Advancing Innovation and Convergence
In Cancer Research

Jerry S.H. Lee, Ph.D.
Health Sciences Director
Deputy Director, Center for Strategic Scientific Initiatives (CSSI)
Office of the Director, National Cancer Institute (NCI)
National Institutes of Health (NIH)

2014 ASEE Engineering Research Council Annual Meeting
Change and Research Opportunities: Perspectives from NIST, DOE, NGA, and NCI

March 18, 2014
What is It?
Tumor, Cancer, and Metastasis


> “…>90% of deaths is caused by disseminated disease or metastasis…”

<table>
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<tr>
<th>Organ Site</th>
<th>All Stages</th>
<th>Localized</th>
<th>Regional</th>
<th>Distant</th>
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<td>Pancreas</td>
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Aggressive phenotype
- Oncogenic mutations
- Epigenomic instability

Prerequisites
- Self renewal, Invasiveness
- Motility, Detachment survival

Microenvironment
- Angiogenesis, Inflammation
- Cancerized stroma

Intravasation
- Epithelial-to-mesenchymal transitions

Life in transit
- Platelet association, embolism
- Vascular adhesion

Distant accomplices
- Vascular progenitors
- Metastatic niche precursors

Homing
- Attachment
- Attraction to survival signals

Extravasation
- Motility, Vascular remodeling

Micrometastasis
- Survival in dormancy

Co-opted stroma
- Angiogenesis, Inflammation
- Cancerized stroma

Full colonization
- Organ-specific metastasis factors and functions
In the U.S., Cancer Continues to Represent an Enormous Burden

- 574,743 Americans died of cancer in 2010 (585,720 projected for 2013)
- 1,665,540 Americans will be newly diagnosed with cancer in 2014 (projected)
- $216.6 billion in 2009 for cancer healthcare costs ($86.6 billion for direct medical)

Unlike Other Major Disease Killers, Cancer Continues to Take Nearly the Same Toll as it did in 1950

Source for 2014 projected deaths and diagnoses: Siegel et. al, Cancer Statistics, 2014
Global Burden: By 2020, Cancer Incidence 16 M/yr (Mortality 10 M/yr)

Source: IACR, WHO
Unprecedented Amount of Scientific Knowledge: Omics

- 2001: The human genome
- 2005: A thousand genomes
- 2010: A map of human genome variation from population-scale sequencing
- 2012: An integrated map of genetic variation from 1,092 human genomes

ISI search for genomics, proteomics, transcriptomics, metabolomics, phenomics, interactomics, glycomics

- 1923: 49,024 pubs
- 2001: 54,587 pubs
- 2005: 87,793 pubs
- 2012: 38,506 pubs
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?

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

NIH Campus – Bethesda, Maryland

NIH Budget ~ $30.8 Billion (FY12)
• ~82% for extramural support
• ~63,000 grants and contracts

NCI Budget ~ $ 5.07 Billion (FY12)
• ~ 76% for extramural support
• ~7,800 grants and contracts
National Institutes of Health (NIH): 27 Institutes and Centers

NIH FY12 Appropriations Data Taken from [http://www.nih.gov/about/almanac/appropriations/index.htm](http://www.nih.gov/about/almanac/appropriations/index.htm) and [http://report.nih.gov/nihdatabook/](http://report.nih.gov/nihdatabook/)
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

- **IC-Specific Program Announcements (PA)**
- 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

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

- ~53% NIH-wide
- ~47% NCI-only
- ~21% NIH-wide
- ~34% NCI-only
- ~26% NIH-wide
- ~19% NCI-only

~575 in FY12
NIH Research Portfolio Online Reporting Tools (RePORT)

NIH

~$11.8B

~$5.7B

~$4.7B

~$22.2B

NCI

~$3.2B

~$1.5B

~$0.6B

~$1.1B

NIAID

~$2.7B

~$1.3B

~$1B

~$0.4B

NIGMS

~$2.3B

~$1.4B

~$0.6B

~$0.3B

NIBIB

~$288M

~$163M

~$31M

~$94M

NHGRI

~$364M

~$77M

~$213M

~$73M

FY12 grants data from http://projectreporter.nih.gov
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)

