



13<sup>TH</sup> ANNUAL INNOVATIVE MOLECULAR  
ANALYSIS TECHNOLOGIES (IMAT)  
PROGRAM PRINCIPAL INVESTIGATORS  
(PI) MEETING

November 27-28, 2012

The Methodist Hospital Research Institute  
Houston, Texas

## Program Overview

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Welcome to the 13<sup>th</sup> Annual Innovative Molecular Analysis Technologies (IMAT) Program Principal Investigators (PI) Meeting. As many of you already know, this annual meeting is organized to address two important aims of the IMAT program: (1) to provide NCI program staff a chance to interact directly with PIs and receive an update on progress to date with supported research and (2) to provide an opportunity for interactions and exchange of ideas among meeting participants. This latter aim is a critical opportunity for sparking potentially transformative project collaborations, receiving critical feedback and guidance from the community, as well as for fostering dissemination of the exciting technologies emerging from IMAT-supported researchers.

The overarching theme for this year's meeting is to *emphasize the importance of engaging technology end-users*, and so the meeting includes various mechanisms for facilitating that communication. To that end, each of the speaker sessions will be chaired by a prominent researcher or clinician engaged in a field relevant to the session topic. They have been asked to provide a brief overview of the various basic and/or clinical research challenges associated with the topic that represent unmet opportunities for innovative technology solutions. Further, our IMAT success story overviews a dissemination path that did not require commercialization of the platform to have a significant impact on cancer research.

As there are more exciting active research projects in the IMAT portfolio than we could possibly allow sufficient speaking time for, we are repeating the "Poster Highlights" session that was piloted last year, in which a number of investigators will give short overview talks on their research posters. An additional change to this year's meeting spurred by our theme is to open the meeting on the afternoon of the first day to all interested local area researchers and clinicians, which will overlap with the Poster Highlights session, and the subsequent poster session in the atrium.

In addition to the agenda and presentation abstracts, a list of resources and funding opportunities that we thought might be of interest to participants are included toward the back of the book. On behalf of the NCI program staff and everyone involved in the planning for this meeting, I thank you for your participation, your interest, and the important work you all do to assist in our collective mission against cancer. I look forward to an exciting and productive meeting.

Sincerely,



Tony Dickherber, Ph.D.  
Program Director  
Center for Strategic Scientific Initiatives  
Office of the Director  
National Cancer Institute

# Agenda

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## *Day 1: Tuesday, November 27*

8:00 a.m. - 8:45 a.m.	Registration and Continental Breakfast  Poster Session Setup	
8:45 a.m. - 9:00 a.m.	Welcome Tony Dickherber, Ph.D., Program Director Innovative Molecular Analysis Technologies Program National Cancer Institute, NIH	Auditorium
9:00 a.m. - 10:10 a.m.	Panel Session: Novel Biosensors I Chair: Steven Shen, M.D., Ph.D. The Methodist Hospital Research Institute	
9:10 a.m. - 9:30 a.m.	<i>Measuring Kinase Activity in Intact Cells Using Surface-Enhanced Raman Spectroscopy Nanosensors</i> Alyssa Garrelts, Ph.D. Purdue University	
9:30 a.m. - 9:50 a.m.	<i>Nanoelectrode and Nanofluidic-Based Assay of Mitochondria Membrane Potential and Apoptosis</i> Peter J. Burke, Ph.D. University of California, Irvine	
9:50 a.m. - 10:10 a.m.	<i>Multiplex Cancer Cell Purification With Magnetic Sifters</i> Shan X. Wang, Ph.D. Stanford University	
10:10 a.m. - 10:30 a.m.	Break	
10:30 a.m. - 12 noon	Panel Session: Novel Biosensors II Chair: Rebecca R. Richards-Kortum, Ph.D. Rice University	
10:40 a.m. - 11:00 a.m.	<i>Quantifying RNA-Protein Interactions In Situ Using Modified-MTRIPs and Proximity Ligation</i> Philip J. Santangelo, Ph.D. Georgia Institute of Technology and Emory University	
11:00 a.m. - 11:20 a.m.	<i>Highly Multiplexed, Spatially Delineated Molecular Imaging in Cancer</i> Michael R. Diehl, Ph.D. Rice University	
11:20 a.m. - 11:40 a.m.	<i>An Integrated Platform for Quantifying Gene Expression in Co-Cultured Cells</i> David J. Beebe, Ph.D. University of Wisconsin	

