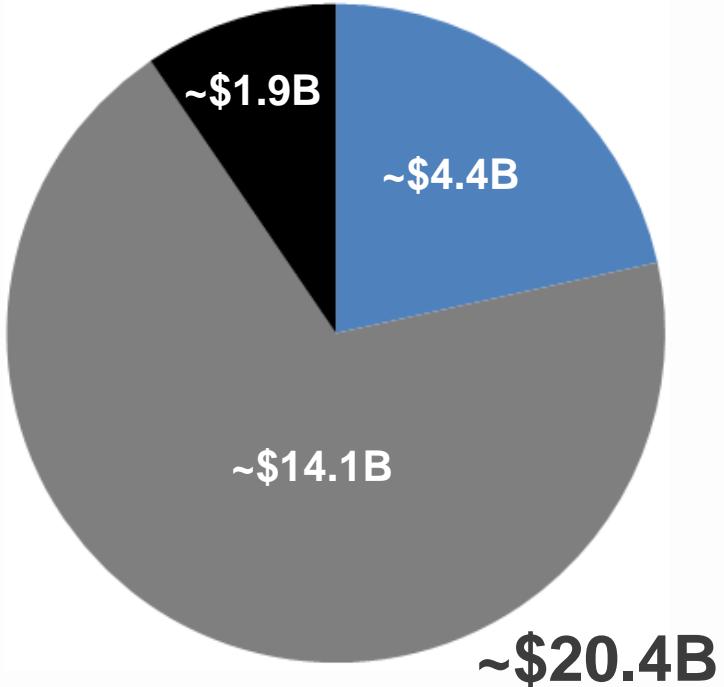
Home > RePORTER > Project Search Results

■ PA

■ PAR, PAS

■ RFA

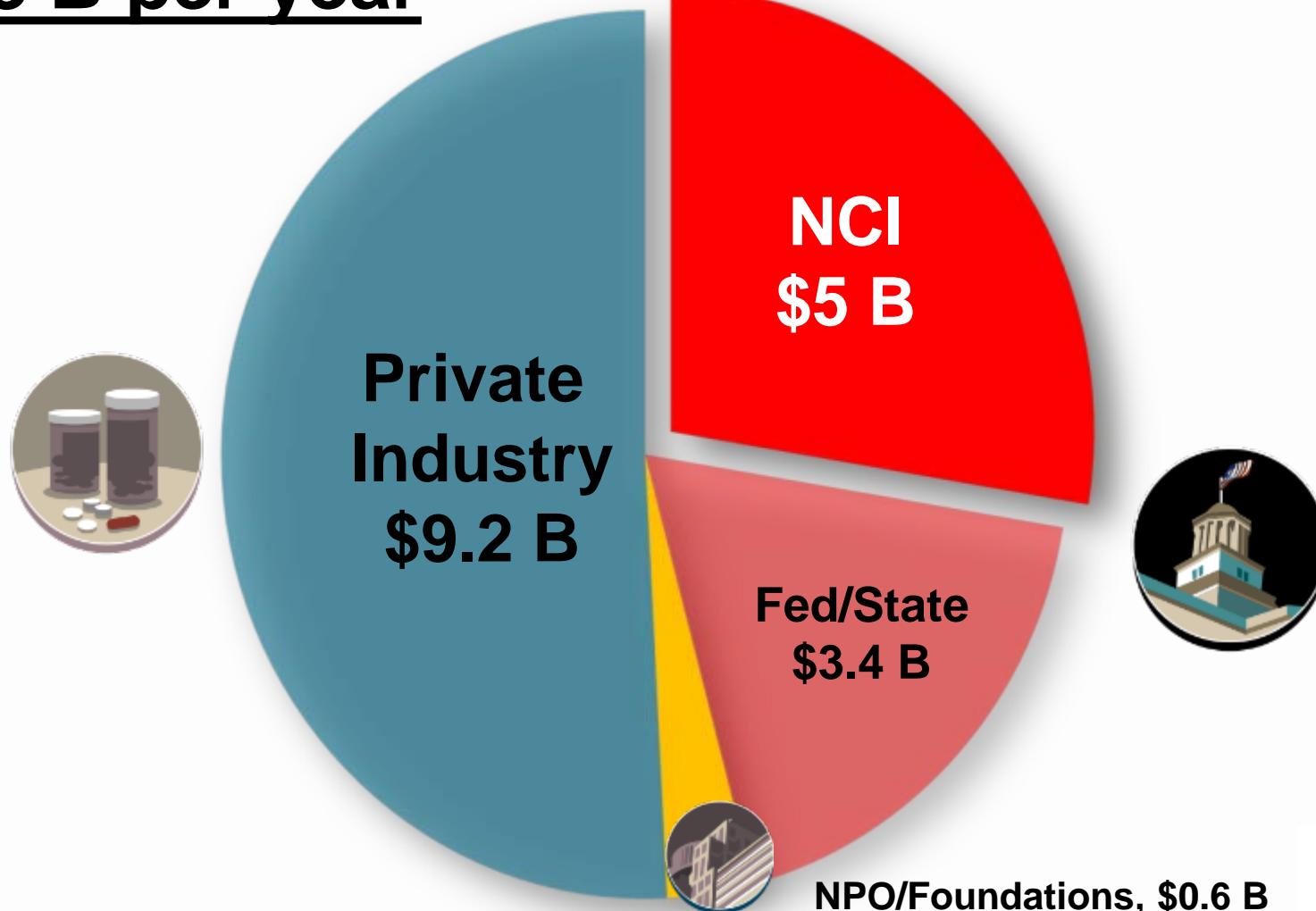
NIH



National Cancer Program: Stakeholders



~\$18 B per year



National Cancer Institute Organization



Director
Harold Varmus, MD

National Cancer Institute

\$4.79B

(FY13)

Office of the
Director

CSSI

~\$110 M (~3%)



Deputy Director
Douglas Lowy, MD

Center for
Cancer
Research

Division of
Cancer
Epidemiology
and Genetics

Division of
Cancer
Treatment
and
Diagnosis

Division of
Cancer
Biology

Division of
Cancer
Control and
Population
Sciences

Division of
Cancer
Prevention

Division of
Extramural
Activities

~\$812M (~17%)

~\$1,166M (~32%)

~\$726M (~20%)

~\$398M (~11%)

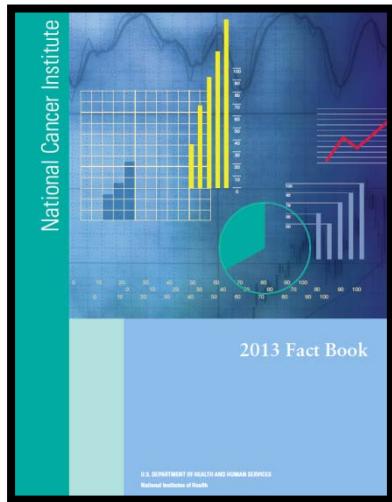
~\$249M (~7%)

~\$22M (~0.5%)

Conducting – Intramural

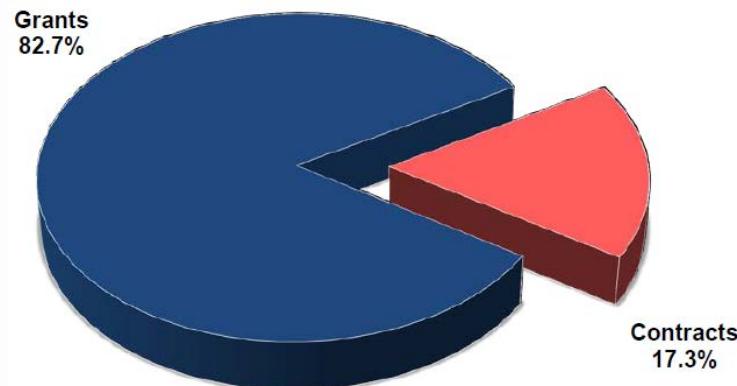
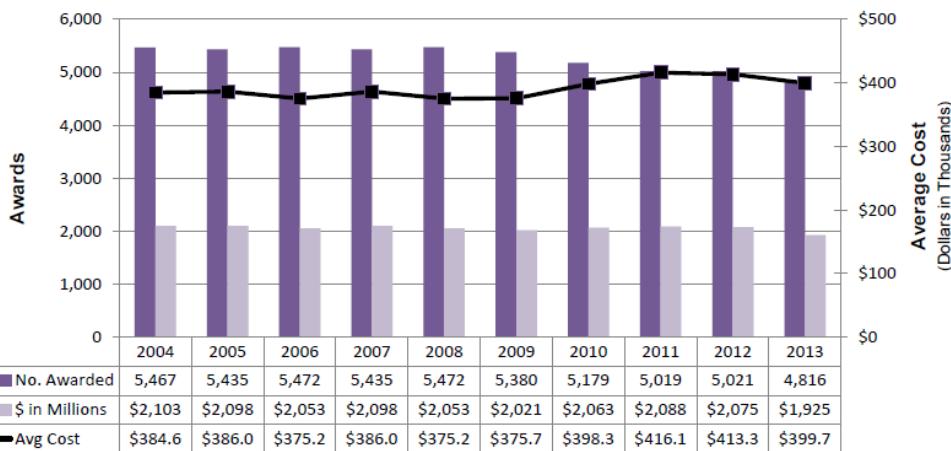
Funding – Extramural

NCI 2013 Fact Book: FY13 Budget Breakdown



Fiscal Year 2013 Budget (Dollars in Thousands)

Mechanism	Amount	Percent
Contracts:		
Research & Development (R&D) Contracts	\$616,046	17.1%
Buildings and Facilities	7,904	0.2%
Construction Contracts	0	0.0%
Subtotal Contracts	623,950	17.3%
Grants:		
Research Project Grants (RPGs)	2,000,161	55.4%
Cancer Centers/Specialized Centers/SPORES	533,951	14.8%
NRSA	65,788	1.8%
Other Research Grants	387,538	10.7%
Construction Grants	0	0.0%
Subtotal Grants	2,987,438	82.7%
Total Extramural Funds	3,611,388	100.0%
Total Intramural/RMS	1,177,626	
*Total NCI	\$4,789,014	



NCI's Federally Funded Research and Development Center (FFRDC)



operated by
Leidos Biomedical Research, Inc.

Frederick National Laboratory
for Cancer Research

Established in 1972 as one of the nation's 39 FFRDC's and the only one **devoted exclusively** to biomedical research and development

Facts

As one of Frederick County's major employers, the contractor Leidos Biomedical Research Inc. employs approximately 1,800 employees.