Does not
- Assemble review committee
- Make awards

http://grants.nih.gov
National Cancer Program: Stakeholders

~$18 B per year

Private Industry $9.2 B

NCI $5 B

Fed/State $3.4 B

NPO/Foundations, $0.6 B

NCAB Working Group Report, 2010
National Cancer Institute Organization

Director
Harold Varmus, MD

Deputy Director
Douglas Lowy, MD

Office of the Director

CSSI
~$132 M (~4%)

Center for Cancer Research
~$858M (~17%)

Division of Cancer Epidemiology and Genetics

Division of Cancer Treatment and Diagnosis
~$919M (~29%)

Division of Cancer Biology
~$779M (~25%)

Division of Cancer Control and Population Sciences
~$441M (~14%)

Division of Cancer Prevention
~$264M (~8%)

Division of Extramural Activities
~$21M (~0.4%)

Conducting – Intramural

Funding – Extramural

NCI 2012 Fact Book: FY12 Budget Breakdown

**Fiscal Year 2012 Budget**
(Dollars in Thousands)

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<th>Mechanism</th>
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<th>Percent</th>
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<td>R&amp;D Contracts</td>
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Data from NCI FY12 Factbook (http://obf.cancer.gov/financial/factbook.htm)
NCI’s Federally Funded Research and Development Center (FFRDC)

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................$183,096,793

- Dollars spent via Leidos Biomedical Research (formerly SAIC-Frederick) purchase orders, 9/28/08–9/10/11
  - Frederick County...$35,695,585
  - Maryland.............$288,944,880

Physical

- 68 acres deeded to the Department of Health and Human Services (HHS)
- 961,217 net square feet
- 1,654,036 gross square feet
- 113 buildings on site

Frederick National Lab Distribution of Effort

- AIDS 16%
- Drug Development 12%
- Vaccine Development 12%
- Clinical Trial Support 16%
- Genomics 8%
- Other 36%

NCI Funding in FY12 $238,204

http://frederick.cancer.gov/About/Facts.aspx
Translation Pace: How To Break Out of Current Paradigm?

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

Turning the Crank…

The potential to transform cancer drug discovery and diagnostics

Paul et. al, Nature Rev. Drug Discovery, March 2010
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...”
## CSSI Programs (FY99-FY14): Diverse Mechanisms

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<tr>
<th>Program</th>
<th>Grants</th>
<th>Cooperative Agreements</th>
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<th>Interagency Collaborations (Co-funds/joint programs)</th>
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</table>
Support Convergence and Innovation At Many Scales

- NCI Alliance for Nanotechnology in Cancer
- Cancer Target Discovery & Development (CTD²)
- Physical Sciences in Oncology
- Clinical Proteomic Technologies for Cancer
- The Cancer Genome Atlas
- Provocative Questions Initiative
- IMAT

Phase II

Early settlers

Team Explorers

Discoverers/Pioneers

Basic  Applied  Translational  Clinical  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)

Qualitative Descriptions

Measurements Taken

Lots of Quantitative “Data”

But also LOTS of disagreements…
Standards and Sharing of Data →
New Insights and Understanding

- Define samples & protocols
- Share collected data

New Understanding

- Phase boundaries
- V/L equilibrium
- Triple Point

(Phase Diagram)

(Steam Table)

LOTs of Quantitative and Reproducible Data
2003 Launch of the Technology Dashboard of CSSI: IMAT

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)

Application of Emerging Technologies for Cancer Research
- Validation and dissemination of platforms
- Demonstration of impact on basic and clinical research

Snapshot of Initial Applications (2003-2004)
Disease of Genomic Alterations

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

- Systematic identification of all genomic changes
- Repeat (a lot) for individual cancer
- Repeat for many cancers
- Make it publically available
Many “Thermometers”: Heterogeneity of Platforms

454
Illumina
SOLiD
Helicos
Visigen
PacBio
Ion-Torrent
Oxford Molecular
Nimblegen
LaserGen
ZSGenetics
NABsys
Agilent
Febit
Raindance
Intelligent Biosystems
Halycon
IBM
"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)..."
TCGA: Connecting Multiple Standardized Sources, Experiments, and Data Types

Three Cancers - 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
### Genomic "Steam Table"

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## Genomic "Steam Table"

