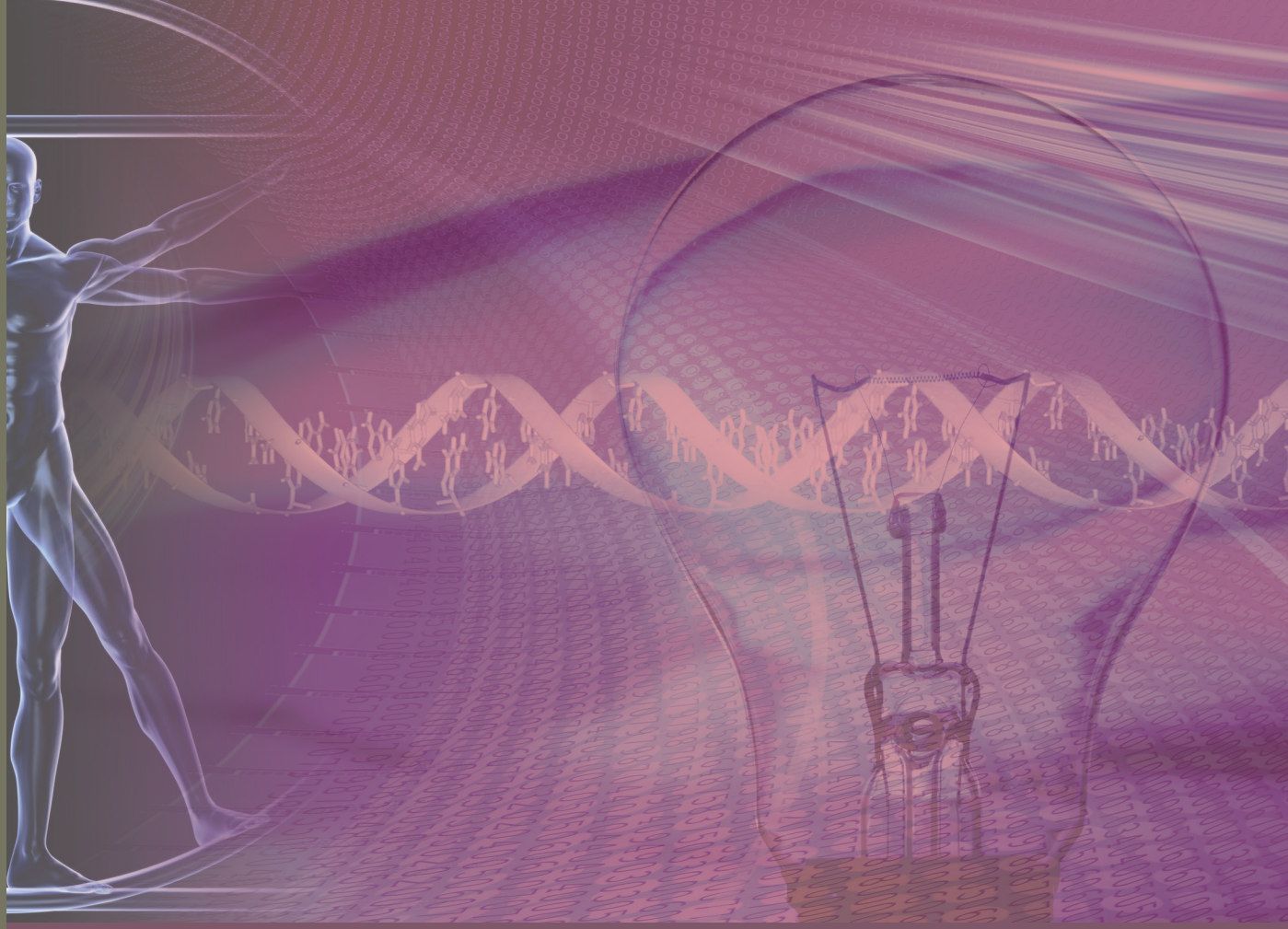
National Cancer Institute



14th Annual Innovative Molecular Analysis Technologies (IMAT) Principal Investigators' (PI) Meeting

November 21-22, 2013

Natcher Auditorium, NIH Main Campus
Bethesda, Maryland

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES

National Institutes of Health

Agenda

Thursday, November 21

8:30 a.m. - 8:40 a.m. **Welcome**
Tony Dickherber, Ph.D.
Innovative Molecular Analysis Technologies
National Cancer Institute, NIH