Economic Impact

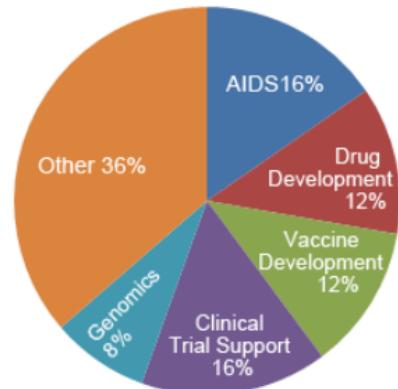
In addition to payroll, Leidos Biomedical Research contributes:

- Dollars spent via Leidos Biomedical Research (formerly SAIC-Frederick) purchase orders, Contract Year 2011
 - Frederick County...\$16,820,351
 - Maryland.....\$183,086,783
- Dollars spent via Leidos Biomedical Research (formerly SAIC-Frederick) purchase orders, 9/26/08–8/10/11
 - Frederick County...\$35,695,585
 - Maryland.....\$286,944,880

Physical

- 68 acres deeded to the Department of Health and Human Services (HHS)
- 991,217 net square feet
- 1,654,035 gross square feet
- 113 buildings on site

Frederick National Lab
Distribution of Effort



NCI Funding in FY12 \$238,204



NCI Center for Strategic Scientific Initiatives (CSSI): Concept Shop



Director
Douglas Lowy, MD



Deputy Director
Jerry S.H. Lee, PhD

Mission

“...to create and uniquely implement exploratory programs focused on the development and integration of advanced technologies, **trans-disciplinary approaches, infrastructures, and standards**, to accelerate the **creation and broad deployment of data, knowledge, and tools** to empower the **entire cancer research continuum** in better understanding and leveraging knowledge of the cancer biology space **for patient benefit...**”



2003, 2007, 2011, 2013, 2014

2005, 2010

2008, 2013*

2011, 2014



2004, 2008, 2014



2005, 2008



2010

Support Convergence and Innovation At Many Scales



NCI Alliance for
Nanotechnology
in Cancer

Phase II

Cancer Target Discovery
& Development (CTD²)

PHYSICAL SCIENCES
in ONCOLOGY

CLINICAL PROTEOMIC
TECHNOLOGIES FOR CANCER

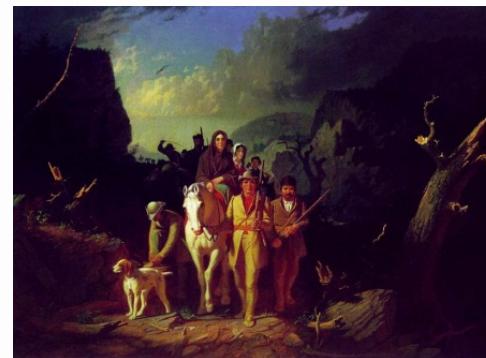
Phase II

THE CANCER GENOME ATLAS

Phase II

Provocative
Questions
Initiative

IMAT
Innovative Molecular Analysis Technologies



**Early
settlers**

A painting of a group of explorers with horses and a dog in a rugged, mountainous landscape.

**Team
Explorers**



**Discoverers/
Pioneers**

Basic

Applied

Translational

Clinical

Commercial/Industry

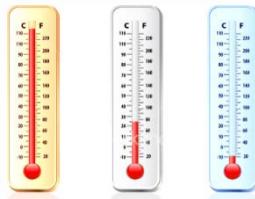
Center Framework: “What is Water?”- Measurements → Insights



Color (clear, yellow, brown)
Taste (none, metallic, awful)



Phase (liquid, gas, solid)
Phase change (boil, melt, freeze)

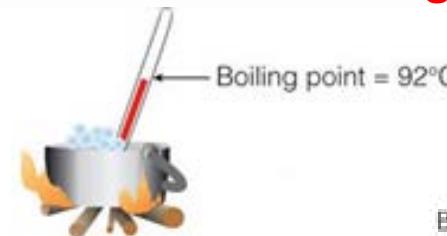


Measurements
Taken

Pressure (kg/cm ³)	Temp (°C)	Saturated steam		Superheated steam	
		Vapour enthalpy (kcal/kg)	Specific volume (m ³ /kg)	Density (kg/m ³)	Specific volume (m ³ /kg) at 250°C at 300°C
1	99.1	638.8	1.725	0.580	2.454 2.691
2	119.6	646.2	0.902	1.109	1.223 1.342
3	132.9	650.6	0.617	1.621	0.812 0.893
4	142.9	653.7	0.471	2.123	0.607 0.668
5	151.1	656.0	0.382	2.618	0.484 0.533
6	158.1	657.0	0.321	3.115	0.402 0.443
7	164.2	659.5	0.278	3.597	0.345 0.379
8	169.6	660.8	0.245	4.082	0.299 0.331
9	174.5	661.9	0.219	4.566	0.265 0.293
10	179.1	662.9	0.198	5.051	0.238 0.263
12	187.1	664.5	0.166	6.024	0.196 0.218
14	194.1	665.7	0.143	6.993	0.167 0.186
16	200.4	666.7	0.126	7.937	0.145 0.162
18	206.1	667.4	0.112	8.929	0.128 0.143
20	211.4	668.0	0.101	9.901	0.114 0.128
22	216.2	668.4	0.092	10.870	0.103 0.116
24	220.7	668.7	0.085	11.765	0.093 0.106
26	225.0	669.0	0.078	12.821	0.085 0.097
28	229.0	669.1	0.073	13.699	0.078 0.089
30	232.7	669.2	0.068	14.706	0.072 0.083

LOTS of
Quantitative
“Data”

But also LOTS of
disagreements...



Boiling point = 100°C



Qualitative Descriptions

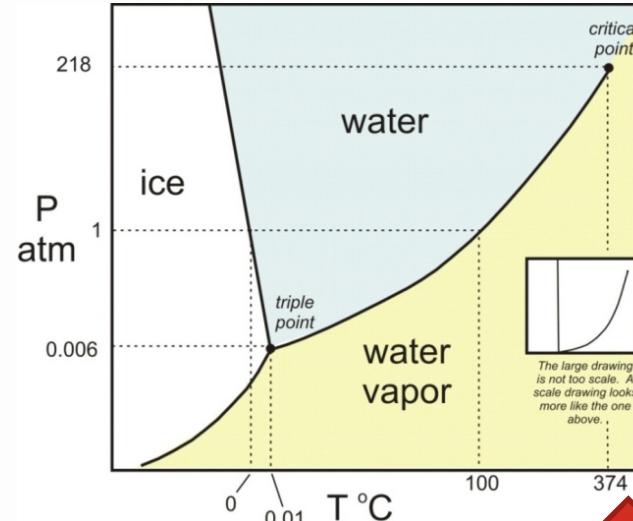
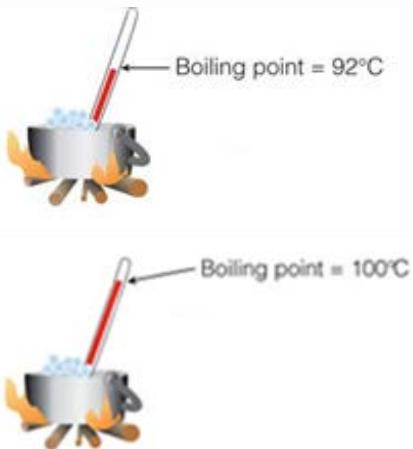
Standards and Sharing of Data → New Insights and Understanding



- Define *samples & protocols*
- Share collected data



2400m



New Understanding

- Phase boundaries
 - V/L equilibrium
- Triple Point

(Phase Diagram)

New Parameter

“Pressure”

Pressure (kg/cm ²)	Temp (°C)	Saturated steam		Superheated steam	
		Vapour enthalpy (kcal/kg)	Specific volume (m ³ /kg)	Density (kg/m ³)	Specific volume at 250 °C at 300 °C
1	99.1	638.8	1.725	0.580	2,454 2,691
2	119.6	646.2	0.902	1,109	1,223 1,342
3	132.9	650.6	0.617	1,621	0,812 0,893
4	142.9	653.7	0.471	2,123	0,607 0,668
5	151.1	656.0	0.382	2,618	0,484 0,533
6	158.1	657.0	0.321	3,115	0,402 0,443
7	164.2	659.5	0.278	3,597	0,343 0,379
8	169.6	660.8	0.245	4,082	0,299 0,331
9	174.5	661.9	0.219	4,566	0,265 0,293
10	179.1	662.9	0.198	5,051	0,238 0,263
12	187.1	664.5	0.166	6,024	0,196 0,218
14	194.1	665.7	0.143	6,993	0,167 0,186
16	200.4	666.7	0.126	7,937	0,145 0,162
18	206.1	667.4	0.112	8,929	0,128 0,143
20	211.4	668.0	0.101	9,901	0,114 0,128
22	216.2	668.4	0.092	10,870	0,103 0,116
24	220.7	668.7	0.085	11,765	0,093 0,106
26	225.0	669.0	0.078	12,821	0,085 0,097
28	229.0	669.1	0.073	13,699	0,078 0,089
30	232.7	669.2	0.068	14,706	0,072 0,083

LOTS of
Quantitative
and
Reproducible
Data

(Steam Table)

2003 Launch of the Technology Dashboard of CSSI: IMAT

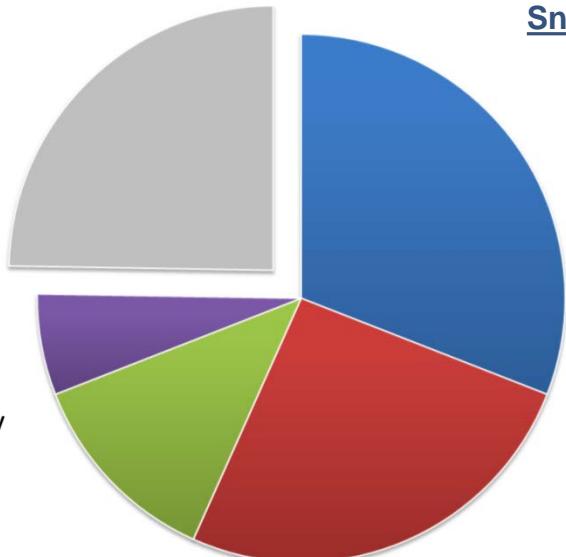


INNOVATIVE MOLECULAR ANALYSIS TECHNOLOGIES

*To support the **development, maturation, and dissemination** of innovative and/or potentially transformative next-generation technologies*

Innovative Technologies for Molecular Analysis of Cancer

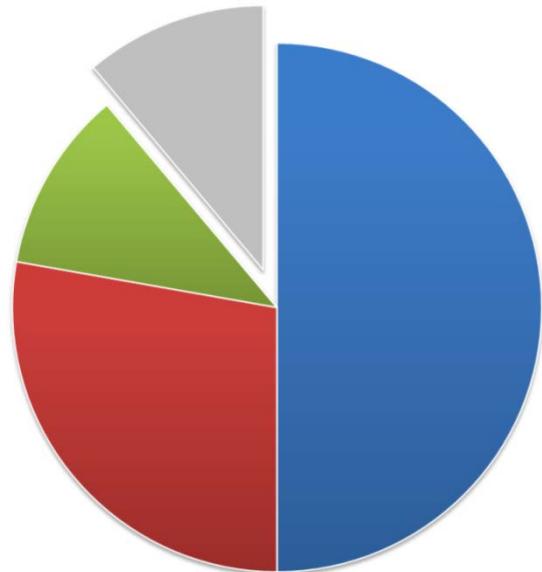
- Proof-of-concept technologies/projects encouraged
- Milestone and technology development driven (no biology)