**Spring 2013**

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<thead>
<tr>
<th>Cancer Type</th>
<th>Cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Glioblastoma</td>
<td>563</td>
</tr>
<tr>
<td>Brain lower grade glioma</td>
<td>180</td>
</tr>
<tr>
<td>Head &amp; neck</td>
<td>306</td>
</tr>
<tr>
<td>Thyroid carc.</td>
<td>401</td>
</tr>
<tr>
<td>Lung adeno.</td>
<td>356</td>
</tr>
<tr>
<td>Lung squamous.</td>
<td>343</td>
</tr>
<tr>
<td>Breast carc.</td>
<td>866</td>
</tr>
<tr>
<td>Stomach adeno.</td>
<td>237</td>
</tr>
<tr>
<td>Liver hep. carc.</td>
<td>97</td>
</tr>
<tr>
<td>Kidney pap. cell carc.</td>
<td>103</td>
</tr>
<tr>
<td>Kidney clear cell carc.</td>
<td>493</td>
</tr>
<tr>
<td>Ovarian serous.</td>
<td>559</td>
</tr>
<tr>
<td>Uterine corpus end. carc.</td>
<td>492</td>
</tr>
<tr>
<td>Cervical carc.</td>
<td>102</td>
</tr>
<tr>
<td>Bladder carc.</td>
<td>135</td>
</tr>
<tr>
<td>Prostate adeno.</td>
<td>171</td>
</tr>
<tr>
<td>Colon/rectum adeno.</td>
<td>575</td>
</tr>
</tbody>
</table>

**Total**: 5979

Source: UCSC Cancer Genomic Heatmaps (CopyNumber GISTIC2) [https://genome-cancer.ucsc.edu/]  Compiled by Jerry S.H. Lee, PhD, March 2013
Clinical Proteomic Tumor Analysis Consortium (CPTAC)

**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

```
DNA ➔ RNA ➔ Protein
```

```
TCGA Specimens

Protein Characterization

Assay Development

Protein Verification

Data, Results Storage & QC

Reagents

TCGA Data

Analytically validated quantitative assays of proteins
Public data sets
```
CPTAC Public Resources:
http://proteomics.cancer.gov

11,419 files (2.2 TB)

280 mAbs (~$35)

542 assays

<table>
<thead>
<tr>
<th>Release Date</th>
<th>Disease</th>
<th># of Samples</th>
</tr>
</thead>
<tbody>
<tr>
<td>9/4/2013</td>
<td>Colorectal</td>
<td>95</td>
</tr>
<tr>
<td>2/20/2014</td>
<td>Breast</td>
<td>105</td>
</tr>
<tr>
<td>4/2014</td>
<td>Ovarian</td>
<td>TBD</td>
</tr>
</tbody>
</table>

~8,000 proteins
~12,000 phospho-proteins
Where Do We Go From Here? Is it **JUST** More Data?

Time? (Evolution)

Public dataset available **NOW!**
Personalized Medicine

The pharmaceutical industry makes billions of dollars a year selling one-size-fits-all medicines. But now the race is on to come up with tailor-made drugs that will treat people based on their individual genetic makeup.

Drug companies hope to create a map of genetic landmarks that will become a potent new tool for uncovering the minute inborn differences.

How Fine-Tuning By Drug Makers Will Work

- **Herceptin from Genentech Inc.**
  Breast-cancer drug developed specifically to treat a minority of patients whose tumors have elevated levels of a protein, her-2.

- **Xeloda from Roche Holding Ltd.**
  Some patients may respond better to this breast-cancer drug than others because of differences in enzymes that process it.

- **Clozaril from Novartis AG**
  Old schizophrenia drug that causes rare blood disorder in a small number of patients; researchers hope to use gene-map data to develop test to predict who will get the disorder.

- **Orzel from Bristol-Myers Squibb Co.**
  Colorectal cancer drug currently under FDA review; company is performing studies to identify which patients are more likely to develop diarrhea and other side-effects from the drug.