8:40 a.m. - 9:20 a.m. **Considering a Biotech Startup? Lessons Learned From UCSF Lean Launchpad for Life Sciences and Healthcare**
Steve Blank
Stanford University

9:20 a.m. - 10:30 a.m. **Session 1: Drug Screening Platforms**
Moderator: Tawnya C. McKee, Ph.D.
National Cancer Institute, NIH

9:20 a.m. - 9:40 a.m. *Hyperspectral and Structural Microscopy Platform for Therapy of Resistant Cancer*
Conor Evans, Ph.D.
Massachusetts General Hospital

9:40 a.m. - 10:00 a.m. *Evaluating Metastatic Potential by Multiplexing the Cell Magneto-Rotation Method*
Raoul Kopelman, Ph.D.
University of Michigan

10:00 a.m. - 10:20 a.m. *Poster Highlights*

Mass Spectrometry-Based Inhibitor Screening for Kinase-Selective Inhibitors Against Cancer Targets
Kenneth Greis, Ph.D.
University of Cincinnati

Discovery of Peptidomimetic Death Ligands Against Ovarian Cancer Through OB2C Combinatorial Library Approach
Kit S. Lam, M.D., Ph.D.
University of California, Davis

An In Vivo System for Cancer Vaccine Immunogen Optimization
Steven Zeichner, M.D., Ph.D.
Children's National Medical Center and The George Washington University

10:20 a.m. - 10:30 a.m. *Session Discussion*

10:30 a.m. - 10:50 a.m. BREAK

10:50 a.m. - 12 noon — Session 2: Macromolecular Interaction Tools
Moderator: J. Randy Knowlton, Ph.D.
National Cancer Institute, NIH

10:50 a.m. - 11:10 a.m. — *Scanning Correlation Microscopy Methods for Quantifying DNA Repair Kinetics*
Georgios Alexandrakis, Ph.D.
The University of Texas at Arlington

11:10 a.m. - 11:30 a.m. — *Characterizing Gene Regulation With Single Molecule Sensitive Probes*
Philip Santangelo, Ph.D.
Georgia Institute of Technology

11:30 a.m. - 11:50 a.m. — *Poster Highlights*

Methods of Systematic microRNA Target Validation and Identification
Yin-Yuan Mo, Ph.D.
University of Mississippi Medical Center

Multimodal DNA Nanoparticles to Bind Cancer Cells
Bradley Messmer, Ph.D.
University of California, San Diego

Protein Painting Reveals Hidden "Hot Spots" of Protein-Protein Interaction
Lance A. Liotta, M.D., Ph.D.
George Mason University

11:50 a.m. - 12 noon — *Session Discussion*

12 noon - 1:30 p.m. — LUNCH (on your own)

1:30 p.m. - 2:40 p.m. — Session 3: Sample Prep & QA/QC
Moderator: Rodrigo Chuaqui, M.D.
National Cancer Institute, NIH

1:30 p.m. - 1:50 p.m. — *CITP-Based Selective Tissue Proteome Enrichment*
Cheng Lee, Ph.D.
University of Maryland

1:50 p.m. - 2:10 p.m. — *Advancing Toward a Global ECM Characterization Method*
Kirk C. Hansen, Ph.D.
University of Colorado, Denver

2:10 p.m. - 2:30 p.m.	*Poster Highlights*
	Ultra-Throughput Multiple Reaction Monitoring Mass Spectrometry for Large-Scale Cancer Biomarker Xudong Yao, Ph.D. University of Connecticut
	mRNA Integrity in Clinical Biospecimens as Measured by RNA-seq and Sentinel RNAs Curt Hagedorn, M.D. Central Arkansas Veterans Healthcare System
	Validation of Nanotrap Nanotechnology for One Step Capture and Preservation of Labile Low-Abundance Body Fluid Biomarkers Lance A. Liotta, M.D., Ph.D. George Mason University
2:30 p.m. - 2:40 p.m.	*Session Discussion*
2:40 p.m. - 2:50 p.m	NCI SBIR Development Center Resources Amir Rahbar, Ph.D. National Cancer Institute, NIH
2:50 p.m. - 3:00 p.m	Grant Supplements From NCI Center to Reduce Cancer Health Disparities Alison Lin, Ph.D. National Cancer Institute, NIH
3:00 p.m. - 5:00 p.m.	Poster Session and One-on-One Meetings

Friday, November 22

8:30 a.m. - 8:35 a.m

Welcome
Tony Dickherber, Ph.D.
Innovative Molecular Analysis Technologies
National Cancer Institute, NIH

8:35 a.m. - 9:20 a.m.