- Genomics
- Proteomics
- Nanotechnology
- Physics
- Screening

Application of Emerging Technologies for Cancer Research

- Validation and dissemination of platforms
- Demonstration of impact on basic and clinical research



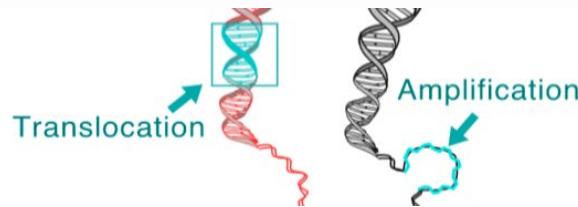
- Genomics
- Proteomics
- Nanotechnology
- Physics
- Screening

First Step(back)- Cancer Genomics: Taking a Page from Engineers

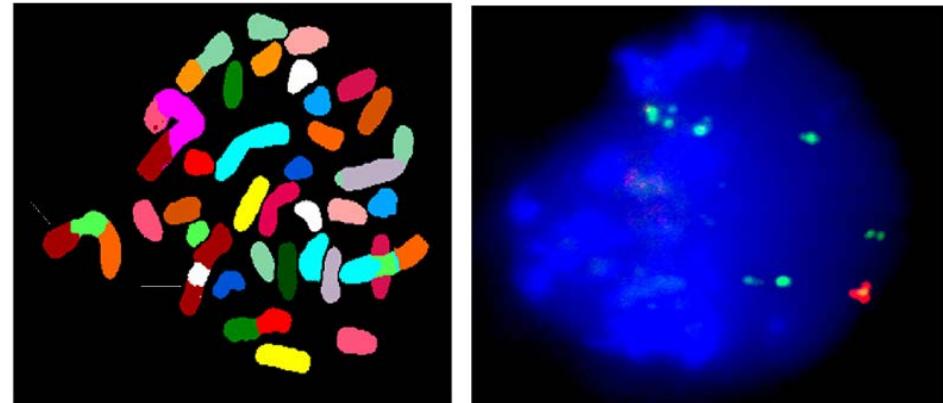


Disease of Genomic Alterations

- Copy number
- Expression (regulation of)
- Regulation of translation
- Mutations
- Epigenome



- Systematic identification of all genomic changes
- Repeat (<500) for individual cancer
- Replicate for as many cancers as possible
- Make it publically available



Pressure (kg/cm ²)	Temp (°C)	Saturated steam			Superheated steam	
		Vapour enthalpy (kcal/kg)	Specific volume (m ³ /kg)	Density (kg/m ³)	Specific volume (m ³ /kg) at 250 °C	Specific volume (m ³ /kg) at 300 °C
1	99.1	638.8	1.725	0.580	2.454	2.691
2	119.6	646.2	0.902	1.109	1.223	1.342
3	132.9	650.6	0.617	1.621	0.812	0.893
4	142.9	653.7	0.471	2.123	0.607	0.668
5	151.1	656.0	0.382	2.618	0.484	0.533
6	158.1	657.0	0.321	3.115	0.402	0.443
7	164.2	659.5	0.278	3.597	0.343	0.379
8	169.6	660.8	0.245	4.082	0.299	0.331
9	174.5	661.9	0.219	4.566	0.265	0.293
10	179.1	662.9	0.198	5.051	0.238	0.263
12	187.1	664.5	0.166	6.024	0.196	0.218
14	194.1	665.7	0.143	6.993	0.167	0.186
16	200.4	666.7	0.126	7.937	0.145	0.162
18	206.1	667.4	0.112	8.929	0.128	0.143
20	211.4	668.0	0.101	9.901	0.114	0.128
22	216.2	668.4	0.092	10.870	0.103	0.116
24	220.7	668.7	0.085	11.765	0.093	0.106
26	225.0	669.0	0.078	12.821	0.085	0.097
28	229.0	669.1	0.073	13.699	0.078	0.089
30	232.7	669.2	0.068	14.706	0.072	0.083

Steam table (Reference)

Many “Thermometers”: Heterogeneity of Platforms



454



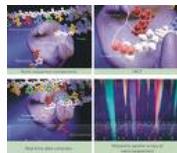
Illumina



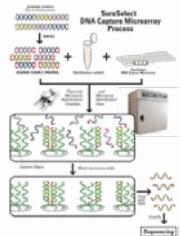
SOLiD



Helicos



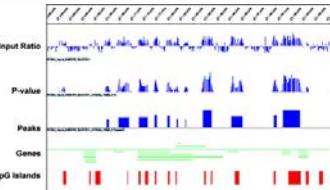
Visigen



Agilent



Raindance

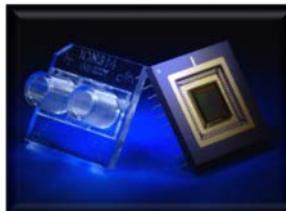


Nimblegen

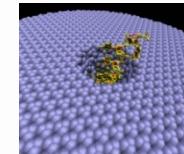


Intelligent Biosystems

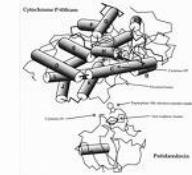
Complete Genomics
Complete Genomics



Ion-Torrent



Oxford Molecular



NABsys

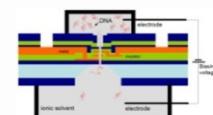


(Sponsoring the CNF Annual Meeting
and the Poster Session Awards)

IBM



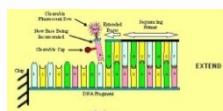
Halycon



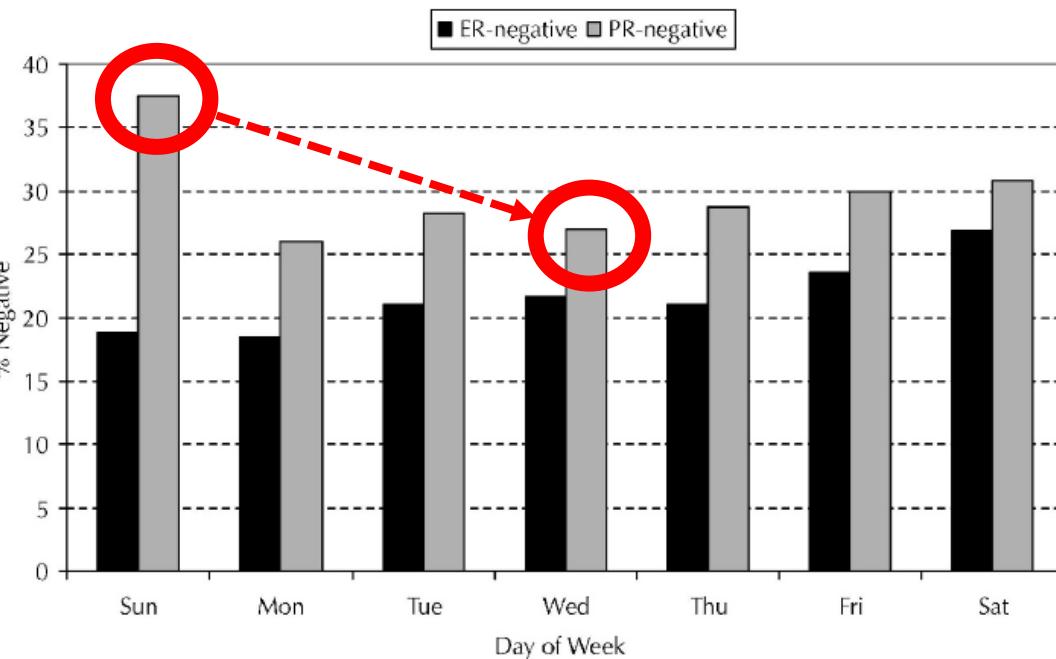
ZSGenetics



LaserGen



Unanticipated Innovation: Samples AND Handling Matter!



“Garbage In...Garbage Out”

“...We found that specimens **obtained late in the week** (prolonged specimen handling) are **more likely to be ER/PR negative** than specimens **obtained on other weekdays** (regular specimen handling)...”

Table 1. Frequency of Specimen Removal by Day of the Week

Day	Cases	ER-Negative	PR-Negative
Sunday	16	3	6
Monday	1252	230	325
Tuesday	1176	248	332
Wednesday	784	170	212
Thursday	904	191	259
Friday	919	216	276
Saturday	26	7	8
System	5077	1065	1418

Abbreviations: ER, estrogen receptor; PR, progesterone receptor.

TCGA: Connecting Multiple Standardized Sources, Experiments, and Data Types

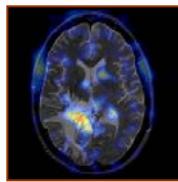


THE CANCER GENOME ATLAS

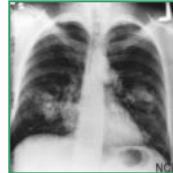


Three Cancers- Pilot

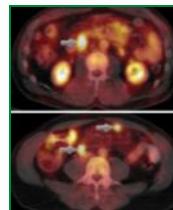
glioblastoma multiforme
(brain)



squamous carcinoma
(lung)



serous
cystadenocarcinoma
(ovarian)



Biospecimen Core Resource with more than 13 Tissue Source Sites

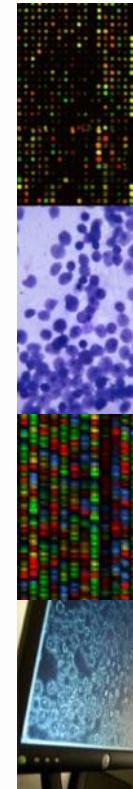
7 Cancer Genomic Characterization Centers