Compiled from www.gene.com and www.roche.com
Incremental Improvements Have Doubled Overall Survival in the Last Decade

<table>
<thead>
<tr>
<th>Study</th>
<th>Treatment</th>
<th>OS (months)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Saltz, NEJM 2000</td>
<td>5-FU bolus</td>
<td>12.6</td>
</tr>
<tr>
<td>Douillard, Lancet 2000</td>
<td>5-FU infusion</td>
<td>14.1</td>
</tr>
<tr>
<td>Saltz, NEJM 2000</td>
<td>IFL</td>
<td>14.8</td>
</tr>
<tr>
<td>Douillard, Lancet 2000</td>
<td>FOLFIRI</td>
<td>17.4</td>
</tr>
<tr>
<td>Goldberg, JCO 2004</td>
<td>FOLFOX</td>
<td>19.5</td>
</tr>
<tr>
<td>Tournigand, JCO 2004</td>
<td>FOLFOX followed by FOLFIRI</td>
<td>20.6</td>
</tr>
<tr>
<td>Hurwitz, NEJM 2004</td>
<td>IFL + bevacizumab</td>
<td>20.3</td>
</tr>
<tr>
<td>Saltz JCO 2008</td>
<td>FOLFOX + bevacizumab</td>
<td>21.3</td>
</tr>
<tr>
<td>VanCutsem JCO 2011</td>
<td>FOLFIRI + cetuximab</td>
<td>23.5*</td>
</tr>
<tr>
<td>Douillard, JCO 2010</td>
<td>FOLFOX + panitumumab</td>
<td>23.9*</td>
</tr>
</tbody>
</table>

*KRAS wild-type population

Courtesy of Scott Patterson, PhD (Amgen)
2012: Cancer Treatment and Survivorship Statistics

An estimated 13.7 million Americans with a history of cancer were alive on January 1, 2012.

As of January 1, 2012

Male
- Prostate: 2,778,830 (43%)
- Colon & rectum: 595,210 (9%)
- Melanoma: 481,040 (7%)
- Urinary bladder: 437,180 (7%)
- Non-Hodgkin lymphoma: 279,500 (4%)
- Testis: 230,910 (4%)
- Kidney & renal pelvis: 213,000 (3%)
- Lung & bronchus: 189,080 (3%)
- Oral cavity & pharynx: 185,240 (3%)
- Leukemia: 167,740 (3%)
- All sites: 6,442,280

Female
- Breast: 2,971,610 (41%)
- Uterine corpus: 606,910 (8%)
- Colon & rectum: 603,530 (8%)
- Melanoma: 496,210 (7%)
- Thyroid: 436,590 (6%)
- Non-Hodgkin lymphoma: 255,450 (4%)
- Uterine cervix: 245,020 (3%)
- Lung & bronchus: 223,150 (3%)
- Ovary: 192,750 (3%)
- Urinary bladder: 148,210 (2%)
- All sites: 7,241,570

Estimated Numbers of US Cancer Survivors by Site.

Cancer Treatment Patterns by Stage, 2008.

Female Breast Cancer
- BCS alone
- Mastectomy + RT
- Mastectomy + RT + Chemo
- BCS + RT + Chemo
- Mastectomy alone
- Mastectomy + chemo
- BCS indicates breast-conserving surgery.

Non-Small Cell Lung Cancer
- Surgery alone
- Surgery + chemo or RT
- Chemo alone
- Chemo + RT
- RT alone
- No treatment

Colon Cancer
- Polypectomy alone
- Polypectomy with chemo
- Polypectomy with (no RT)
- Chemo and/or RT
- No treatment

Modified from Siegel et al. CA Cancer J Clin, June 2012
Provocative Question (PQ) Project: Seeding Innovations for the Future

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

**Implementation:**
- PQs solicited through website and workshops
  - **Phase 1:** requested R01/R21 applications on 24 final PQs (55 awards)
  - **Phase 2:** new set of 24 PQs for R01/R21 apps (93 awards)
  - **Phase 3:** new set of 20 PQs

**Examples of PQs:**
- **PQA4:** For tumors that arise from a pre-malignant field, what properties of cells in this field can be used to design strategies to inhibit the development of future tumors?
- **PQC4:** What in vivo imaging methods can be developed to portray the "cytotype" of a tumor?
- **PQB1:** Why do second, independent cancers occur at higher rates in patients who have survived a primary cancer than in a cancer-naïve population?
- **PQD1:** What molecular properties make some cancers curable with conventional chemotherapy?
- **PQD4:** What are the mechanistic bases for differences in cancer drug metabolism and toxicity at various stages of life?
Bringing In New Perspectives

- To generate **new knowledge** and catalyze **new fields of study** in cancer research by utilizing physical sciences/engineering principles to enable a better understanding of cancer and its behavior at all scales.