Bioengineering and Clinical Applications of Circulating Tumor Cells
Mehmet Toner, Ph.D.
Harvard-MIT Health Sciences and Technology

9:20 a.m. - 10:30 a.m.

Session 4: CTC Capture and Analysis Platforms
Moderator: Lynn R. Sorbara, Ph.D.
National Cancer Institute, NIH

9:20 a.m. - 9:40 a.m.

Highly Fluorescent Semiconducting Polymer Dots for Biology and Medicine
Daniel T. Chiu, Ph.D.
University of Washington

9:40 a.m. - 10:00 a.m.

Microfluidic Multiplex Plasmon Coupled Fluorescence Analysis of Sorted Proteins and Cells
David A. Lawrence, Ph.D., M.S.
University at Albany School of Public Health

10:00 a.m. - 10:20 a.m.

Poster Highlights

Oligonucleotide Aptamer: A Revolutionary Antibody for Detection of Circulating Tumor Cells?
Youli Zu, M.D., Ph.D.
Weill Cornell Medical Center

Single-CTC Genomics for Monitoring the Dynamic Evolution of Treatment Resistance in Metastatic Cancer Patients
Hsian-Rong Tseng, Ph.D.
University of California, Los Angeles

Isolation of Tumor Initiating Cells (TICs) Using Contactless Dielectrophoresis
Rafael V. Davalos, Ph.D.
Virginia Polytechnic Institute

10:20 a.m. - 10:30 a.m.

Session Discussion

10:30 a.m. - 10:50 a.m.

BREAK

10:50 a.m. - 12 noon — Session 5: Mutation and Expression Analysis Platforms
Moderator: Rao Divi, Ph.D., M.S.
National Cancer Institute, NIH

10:50 a.m. - 11:10 a.m. — *Detection of Low Prevalence Mutations in Solid Tumors via Ultra-Deep Targeted Sequencing*
Olivier Harismendy, Ph.D.
University of California, San Diego

11:10 a.m. - 11:30 a.m. — *Single Molecule Molecular Inversion Probes for Targeted, High Accuracy Detection of Low-Frequency Variation and Intra-Tumoral Heterogeneity*
Jay A. Shendure, M.D., Ph.D.
University of Washington

11:30 a.m. - 11:50 a.m. — *Poster Highlights*

Differential Strand Separation at Critical Temperature Reveals Low-Abundance Mutations in Cancer Samples
G. Mike Makrigiorgos, Ph.D.
Dana-Farber Cancer Institute

A Robust and Rapid Analysis Sequencing Approach for Identifying Clinically Actionable Genetic Aberrations in Cancer
Hanlee P. Ji, M.D.
Stanford University

Automated, Quantitative Multi-Gene Expression Profiling for Diagnostic Assay of DLBCL Using ICEPlex
Kiran Madanahally Divakar, Ph.D.
PrimeraDx

11:50 a.m. - 12 noon — *Session Discussion*

12 noon - 1:00 p.m. — LUNCH (on your own) and Discussion Groups

1:00 p.m. - 2:10 p.m. — Session 6: Other Platforms
Moderator: Tony Dickherber, Ph.D.
Innovative Molecular Analysis Technologies
National Cancer Institute, NIH

1:00 p.m. - 1:20 p.m. — *Novel Glycan-Specific Reagents to Facilitate Early Detection of Epithelial Ovarian Cancer*
David Muddiman, Ph.D.
North Carolina State University

1:20 p.m. - 1:40 p.m. — *Microfluidic Metastasis Assay (µMA) Platform*
Joseph Charest, Ph.D.
Draper Laboratory

1:40 p.m. - 2:00 p.m. *Poster Highlights*

Phage Display Selection of Functional Domain-Exchanged Immunoglobulin Scaffolds With High Affinity for Glycan Targets
Jonathan Lai, Ph.D.
Albert Einstein College of Medicine

Prussian Blue Nanoparticles as an Effective T1 MRI Contrast Agent for Cancer Detection and Staging Evaluation in the GI Tract
Songping Huang, Ph.D.
Kent State University