11:40 a.m. - 12 noon	<p><b><i>Rapid and Sensitive Multiplex Sequencing of Actionable Cancer Genes in Clinical Samples</i></b>  Stephen Salipante, M.D., Ph.D.  University of Washington</p>
12 noon - 1:00 p.m.	Lunch (on your own)
1:00 p.m. - 2:00 p.m.	<p>Success Story: Collaboration Versus Commercialization to Disseminate Your Technology  William C. Hahn, M.D., Ph.D.  Dana-Farber Cancer Institute</p> <p>David E. Hill, Ph.D.  Dana-Farber Cancer Institute</p>
2:00 p.m. - 3:50 p.m.	<p>Poster Highlights Session</p> <p><b><i>Activatable BRET Probes for MMP Enzymatic Activity Detection</i></b>  Jianghong Rao, Ph.D.  Stanford University</p> <p><b><i>Development of a Methylation-Based Diagnostic Assay for Malignant Melanoma: Defining the Factors Affecting Marker Selection and Assay Performance</i></b>  Sharon N. Edmiston  The University of North Carolina at Chapel Hill</p> <p><b><i>FRET-Based Biosensors to Monitor Redox in Cell Cycle Regulation</i></b>  Vladimir Kolossov, Ph.D.  University of Illinois, Urbana-Champaign</p> <p><b><i>Microfluidic Sorting of Blood Cells for SPR and Fluorescence Analysis</i></b>  Nathaniel C. Cady, Ph.D.  University at Albany</p> <p><b><i>Application of an Innovative Technology to Develop Low-Toxicity Kinase Inhibitors</i></b>  Xiang Li, Ph.D.  University of Maryland, Baltimore County</p> <p><b><i>Multiple Reaction Monitoring to Profile Biosensor Phosphorylation in Leukemia</i></b>  Laurie L. Parker, Ph.D.  Purdue University</p> <p><b><i>Probing Cancer Cell Chemoinvasion Strategies Using 3D Microfluidic Models</i></b>  Mingming Wu, Ph.D.  Cornell University</p> <p><b><i>Specific and Reversible Binding of DNA Nanoparticles to Cancer Cells</i></b>  Bradley T. Messmer, Ph.D.  University of California, San Diego</p>

*2D-PCR for Spatially Mapping Gene Changes in Tumor Sections*

Daniel Gowetski, Ph.D.

University of Maryland

*Discovery Platform for Cancer Antigens*

Kevin Claffey, Ph.D.

University of Connecticut Health Center

*Digital Analysis of Proteins Through End Sequencing (DAPES)*

Tom Cohen, Ph.D.

Washington University in St. Louis

*Molecular Diagnostic Tests to Augment Cytomorphologic Diagnosis of Lung Cancer*

James C. Willey

University of Toledo

*Method for Detection of Secreted Proteins in Single-Cell Assays*

Henryk Szmecinski, Ph.D.

University of Maryland

3:50 p.m. - 6:00 p.m.

Poster Session

First Floor Lobby

*Day 2: Wednesday, November 28*

8:00 a.m. - 8:15 a.m.	Recap of Day One and Overview of Day Two Tony Dickherber, Ph.D. Innovative Molecular Analysis Technologies Program National Cancer Institute, NIH	Auditorium
8:15 a.m. - 8:45 a.m.	Host Welcome Mauro Ferrari, Ph.D. The Methodist Hospital Research Institute	
8:45 a.m. - 9:30 a.m.	Keynote Address Joshua LaBaer, M.D., Ph.D. The Biodesign Institute Arizona State University	
9:30 a.m. - 10:40 a.m.	Panel Session: Pathway Tools - 1 Chair: TBD	
9:40 a.m. - 10:00 a.m.	<i>VEC<sup>3</sup>-Valve Enabled Cell Co-Culture Platforms for Cancer Biology Study</i> Deyu Li, Ph.D. Vanderbilt University	
10:00 a.m. - 10:20 a.m.	<i>Translational Control Analysis by Translationally Active RNA Capture/Microarray Analysis (TriP-Chip)</i> Jingfang Ju, Ph.D. Stony Brook University	
10:20 a.m. - 10:40 a.m.	<i>Scanning Correlation Microscopy Methods for Quantifying DNA Repair Kinetics</i> Georgios Alexandrakis, Ph.D. The University of Texas at Arlington	
10:40 a.m. - 11:00 a.m.	Break	
11:00 a.m. - 12:30 p.m.	Panel Session: Biomarker Preservation and Discovery Chair: Ignacio Wistuba, M.D. The University of Texas MD Anderson Cancer Center	
11:10 a.m. - 11:30 a.m.	<i>Genome-Scale DNA Methylation Profiling in the Developing Colon and the Impact of Diet</i> Lanlan Shen, M.D., Ph.D. Baylor College of Medicine	
11:30 a.m. - 11:50 a.m.	<i>Detection of Low-Prevalence Mutations in Solid Tumors via Ultra-Deep Targeted Sequencing</i> Olivier Harismendy, Ph.D. University of California, San Diego	