- Not looking for new tools to do “better” science, but new perspectives and approaches to do **paradigm-shifting** science that will lead to exponential progress against cancer.

- Build **trans-disciplinary teams** and infrastructure to better understand and control cancer through the convergence of physical sciences and cancer biology.
PS-OC Model: **PI Driven Interactions** Inside/Outside of Network/Center

**PS-OC #1**

**Organizing Framework**

- **Core A**
- **Core B**
- **Project 1**
- **Project 2**
- **Outreach and Dissemination Unit**

**Education and Training Unit**

**Pilots Projects (Admin Unit)**

**Trans-Network (Admin Unit)**

- **Trainee Exchanges** $50K/yr (Designed by Center, 121)
- **$100K/yr** (Designed by Center, 121)

**Trans-Network Projects**

- **~$1.2M/yr** [$100K/center] (Designed by Network, 75)

**Outreach Pilots**

**PS-OC #2**

**Organizing Framework**

- **Core A**
- **Core B**
- **Project 1**
- **Project 2**
- **Outreach and Dissemination Unit**

**Education and Training Unit**

**Pilots Projects (Admin Unit)**

**Trans-Network (Admin Unit)**

- **Outreach Pilots** $50K/yr (Designed by Center, 48)
Then…(2002)

Drew Sheneman, The Star-Ledger, Newark, NJ
Now…(2014):
Moore’s Law of Analysts?
Basic  Applied  Translational  Clinical  Commercial/Industry
Need to Look Beyond Publications

The graph illustrates the number of publications from 2003 to 2011 across various categories:
- NIH Tech Dev
- Nano
- Physics
- IMAT
- Proteomics
- TCGA

The x-axis represents the years from 2003 to 2011, and the y-axis represents the number of publications.
## CSSI Programs and Evaluations (2004-2014)

### CaNano Plan 1
- **Published**
- **Phase I Launched**
  - U54
  - R01
  - F32/F33
- **Program Eval**
- **Program Renewed**
- **Program Eval**

### CaNano Plan 2
- **Published**
- **Phase II Launched**
  - U54
  - U01
  - K99/R00
  - R25
- **Program Eval**
- **Program Renewed**
  - 2 R21 (3 year)
  - 2 R33

### CaNano Plan 2
- **Phase I Launched**
  - U54
  - R33
- **Program Eval**
- **Program Renewed**

### CaNano Plan 2
- **Phase I Launched**
  - U24
  - R21/R33
- **Program Eval**
- **Program Renewed**

### CaNano Plan 2
- **Phase II Launched**
  - U54
  - U01
  - R21/R33
- **Program Eval**
- **Program Renewed**
  - 2 R21 (3 year)
  - 2 R33

### RFA Program Launched
- 3 R21
- 3 R33
- 3 R21/R33

### IMAT
- **Phase I Launched**
  - U24
  - R01
  - R21/R33
- **Program Eval**
- **Program Renewed**

### IMAT
- **Phase II Launched**
  - U54
  - Linked with TCGA
- **Program Eval**

### IMAT
- **Prospective Electronic Program Eval**

### TRAQR
- **Prospective Electronic Program Eval**

### TRAQR
- **Program Eval**
- **Program Renewed**

### PHYSICAL SCIENCES in ONCOLOGY
- **Phase I Launched**
  - U54
- **Program Eval**

### PHYSICAL SCIENCES in ONCOLOGY
- **Phase I Launched**
  - R01
  - R21
- **Program Eval**

### PHYSICAL SCIENCES in ONCOLOGY
- **Prospective Electronic Program Eval**

### PROTEOMIC TECHNOLOGIES for CANCER
- **Program Eval**
- **Program Renewed**

### PROTEOMIC TECHNOLOGIES for CANCER
- **Phase II Launched**
  - U24
  - Linked with TCGA
- **Program Eval**

### PROTEOMIC TECHNOLOGIES for CANCER
- **Program Eval**

### Ongoing Eval

### Pre-Review Applicant Eval

*Red Denotes Eval and/or Changes to Programs*
Join the Team!