Platform for High-Throughput Analysis of Protein Adducts for Carcinogen Exposure Assessment
Anthony DeCaprio, Ph.D.
Florida International University

2:00 p.m. - 2:10 p.m. *Session Discussion*

2:10 p.m. - 2:30 p.m. BREAK

2:30 p.m. - 3:30 p.m. Session 7: Novel Biosensors
Moderator: Brian Sorg, Ph.D.
National Cancer Institute, NIH

2:30 p.m. - 2:50 p.m. *Fabrication and Characterization of a Novel Nanodendrite-Based Electrochemical Sensor for the Detection of Ovarian Cancer Biomarkers*
Thomas Chiles, Ph.D.
Boston College

2:50 p.m. - 3:10 p.m. *Advanced Development of a Multiplexed SERS-Based Biomarker Detection Platform*
Marc Porter, Ph.D.
University of Utah

3:10 p.m. - 3:30 p.m. *Poster Highlights*

Nanoelectrode and Nanofluidic-Based Assay of Mitochondria Membrane Potential and Apoptosis
Peter J. Burke, Ph.D.
University of California, Irvine

Charge-Sensitive Optical Detection for High-Throughput Study of Small Molecules
Nongjian Tao, Ph.D.
Arizona State University

PCR-Free Multiplexed Detection of Circulating miRNA in Blood
Tza-Huei (Jeff) Wang, Ph.D.
Johns Hopkins University

3:30 p.m. - 3:40 p.m.	*Session Discussion*
3:40 p.m. - 3:45 p.m.	*Meeting Wrap-up* Tony Dickherber, Ph.D. Innovative Molecular Analysis Technologies National Cancer Institute, NIH

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Resources and Funding Opportunities

Resources

- The TCGA Data Portal (https://tcga-data.nci.nih.gov/tcga/tcgaHome2.jsp): provides a platform for researchers to search, download, and analyze datasets generated by TCGA. It contains clinical information, genomic characterization data, and high-throughput sequencing analysis of the tumor genomes.
- NCI Proteomics Data Portal (https://cptac-data-portal.georgetown.edu/cptacPublic/): proteomics datasets of breast, ovarian, and tumor tissue that have also been genomically characterized by TCGA datasets.
- The Antibody Characterization Laboratory (http://antibodies.cancer.gov): provides access to a large number of reagents and accompanying characterization data. Antigens and antibodies are expressed, purified, and characterized using standard operating procedures, with all accompanying protocols and data.
- The Nanotechnology Characterization Laboratory (NCL): serves as a national resource for cancer researchers to facilitate the development and translation of nanoscale particles and devices for clinical applications. Find out more at http://ncl.cancer.gov/.
- NCI Best Practices for Biospecimen Resources guiding principles that define state-of-the-science biospecimen resource practices, promote biospecimen and data quality, and support adherence to ethical and legal requirements (http://biospecimens.cancer.gov/practices/default.asp).

Funding Opportunities

- Innovative Molecular Analysis Technologies (IMAT) reissuance
  - All IMAT RFAs (4) have recently been approved for reissuance. Updates and links will be posted on the IMAT website at http://innovation.cancer.gov.
- NCI Provocative Questions (PQ) initiative (http://provocativequestions.nci.nih.gov/), to support research projects designed to use sound and innovative research strategies to solve specific problems and paradoxes in cancer research
  - Cancer Prevention and Risk (Group A): RFA-CA-13-016 and -017 (R01 and R21, respectively)
  - Mechanisms of Tumor Development or Recurrence (Group B): RFA-CA-13-018 and -019 (R01 and R21, respectively)
  - Tumor Detection, Diagnosis, and Prognosis (Group C): RFA-CA-13-020 and -021 (R01 and R21, respectively)
  - Cancer Therapy and Outcomes (Group D): RFA-CA-13-022 and -023 (R01 and R21, respectively)
  - Clinical Effectiveness (Group E): RFA-CA-13-024 and -025 (R01 and R21, respectively)
- Informatics Technology for Cancer Research (ITCR) program (http://itcr.nci.nih.gov)
  - Early-stage development including initial development (prototyping) and modification of existing methods for new applications: collaborate with NCI grantees and target naïve users for up to $150k DC/yr for 2 years. PAR-12-286[R01 supplement], PAR-12-290[P01 supplement], PAR-12-289[U01 supplement]
  - Early-stage development (U01) at the prototyping and hardening stages, for up to $250,000 DC/year for 3 years – PAR-12-288
  - Advanced development (U24) at the enhancement, dissemination, and maintenance stages: target both naïve users and power users, for up to $500,000 DC/year for 5 years – PAR-12-287