3 Genome Sequencing Centers

Data Coordinating Center

Multiple data types

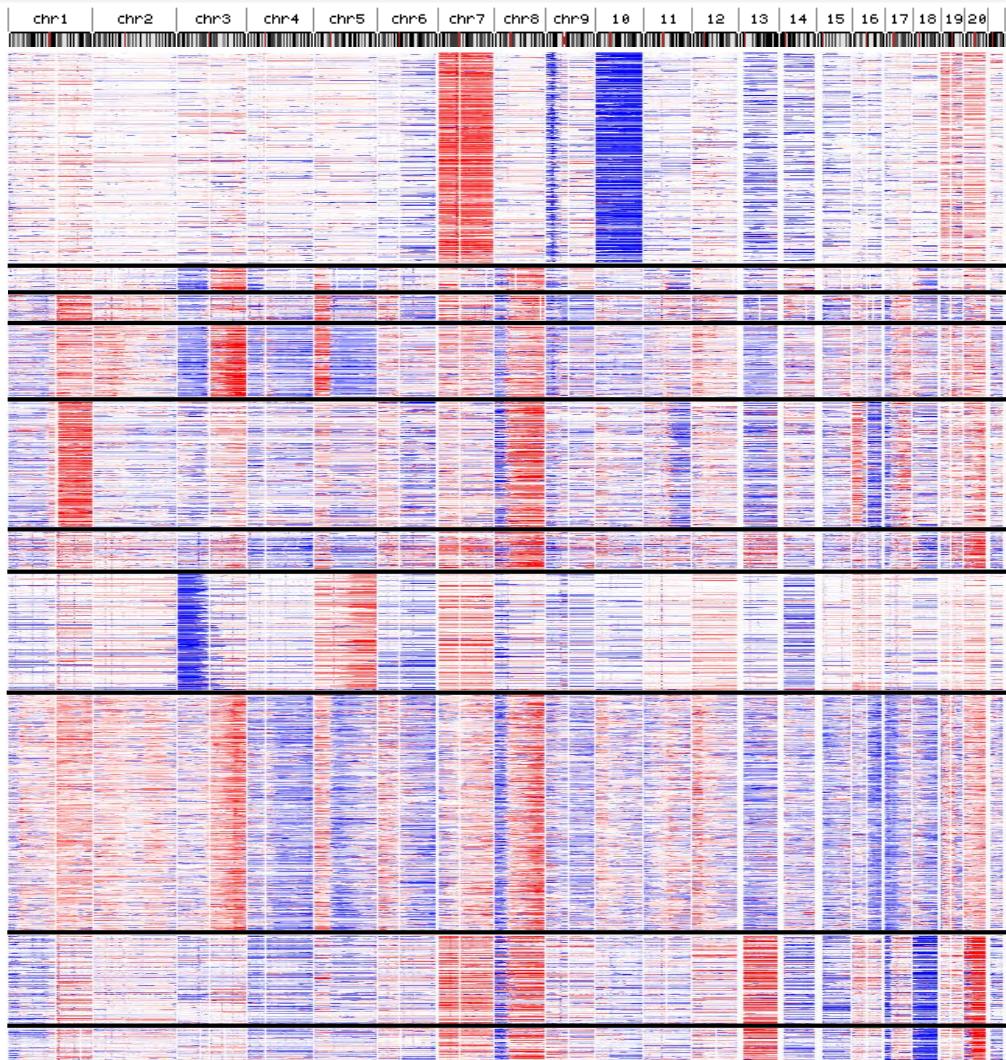
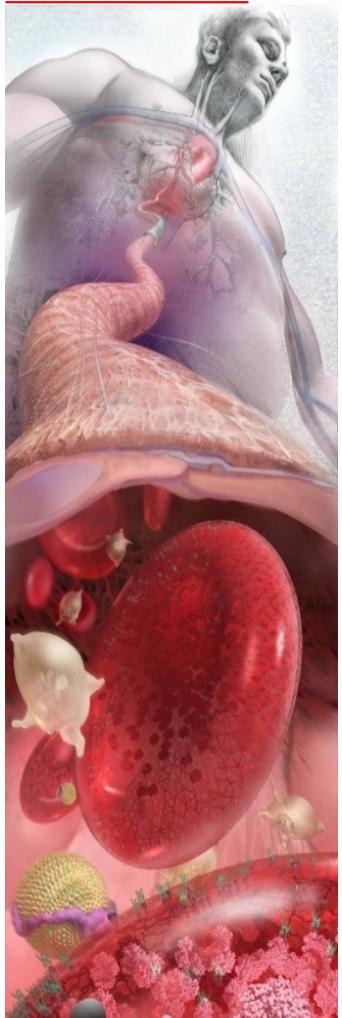
- Clinical diagnosis
- Treatment history
- Histologic diagnosis
- Pathologic status
- Tissue anatomic site
- Surgical history
- Gene expression
- Chromosomal copy number
- Loss of heterozygosity
- Methylation patterns
- miRNA expression
- DNA sequence



Genomic “Steam Table”



Summer 2011

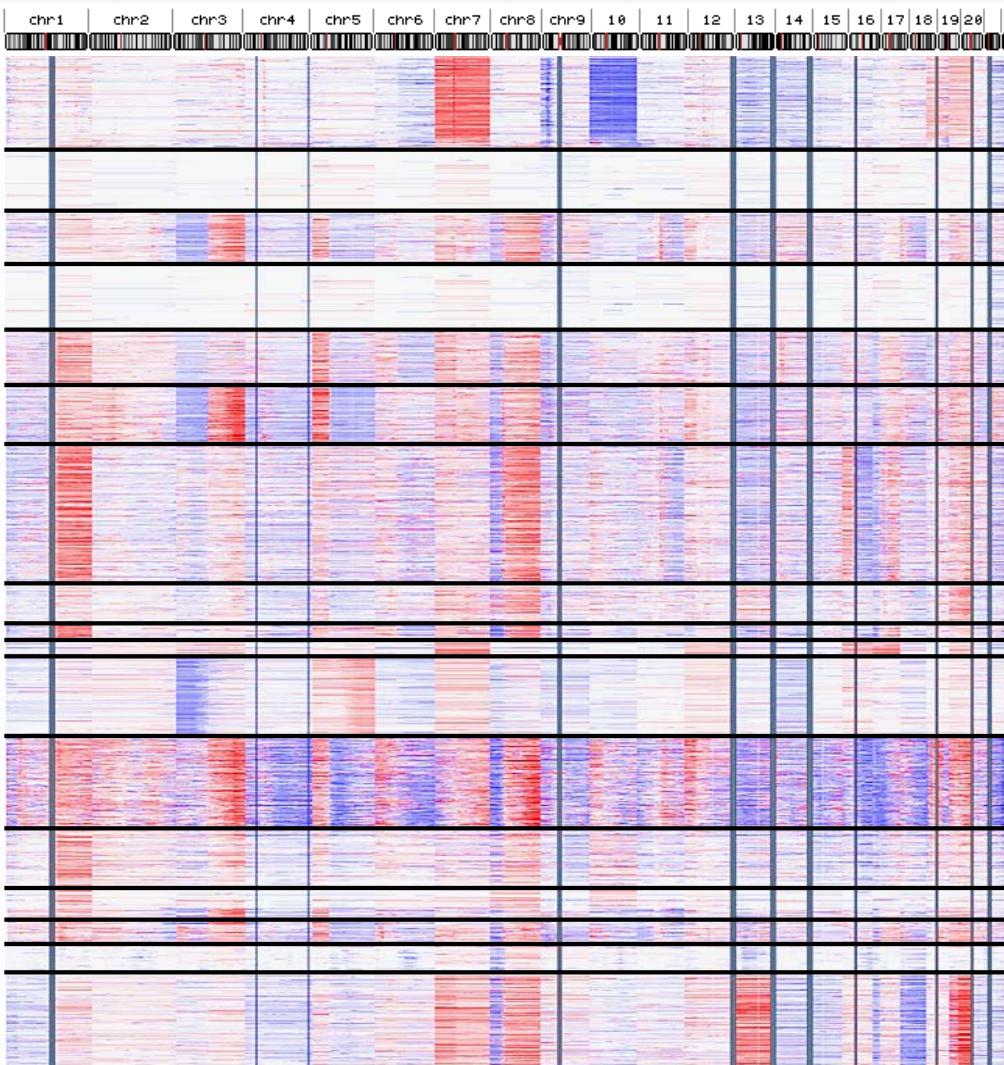
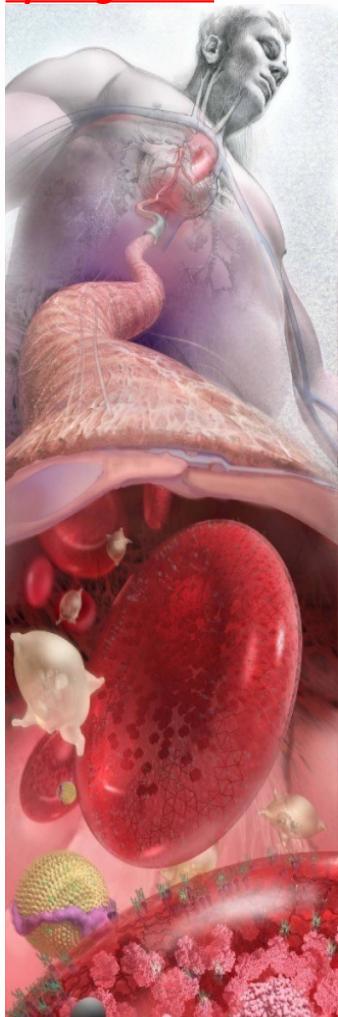


Glioblastoma:	470
Head & neck:	51
Lung adeno:	57
Lung squamous:	159
Breast carcinoma:	180
Stomach adeno:	84
Kidney clear carc:	260
Ovarian serous:	520
Colon adeno:	198
Rectum carcinoma:	74
Total:	2053

Genomic “Steam Table”



Spring 2013

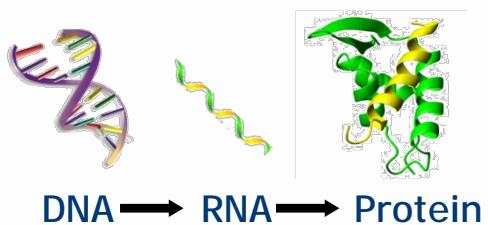


Glioblastoma:	563
Brain lower grade glioma:	180
Head & neck:	306
Thyroid carc:	401
Lung adeno:	356
Lung squamous:	343
Breast carc:	866
Stomach adeno:	237
Liver hep. carc:	97
Kidney pap. cell carc:	103
Kidney clear cell carc:	493
Ovarian serous:	559
Uterine corpus end. carc:	492
Cervical carc:	102
Bladder carc:	135
Prostate adeno:	171
Colon/rectum adeno:	575
Total:	5979

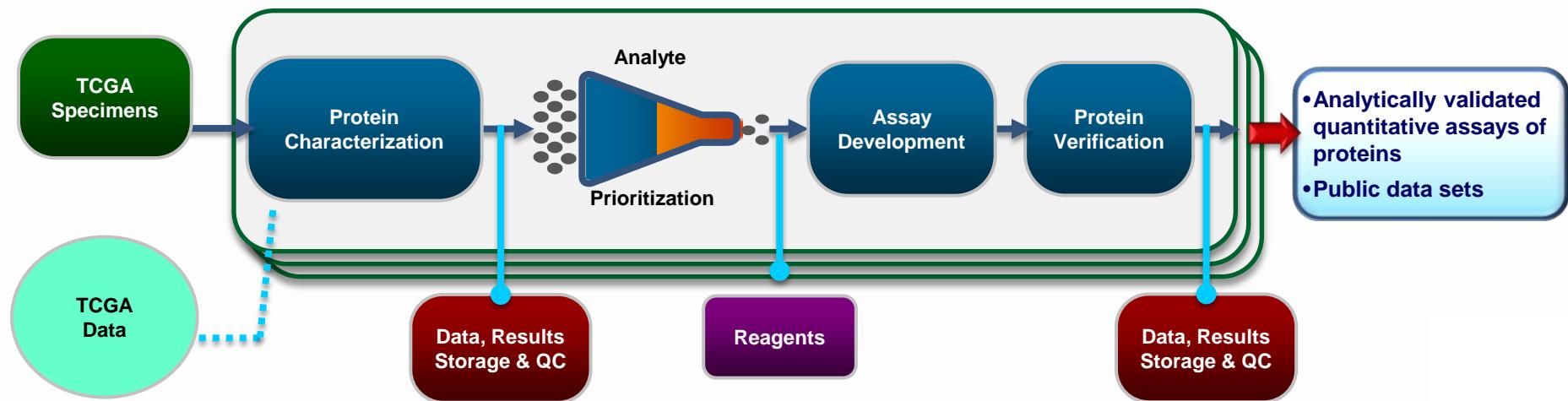
Clinical Proteomic Tumor Analysis Centers (CPTAC Phase II)