Upcoming Funding Opportunities

**Provocative Questions ($30M)**

Due Date 06/20/14

PQ Program Director

emily.greenspan@nih.gov

**Innovative Molecular Analysis Technologies ($10.5M)**

Due Dates 05/20 and 9/18/14

IMAT Program Director

anthony.dickherber@nih.gov

Data from projectreporter.nih.gov
Join the Team!
Upcoming Network Funding Opps

PS-OC Program*

Sean Hanlon, PhD
sean.hanlon@nih.gov

Larry Nagahara, PhD
larry.nagahara@nih.gov

Discussion from NCI Board of Scientific Advisors (Nov 2013)

PS-OC Network PAR
Future

NCI Alliance for Nano Program (Approved 3/2014)

Cancer Research

Future Opportunities in Cancer Nanotechnology - NCI Strategic Meeting Report
Piotr Grodzinski and Dorothy Farrell
Cancer Res. Published Online First January 10, 2014.

Piotr Grodzinski, PhD
piotr.grodzinski@nih.gov

Stephanie Morris, PhD
stephanie.morris@nih.gov

Summary of Responses to RFI on Directions and Needs for Cancer Nanotechnology Research and Development

The National Cancer Institute Office of Cancer Nanotechnology Research published a summary of its request for information on the directions and needs for cancer nanotechnology research and development. The purpose of the RFI was to gain feedback, comments and ideas from the extramural community, as well as NCI Alliance leaders, investigators, trainees and related stakeholders, on the status and future of the field and the role NCI funding has played and should continue to play in the future.
Relevant CSSI Funding Opportunities

- **Research Answers to NCIs Provocative Questions- Group A-E (R01)**
  - Due Date: 06/20/2014 RFA-CA-13-016, 018, 020, 022,024 ($2-3M each RFA, $10-$15M total)

- **Research Answers to NCIs Provocative Questions- Group A-E (R21)**
  - Due Date: 06/20/2014 RFA-CA-13-017, 019, 021, 023, 025 ($0.5-1M each RFA, $2.5M - $5M total)

- **Early-Stage Innovative Molecular Analysis Technology Development (R21)**
  - Due Date: 05/20/2014 and 09/18/2014 RFA-CA-14-003 ($5M)

- **Validation and Advanced Development of Emerging Molecular Analysis Technologies (R33)**
  - Due Date: 05/20/2014 and 09/18/2014 RFA-CA-14-004 ($4M)

- **Early-Stage Development of Innovative Technologies for Biospecimen Science (R21)**
  - Due Date: 05/20/2014 and 09/18/2014 RFA-CA-14-005 ($0.8M)

- **Validation and Advanced Development of Emerging Technologies for Biospecimen Science (R33)**
  - Due Date: 05/20/2014 and 09/18/2014 RFA-CA-14-006 ($0.7M)
Relevant NCI Funding Opportunities

- **Innovative Molecular Analysis Technology Development for Cancer Research and Clinical Care (R43/R44)**
  - Due Date: 5/28/2014 and 11/4/2014  PAR-13-327

- **Early-Stage Development of Informatics Technology (U01)**
  - Due Date: 6/18/2014 and 11/18/2014  PAR-12-288

- **Advanced Development of Informatics Technology (U24)**
  - Due Date: 6/18/2014 and 11/18/2014  PAR-13-294

- **Imaging and Biomarkers for Early Cancer Detection (R01)**
  - Due Date: 7/10/2014 and 12/11/2014  PAR-13-189

- **Image-guided Drug Delivery in Cancer (R01)**
  - Due Date: 6/19/2014 and 11/19/14  PAR-13-185

- **Biomarkers for Early Detection of Hematopoietic Malignancies (R21/R01)**
  - Due Date: 6/16/2014 (R21) & 7/5/2014 (R01) [Standard]  PA-12-220 (R21) & PA-12-221 (R01)
Acknowledgements/Thanks to the “Secret Ingredients”

Clinical Sciences

Life Sciences

Physical Sciences
Learn More About Us…

http://cssi.cancer.gov

Jerry S.H. Lee, PhD
jerry.lee@nih.gov
NIH Early Career Reviewer Program

PURPOSE
• Train and educate qualified scientists
• Help emerging researchers advance their careers by exposing them to review experience
• Enrich the existing pool of NIH reviewers

REQUIREMENTS
• ≤ 1 mail-in review
• Faculty appointment or equivalent
• Active independent research program
• Recent publications

Interested in serving as an NIH reviewer?
Send your CV to petersonjt@csr.nih.gov

Hope to meet you at the conference. Thomas Peterson
(Chief of Bioengineering Sciences and Technologies)