- NCI Small Business Innovation Research Development Center offers an array of grant and contract awards and other resources for the cancer research community. Find out more at http://sbir.cancer.gov. Specific programs to consider include:
  - PAR-13-327 IMAT-SBIR (R43/R44)
  - PA-13-140 Development of Highly-Innovative Tools and Technology for Analysis of Single Cells (R43/R44)
  - PA-12-196 Innovative Health Information Technology for Broad Adoption by Healthcare Systems and Consumers (R44)
- NIBIB Bioengineering Research Grants (BRG) program:
  - Multidisciplinary research that applies an integrative, systems approach to developing knowledge and/or methods to prevent, detect, diagnose, or treat disease or to understand health and behavior. Exploratory BRG (PA-12-284 [R21], up to $275k DC/2 years) and BR Partnerships (PA-10-234 [R01], large R01).
- Research Supplements to Promote Diversity in Health-Related Research
  - Research supplements (up to $100k) to support and recruit students, postdoctorates, and eligible investigators from groups that have been shown to be underrepresented in cancer and cancer health disparities research (PA-12-149)
  - Other Current RFA-RF-13-07 NIH Director's New Innovator Award Program (DP2)
- FOAs
  - RFA-CA-13-015 Cancer Detection, Diagnostic and Treatment Technologies for Global Health (UH2/UH3)
  - RFA-RM-13-010 Adaptation of Scalable Technologies to Illuminate the Druggable Genome (U01)
  - RFA-RF-13-007 NIH Director's New Innovator Award Program (DP2)
  - RFA-RF-13-006 NIH Pioneer Award Program (DP1)
  - PAR-13-185 Image-Guided Drug Delivery in Cancer (R01)
  - PAR-13-169 Academic-Industrial Partnerships for Translation of In Vivo Imaging Systems for Cancer Investigations (R01)
  - PAR-13-146 NCI Exploratory/Developmental Research Grant Program (NCI Omnibus R21)
  - PAR-13-081 Bridging the Gap Between Cancer Mechanism and Population Science (U01)
  - PAR-13-036 Utilizing the PLCO Biospecimens Resource to Bridge Gaps in Cancer Etiology and Early Detection Research (U01)
  - PAR-12-144 NCI Small Grants Program for Cancer Research (NCI Omnibus R03)
  - PAR-12-039 Small Grants Program for Cancer Epidemiology (R03)
  - PAR-11-150 Quantitative Imaging for Evaluation of Responses to Cancer Therapies (U01)
  - PA-11-148 & -149 Nanoscience and Nanotechnology in Biology and Medicine (R01 and R21, respectively)
  - PA-11-158 & -159 Biomarkers of Infection-Associated Cancers (R01 and R21, respectively)
  - PA-12-213 & -214 Identifying Non-coding RNA Targets for Early Detection of Cancer (R01 and R21, respectively)
  - PA-12-221 & -220 Biomarkers for Early Detection of Hematopoietic Malignancies (R01 and R21, respectively)
  - PA-11-297 & -298 Pilot studies in Pancreatic Cancer (R21 and R03, respectively)
  - PA-13-377 & -378 Research on Malignancies in the Context of HIV/AIDS (R01 and R21, respectively)
  - PA-11-073 & -074 Mitochondria in Cancer Epidemiology, Detection, Diagnosis and Prognosis (R01 and R21, respectively)

- PA-12-013 & -014 Validation of Molecular Diagnostics to Predict Patient Outcomes Using Specimens from Multi-Site Cancer Trials (R01 and R21, respectively)
- PAR-11-216 Early Phase Clinical Trials in Imaging and Image-Guided Interventions (R21)

- And please always check the following for opportunities
  - NCI Center for Strategic Scientific Initiatives @ http://cssi.cancer.gov/resources-current_funding.asp
  - NCI Research Funding Opportunities @ http://www.cancer.gov/researchandfunding/funding/announcements
  - NIH Common Fund Initiatives @ http://commonfund.nih.gov, especially the "High-Risk Research" programs @ http://commonfund.nih.gov/highrisk/index.aspx

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