Phase II Launched Sept 2011



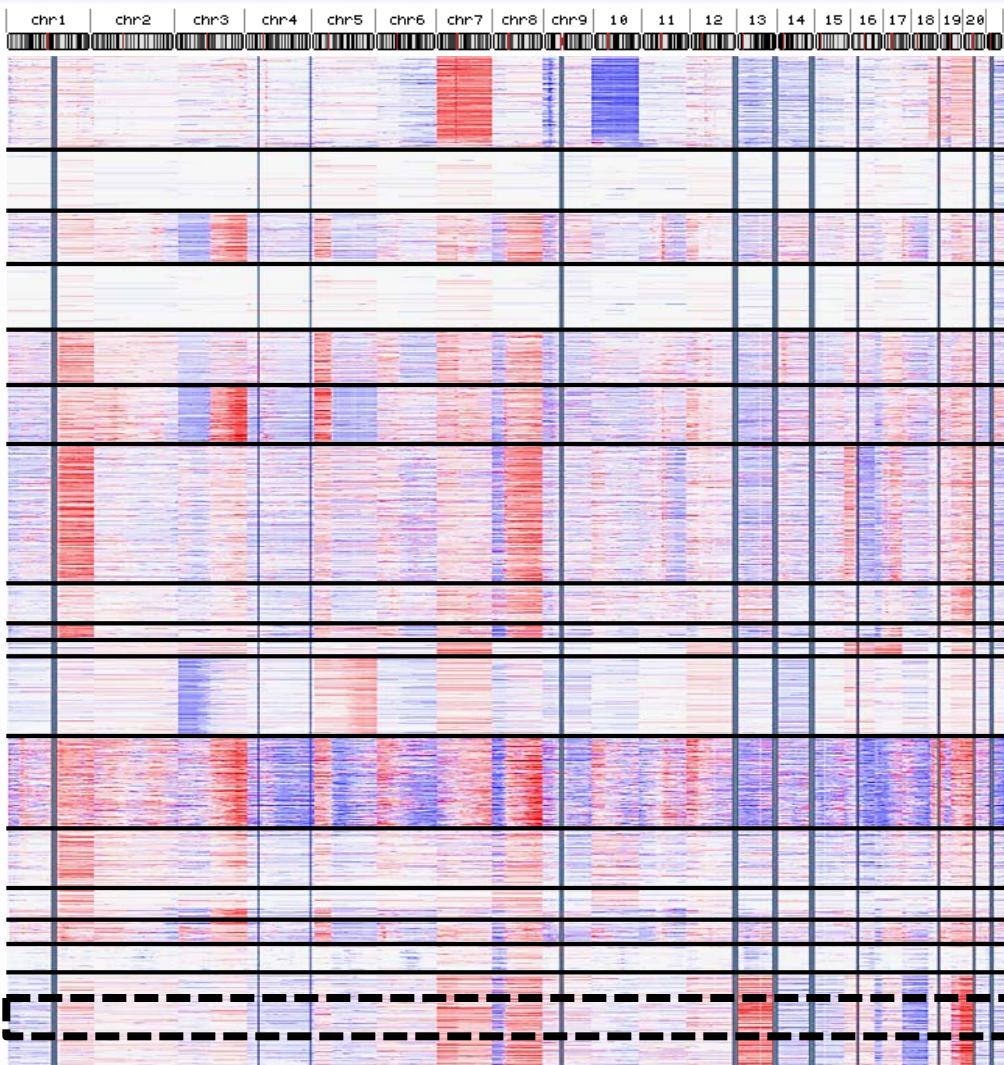
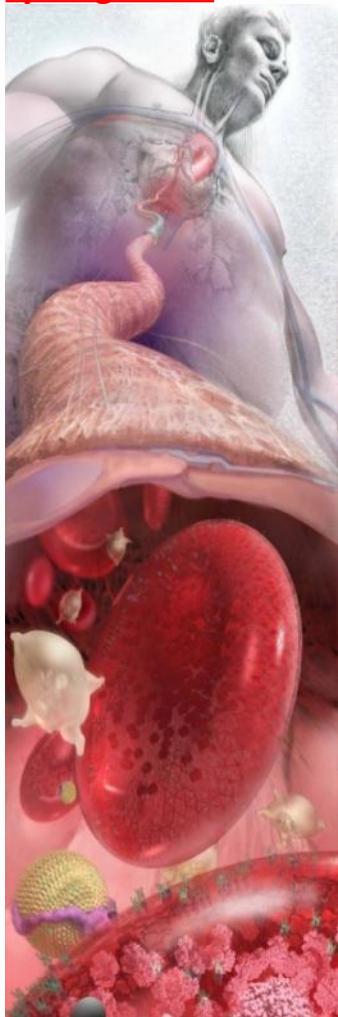
- Analyze matched TCGA samples using two approaches
 - Targeting genome to proteome
 - Mapping proteome to genome
- Develop **validated and quantitative** assays and reagents
 - Lessons from Phase I (mock 510K submission)
 - Antibody Characterization Lab
- Distribute raw and analyzed data via public data portal



Genomic “Steam Table”



Spring 2013



Glioblastoma:	563
Brain lower grade glioma:	180
Head & neck:	306
Thyroid carc:	401
Lung adeno:	356
Lung squamous:	343
Breast carc:	866
Stomach adeno:	237
Liver hep. carc:	97
Kidney pap. cell carc:	103
Kidney clear cell carc:	493
Ovarian serous:	559
Uterine corpus end. carc:	492
Cervical carc:	102
Bladder carc:	135
Prostate adeno:	171
Colon/rectum adeno:	575
Total:	5979

Colorectal Cancer: Global proteome reveals 2 new subtypes

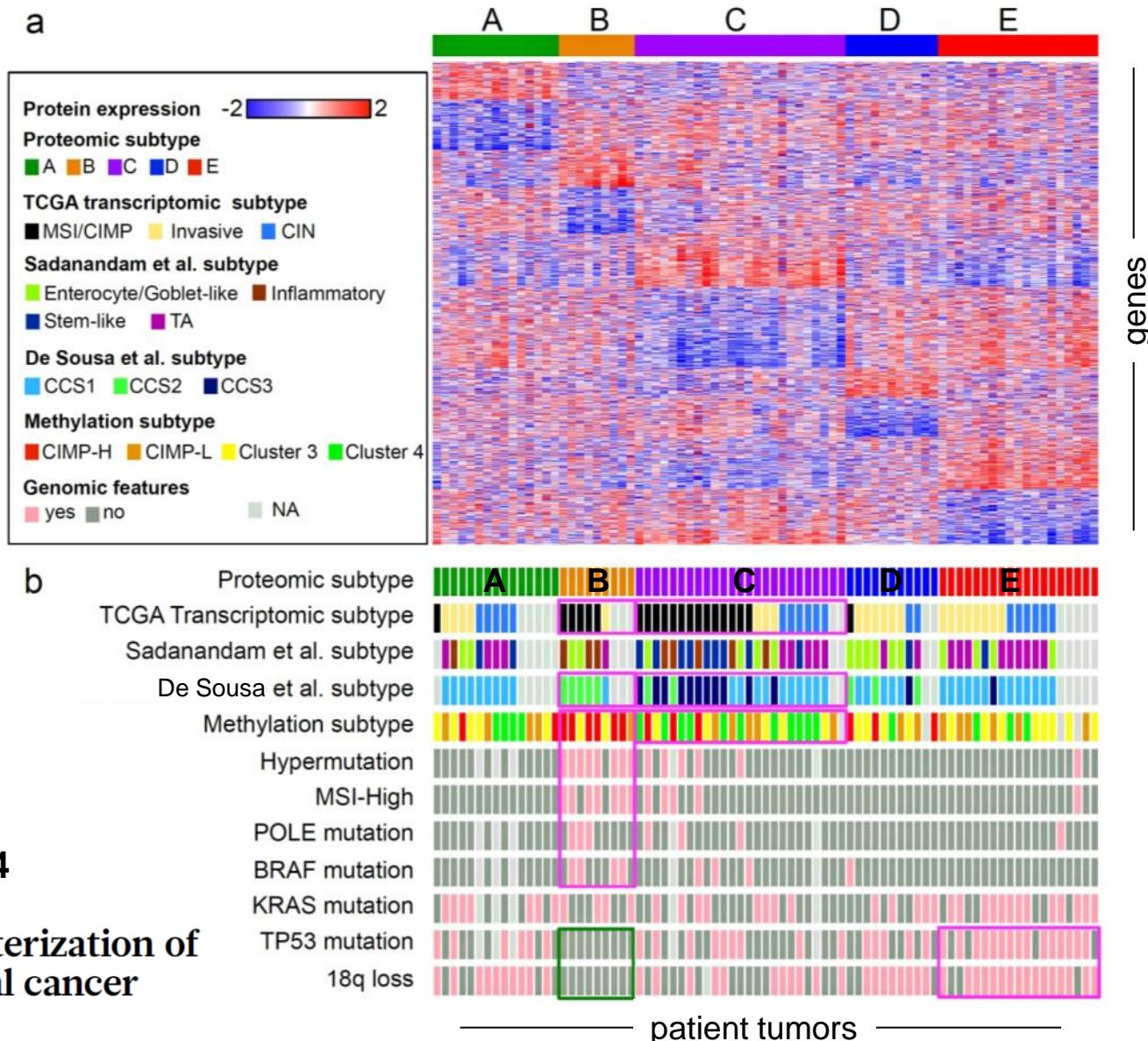


Transcriptome Subtypes

- MSI/CIMP
- Invasive
- CIN

Proteome Subtypes

- A
- B
- C
- D
- E

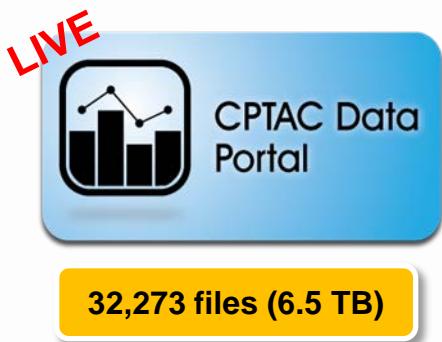


nature July 20, 2014

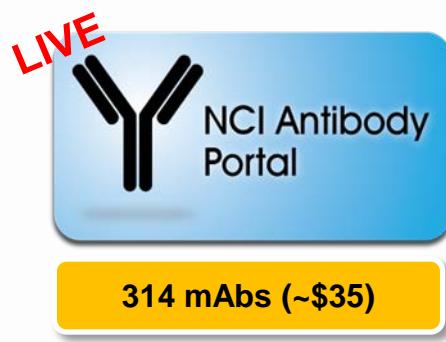
Proteogenomic characterization of human colon and rectal cancer

CPTAC Public Resources:

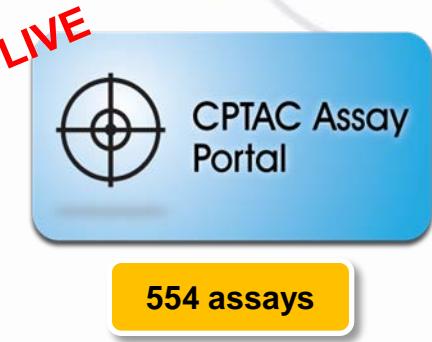
<http://proteomics.cancer.gov>



32,273 files (6.5 TB)



314 mAbs (~\$35)



554 assays

[Download Data](#) [About the Data](#) [Help](#) [CPTAC Home](#) [Artifact Portal](#)

CPTAC, TCGA Cancer Proteome Study of Colorectal Tissue
Embargo Release Date: December 04, 2014

[View This Page](#)

The goal of the CPTAC, TCGA Cancer Proteome Study of Colorectal Tissue is to analyze the proteomes of TCGA tumor samples that have been comprehensively characterized by molecular methods (Cancer Genome Atlas Network, *Nature* 2012).