- 11:50 a.m. - 12:10 p.m.      *Tissue Is Alive: Preserving Biomolecules and Tissue Morphology in Clinical Trial Samples*  
Lance A. Liotta, M.D., Ph.D.  
George Mason University
- 12:10 p.m. - 12:30 p.m.      *Sentinel RNAs as a Measure of mRNA Integrity in Clinical Biospecimens*  
Curt H. Hagedorn, M.D.  
University of Utah
- 12:30 p.m. - 1:30 p.m.      Lunch (on your own)
- 1:30 p.m. - 2:40 p.m.      Panel Session: Pathway Tools - 2  
Chair: Stephen Wong, Ph.D.  
The Methodist Hospital Research Institute
- 1:40 p.m. - 2:00 p.m.      *Development and Application of Novel Glycan-Specific Reagents to Facilitate Early Detection of Epithelial Ovarian Cancer*  
David C. Muddiman, Ph.D.  
North Carolina State University
- 2:00 p.m. - 2:20 p.m.      *Targeted Selection, Sequencing, and Analysis of Human Telomere and Subtelomere DNA in Cancer*  
Harold C. Riethman, Ph.D.  
The Wistar Institute
- 2:20 p.m. - 2:40 p.m.      *Application of Next-Generation Sequencing to Cancer Epigenomics*  
Huidong Shi, Ph.D.  
Georgia Health Sciences University
- 2:40 p.m. - 3:00 p.m.      Break
- 3:00 p.m. - 4:50 p.m.      Panel Session: Technologies to Assist With Drug Screening and Delivery  
Chair: Melissa D. Landis, Ph.D.  
The Methodist Hospital Research Institute
- 3:10 p.m. - 3:30 p.m.      *Magnetorotation: A Rapid Assay for Single Cell Drug Sensitivity of Cancer Cells*  
Raoul Kopelman, Ph.D.  
University of Michigan
- 3:30 p.m. - 3:50 p.m.      *Scaffolds for Delivering Deoxycytidine Kinase to HER2 Positive Cancer Cells*  
Brian K. Kay, Ph.D.  
University of Illinois at Chicago
- 3:50 p.m. - 4:10 p.m.      *384-Well Cell Migration Assay Suitable for High-Throughput Screening (HTS) of Chemical Libraries for Cancer Therapeutics*  
Andreas Vogt, Ph.D.  
University of Pittsburgh Drug Discovery Institute

4:10 p.m. - 4:30 p.m.      *Hyperspectral and Structural Microscopy Platform for Therapy of Resistant Cancer*  
Conor L. Evans, Ph.D.  
Harvard University

4:30 p.m. - 4:50 p.m.      *Ultra-Throughput Multiple Reaction Monitoring Mass Spectrometry for Large-Scale Cancer Biomarker Validation*  
Xudong Yao, Ph.D.  
University of Connecticut

4:50 p.m. - 5:00 p.m.      Closing Remarks and Adjournment  
Tony Dickherber, Ph.D.  
Innovative Molecular Analysis Technologies Program  
National Cancer Institute, NIH



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## Resources and Funding Opportunities

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### Resources

- 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/>) provides 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.
- NCI Best Practices for Biospecimen Resources guiding principles 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
  - Early-stage innovative molecular analysis technologies for cancer research (R21, up to 3 years and \$500k in direct costs) – RFA-CA-13-001
  - Advanced development and validation of emerging molecular analysis technologies for cancer research (R33, up to 3 years and \$900k in direct costs) – RFA-CA-13-002
  - Early-stage innovative technologies for biospecimen science (R21, up to 3 years and \$500k in direct costs) – RFA-CA-13-003
  - Advanced development and validation of emerging technologies for biospecimen science (R33, up to 3 years and \$900k in direct costs) – RFA-CA-13-004
- 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
  - Group A covered by RFA-CA-12-015 (R01) and RFA-CA-12-016 (R21) that generally relates to cancer prevention and risk
  - Group B covered by RFA-CA-12-017 (R01) and RFA-CA-12-018 (R21) that generally relates to mechanisms of tumor development or recurrence
  - Group C covered by RFA-CA-12-019 (R01) and RFA-CA-12-020 (R21) that generally relates to cancer detection, diagnosis, and prognosis
  - Group D covered by RFA-CA-12-021 (R01) and RFA-CA-12-022 (R21) that generally relates to cancer therapy and outcomes
- 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 \$250k 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 \$500k DC/year for 5 years - PAR-12-287