New!

Data Sets

Download

- Name
- CPTAC, TCGA, Colorectal
- TCGA-M-3401-01A-02
- TCGA-M-3401-01B-02
- TCGA-M-3401-01C-02
- TCGA-M-3401-01D-02
- TCGA-M-3401-01E-02
- TCGA-M-3401-01F-02
- TCGA-M-3401-01G-02
- TCGA-M-3401-01H-02
- TCGA-M-3401-01I-02
- TCGA-M-3401-01J-02
- TCGA-M-3401-01K-02
- TCGA-M-3401-01L-02
- TCGA-M-3401-01M-02
- TCGA-M-3401-01N-02
- TCGA-M-3401-01O-02
- TCGA-M-3401-01P-02
- TCGA-M-3401-01Q-02
- TCGA-M-3401-01R-02
- TCGA-M-3401-01S-02
- TCGA-M-3401-01T-02
- TCGA-M-3401-01U-02
- TCGA-M-3401-01V-02
- TCGA-M-3401-01W-02
- TCGA-M-3401-01X-02
- TCGA-M-3401-01Y-02
- TCGA-M-3401-01Z-02
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- TCGA-M-3401-01Z-02

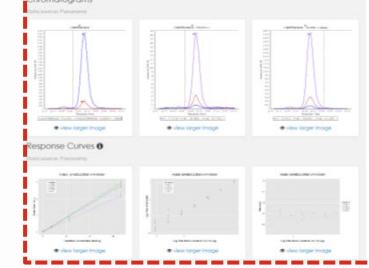
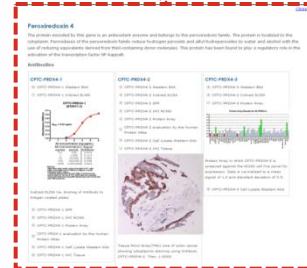
Software Tools

NetGestalt – Gene Network Browser

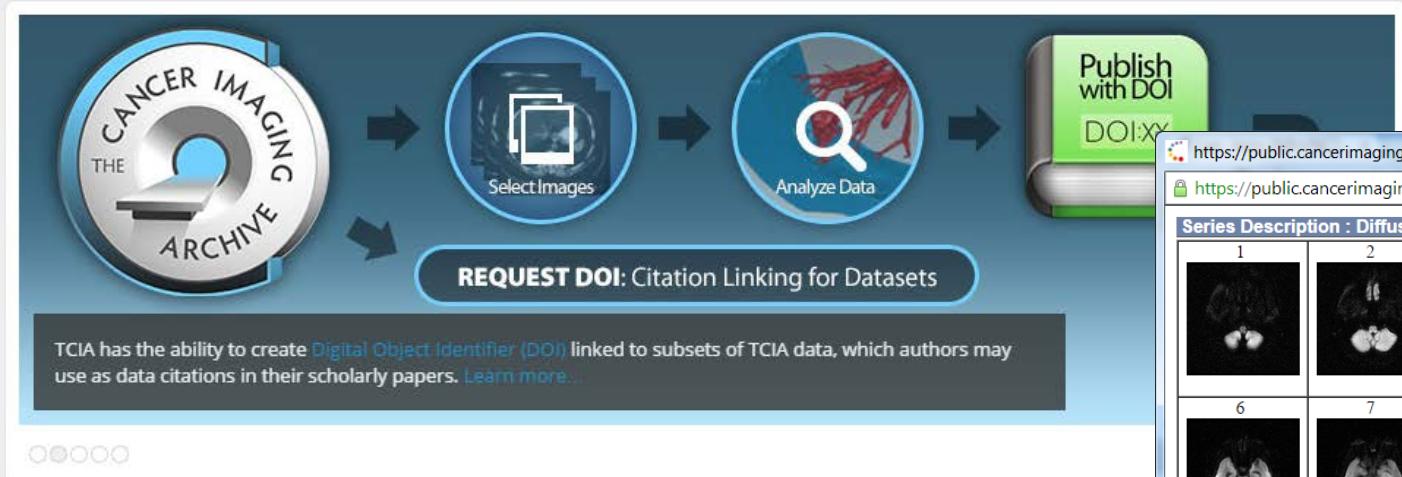
Available Antibodies		Antibody Portal		CFTR Home	
Browse by Antibodies				Find This Page	
Antigen Recognition		Show 26 / 231 entries		Showing 1 to 23 of 231 entries	
✓ recombinant full-length					
Antibody Images Types		Antibodies	*	Antigens	%
✓ GMR	OPTC-AKRR3B-1			Aldo-keto Reductase Family 1 Member B1	100
✓ DHC NC160	OPTC-AKRR3B-2			Aldo-keto Reductase Family 1 Member B1	100
✓ Immunoblot	OPTC-AKRR3B-3			Aldo-keto Reductase Family 1 Member B1	100
✓ Immunoprecipitation	OPTC-AKRR3C-1			Aldo-keto Reductase Family 1 Member C1	100
✓ Western Blot	OPTC-AKRR3C-2			Aldo-keto Reductase Family 1 Member C1	100
✓ Indirect ELISA	OPTC-AKRR3C-3			Aldo-keto Reductase Family 1 Member C1	100
✓ NCI NO Protein Array	OPTC-AKRR3C-4			Aldo-keto Reductase Family 1 Member C2	100
✓ Cell Lines	OPTC-AKRR3C-5			Aldo-keto Reductase Family 1 Member C2	100
✓ Cell Lines Human Blat	OPTC-AKRR3C-6			Aldo-keto Reductase Family 1 Member C2	100
✓ Cross Reactivity Data	OPTC-ANXA5-2			Anxa5 A1 (Annexin C)	100
✓ InIC Reactivity	OPTC-ANXA5-3			Anxa5 A1 (Annexin C)	100
✓ Antibody Targets	OPTC-APAF1-1			APAF1 Nuclelease	100
✓ IgG1	OPTC-BCL2L1-1			BCL2L1	100
✓ IgG2a	OPTC-BCL2L1-2			BCL2L1 like 1	100
✓ IgG2b	OPTC-BCL2L3-1			C23-like 1	100
✓ IgG3	OPTC-BCL2L3-2			C23-like 2	100
✓ Monoclonal Source	OPTC-BCL2L3-3			C23-like 2	100
✓ House	OPTC-CAB-1			Carbonic anhydrase 2	100
External Links	OPTC-CAB-2			Carbonic anhydrase 2	100
✓ Human Protein Atlas	OPTC-Calgril-1			Calgril (Protein Receptor Associated Protein)	100
✓ DBH8	OPTC-Calgril-2			Calgril (Protein Receptor Associated Protein)	100
	OPTC-Calgril-3			Calgril (Protein Receptor Associated Protein)	100
	OPTC-CDH4-1			Cell division cycle 24 homolog (S)	100

Available Assets		About		CPAC Home					
Assay Portal		CPTAC Qualified Assay							
Search the Assay Database by:					Show / Hide Columns				
<input checked="" type="checkbox"/> Clear All Filters					Show: 50 • entries				
KEGG Pathways	Select	Search:		Showing 1 to 50 of 870 entries					
Data Source: KEGG									
Find assays to profile encoded in a specific genomic region Chromosome Number: <input type="text"/> All									
Chromosomal location: <input type="text"/> Start: <input type="text"/> Stop: Data Source: CPAC Annex Database									
Find assays to profile proteins encoded in a specific genomic region Protein ID: <input type="text"/>									
Proteins and peptides for which assays are available									
AABZ - UniProt Accession ID: P47588	Submitting Laboratory	Modification	Assay Type	Motif					
AVDTEPPFVR	Fred Hutchinson Cancer Research Center	unmodified	direct MMW	cell line lysate pool	--> Previous				
ITVIALADDQPGNTR	Fred Hutchinson Cancer Research Center	unmodified	direct MMW	cell line lysate pool	1 2 3 4 5 Next -->				
ABAT - UniProt Accession ID: P80404	Submitting Laboratory	Modification	Assay Type	Motif					
ALGTQDLGQAR	Fred Hutchinson Cancer Research Center	unmodified	direct MMW	cell line lysate pool					
GIFPSDFCDSR	Fred Hutchinson Cancer Research Center	unmodified	direct MMW	cell line lysate pool					
ABCD3 - UniProt Accession ID: P28288	Submitting Laboratory	Modification	Assay Type	Motif					
VUGBVPFLGGR	Seoul National University / Korea Institute Science and Technology	unmodified	direct MMW	cell line lysate pool					
VUDELWPUGGR	Fred Hutchinson Cancer Research Center	unmodified	direct MMW	cell line lysate pool					
Final results (2 results)									

Release Date	Disease	# of Samples	
9/4/2013	Colorectal	95	
2/20/2014	Breast	105	~8,000 proteins ~12,000 phospho-proteins
6/16/2014	Ovarian	174**	~10,000 proteins



****32 samples with global, phospho, and glyco-proteomics data**



TCIA has the ability to create [Digital Object Identifier \(DOI\)](#) linked to subsets of TCIA data, which authors may use as data citations in their scholarly papers. [Learn more...](#)



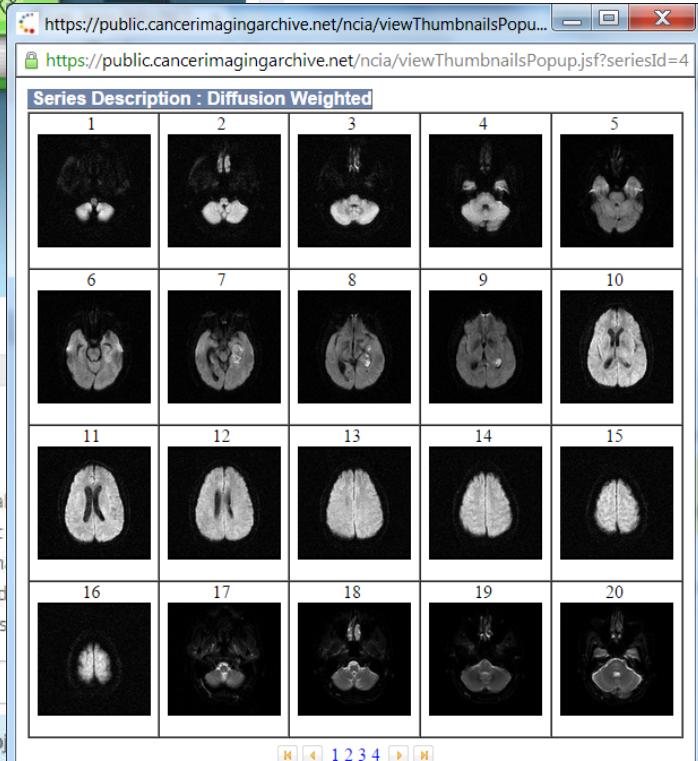
TCIA Collections

The image data in The Cancer Imaging Archive (TCIA) is organized into purpose-built collections of subjects. The subjects typically have one or more common characteristics such as cancer type and/or anatomical site (lung, brain, etc.) in common. Each link in the table below contains information concerning the scientific information about how to obtain any supporting non-image data which may be available, and links to view or download the images. To facilitate reproducibility in scientific research, TCIA supports [Digital Object Identifiers \(DOIs\)](#) which allow users to share subsets of TCIA data in their research manuscript. You can subscribe to our [Email List](#) or social media feeds to be notified of new collections and changes.

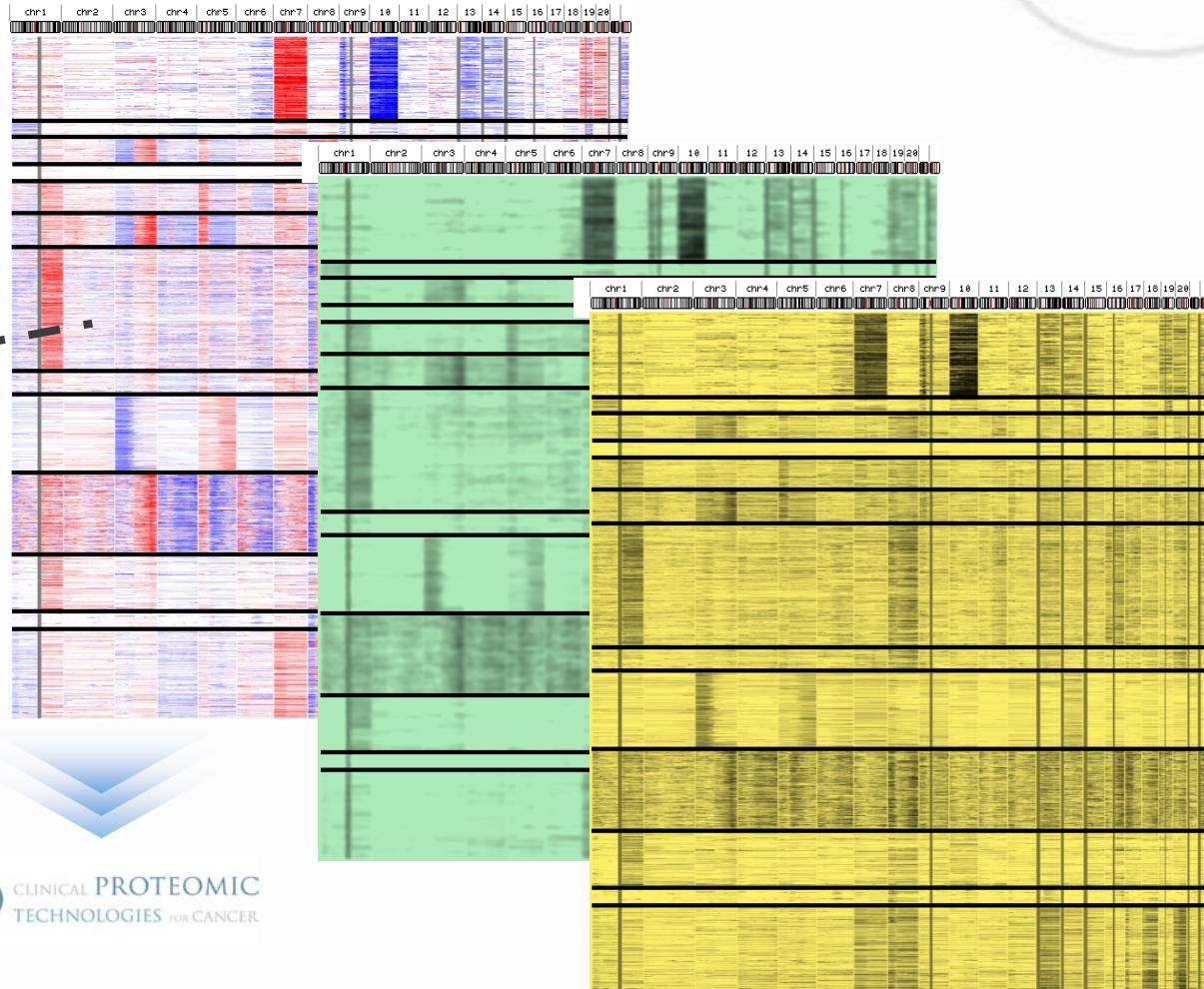
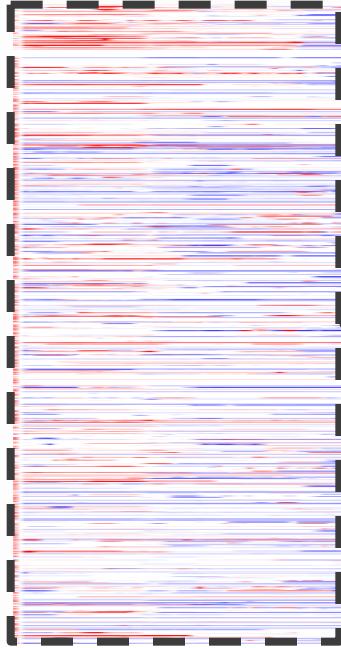
Show [100](#) entries

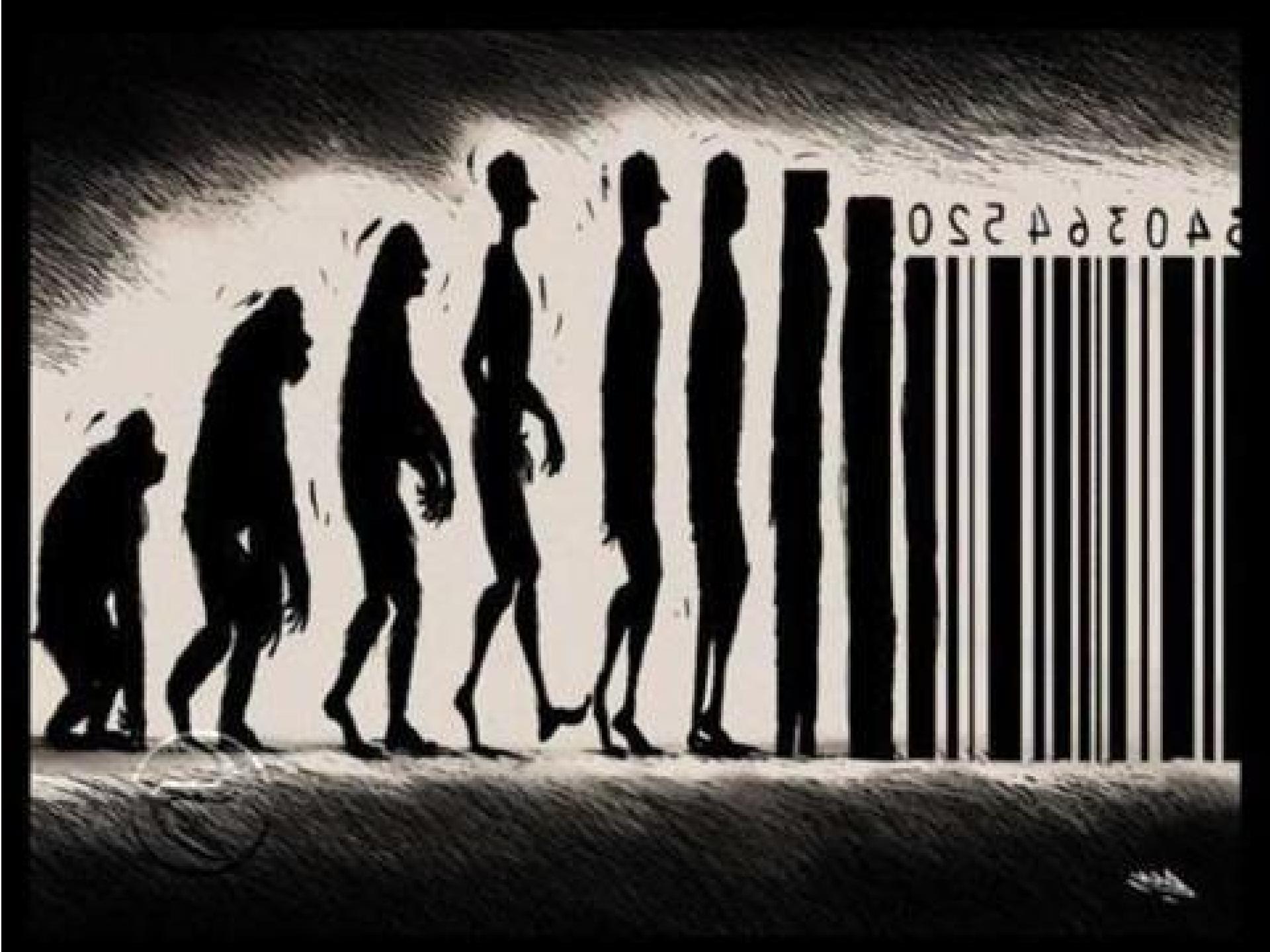
Filter table:

Cancer Type	Collection	Location	Subject
Ovarian Serous	TCGA-OV	Ovary	111
Cystadenocarcinoma			



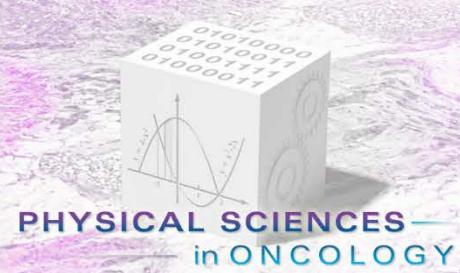
Where Do We Go From Here? Is it JUST More Data?





03464250

Physical Sciences-Oncology Network (PS-ON): Phase II



Thematic Areas: The Physical Dynamics of Cancer | Spatial Organization and Cancer

PS-OC PAR – [PAR-14-169](#)

- U54 mechanism up to \$1.5M (DC)/year
 - 2-3 Projects/Center
 - Education/Outreach Unit
 - Pilot/Trans-Network Projects
- Competition under **Type 1** (i.e., new Centers)
- 3rd Receipt Date Nov 26, 2015 (LOI Oct 14, 2015)

Sean Hanlon



sean.hanlon@nih.gov

Larry Nagahara



larry.nagahara@nih.gov

PS-OP PAR – [PAR-15-021](#)

- U01 mechanism up to \$500K (DC)/year
 - 1 Project
 - Trans-Network Projects
 - Pilot Projects **Optional**
- 2nd Receipt Date Nov 26, 2015 (LOI Oct 14, 2015)

Nastaran Kuhn



nas.kuhn@nih.gov

NCI Alliance for Nanotechnology in Cancer (Phase III)



Cancer Research

Future Opportunities in Cancer Nanotechnology - NCI Strategic Meeting Report

Piotr Grodzinski and Dorothy Farrell

Cancer Res. Published OnlineFirst January 10, 2014.

NCI **Alliance for Nanotechnology** in Cancer



Piotr Grodzinski, PhD

piotr.grodzinski@nih.gov

PAR-14-285: Innovative Research in Cancer Nanotechnology (IRCN)

- U01 Mechanism up to \$450K in Direct Cost per year [5 years total]
- *Milestone-driven focus on developing further understanding of nanomaterial interactions with biological systems and the mechanisms of nanoparticle delivery to the desirable and intended cancer targets *in vivo**
- **2nd Receipt Date April 15, 2015; Total of 6 receipt dates**

NOT-CA-14-035: Nanotechnology Research Training Program

- T32 Mechanism
- Support for the development and operation of cancer nanotechnology research training programs to educate graduate students and postdoctoral fellows in the multi-disciplinary field of cancer nanotechnology research
- **Next Receipt Date May 25, 2015; Standard receipt dates**

Provocative Question (PQ) Initiative: Renewed for FY15 [\$20M]



Nature Jan 26, 2012

Science funding: Provocative questions in cancer research

Harold Varmus & Ed Harlow



Program Director
emily.greenspan@nih.gov



Project Manager
michelle.berny-lang@nih.gov

Program Objective:

Challenge the scientific community to creatively think about and answer **important, but non-obvious or understudied**, provocative questions (PQs) in cancer research

Phase 1: PQs solicited through website and workshops [~\$21M/yr]

- **FY12**
 - 24 original PQs for R01/R21 apps (**56 awards**)
- **FY13**
 - 24 new PQs for R01/R21 apps (**29 awards**)
- **FY14**
 - 24 final PQs for R01/R21 apps (**83 awards**)

Phase 2: PQs solicited and managed by NCI Q-Teams [\$20M/yr]

- **FY15**
 - 12 new PQs for R01/R21 apps (**Spring 2015**)

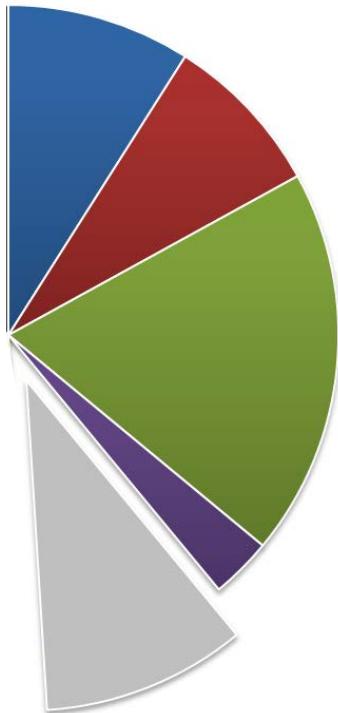
PQ13 (2011): Can tumors be detected when they are two to three orders of magnitude smaller than those currently detected with *in vivo* imaging modalities?

PQB4 (2013): What methods can be devised to characterize the functional state of individual cells within a solid tumor?

Innovative Molecular Analysis Technology Program in 2015 [\$11M]



INNOVATIVE MOLECULAR ANALYSIS TECHNOLOGIES



- Genomics
- Proteomics
- Nanotechnology
- Physics
- Screening

- Epigenomics
- Glycomics
- Single Cellomics
- In Silico Models
- Imaging Agents
- Advanced Microscopy
- Sample QA/QC

100 active projects (478 to date)

<http://imat.cancer.gov>

Current Year | 2014 | 2013 | 2012 | 2011 | 2010 | 2009 | 2008 | 2007 | 2006 | 2005 | 2004 | 2003 | 2002 | 2001 | 2000 | 1999

Show/Hide All

Award Type	Project #	Year of Award	PI Name(S) All	Institution	Title
Abstract Text (Official)					
R21	CA174541	2013	BAI, MINGFENG	UNIVERSITY OF PITTSBURGH AT PITTSBURGH	A NOVEL THERANOSTIC PLATFORM FOR TARGETED CANCER THERAPY AND TREATMENT MONITORING
Cancer treatment currently relies heavily upon administration of cytotoxic drugs that attack both cancerous and healthy cells due to limited selectivity of drugs. Therapeutic efficacy and systemic toxicity can be improved by employing a multifunctional drug delivery system that allows targeted drug delivery, controlled drug release and therapeutic effect monitoring. The integration of therapeutic and diagnostic treatments has created a new era in patient care and personalized medicine termed theranostics. Dendrimers provide an ideal theranostic platform due to their precisely controlled size, shape, and unique chemistry. Their unique properties allow dendrimers to be developed independently or independently, desired pharmacological target and distribution properties, as well as control over drug release. In our pioneering approach, we aim to develop the first quaternary-based (QR) near-infrared (NIR) fluorescent theranostic dendrimer platform and seek to shift NIR theranostic dendrimers away from those with poor chemical stability, quantum yield and photostability to a highly chemically stable, fluorescent and photostable NIR theranostic platform. As a proof-of-principle study to demonstrate that the QR theranostic dendrimers can be applied in targeted cancer imaging, we will attach a conjugate translocator protein (TSPQ) ligand to the selected dendrimers and image the targeted agents in TSPQ over-expressing breast cancer cells and in an animal model. We hypothesize that a quaternary-based dendrimer will provide a highly photostable, fluorescent and chemically stable theranostic platform for targeted cancer therapy and efficacy monitoring. Such innovative design avoids the photobleaching and self-quenching issues of current technology, thus allowing NIR theranostic studies with longer imaging time, higher fluorescence signal and more accurate quantification. It will be possible to conjugate various targeting molecules, signaling moieties and drugs to this innovative platform and therefore, this platform has the potential to be widely applied in cancer treatment and may transform the way that cancer patients are treated and monitored.					
R21	CA174583	2013	CASTRO, CARLOS E.	OHIO STATE UNIVERSITY	NANOSCALE TOOLS FOR FUNCTIONAL STUDIES OF CANCER-RELEVANT CHROMATIN MODIFICATIONS
Dynamic organization of the human genome into chromatin regulates transcription initiation and elongation. Defects in chromatin modifications, assembly, disassembly and remodeling result in misregulation of oncogenes, which are associated with numerous cancers including ovarian, bladder, prostate, and colorectal tumors. Prior research has identified the components involved in chromatin transcriptional regulation (CTR), including histone variants and post-translational modifications (PTMs), histone modification enzymes, and histone chaperone assembly factors. Remarkably, genetic, biochemical, structural, deep sequencing and single molecule studies have not fully revealed the mechanisms of CTR. Therefore, new technologies are required to probe currently inaccessible dynamics and structure of chromatin assembly at the ~100 nm length scale, which encompasses critical nucleic events that regulate DNA processing. This research will address current technical gaps through the development of nanoscale tools to probe the nanoscale (10–100nm) structure and dynamics of chromatin in specific cancer-relevant contexts. Specifically, we will develop 1D/DNA chromatin nanostructures with multiple antibodies that recognize distinct physiological and cancer-relevant combinations of					

Due Dates: 3/17/15, 6/17/15, and 9/22/15



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Acknowledgements/Thanks to the “Secret Ingredients”

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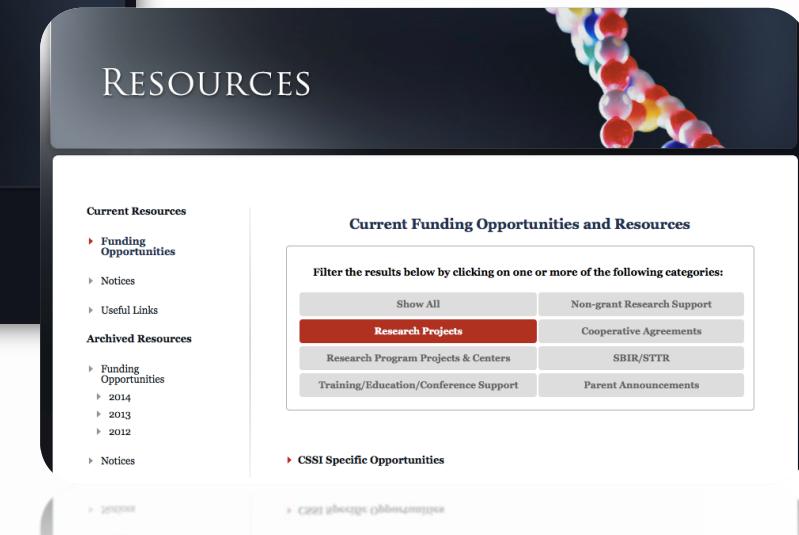


<http://cssi.cancer.gov>



The screenshot shows the homepage of the CSSI website. At the top, there's a red header bar with the National Cancer Institute and U.S. National Institutes of Health logos. Below the header, the CSSI logo is displayed. The main banner features a dark background with a colorful molecular structure on the right and the text "ENABLING PROGRESS IN CANCER RESEARCH THROUGH ADVANCED TECHNOLOGIES, TRANS-DISCIPLINARY PROGRAMS". A timeline feature in the center shows a grid of circular icons representing different years and offices. On the left, there's a sidebar with options to view all offices or specific ones like OD, OBBR, TCGA, OCG, OCCPR, OCNR, and OPSO. It also includes a "Zoom Level" selector for 1, 3, or All Years. The footer contains a navigation menu with links to Home, About CSSI, CSSI Offices, and Contact CSSI.

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The screenshot shows the "RESOURCES" page. The main title "RESOURCES" is at the top. Below it, there are two main sections: "Current Resources" and "Current Funding Opportunities and Resources". The "Current Resources" section includes links for "Funding Opportunities", "Notices", and "Useful Links". The "Archived Resources" section includes links for "Funding Opportunities" (listing 2014, 2013, 2012) and "Notices". The "Current Funding Opportunities and Resources" section has a filter table with categories like "Show All", "Non-grant Research Support", "Research Projects", "Cooperative Agreements", "Research Program Projects & Centers", "SBIR/STTR", "Training/Education/Conference Support", and "Parent Announcements". There are also links for "CSSI Specific Opportunities" and "CSSI General Opportunities".

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