National Cancer Institute

16th Annual Innovative Molecular Analysis Technologies (IMAT) Principal Investigators' (PI) Meeting

November 12-13, 2015

Porter Neuroscience Conference Center
NIH Campus
Bethesda, Maryland

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
National Institutes of Health

Welcome

Welcome to the 16th Annual Principal Investigators' (PI) Meeting for the NCI Innovative Molecular Analysis Technologies (IMAT) program. As many of you already know, this annual meeting is organized to address two important aims of the IMAT program: (1) for supported investigators to provide NCI program staff a chance to interact directly with PIs and receive an update on progress to date for supported research and (2) to provide an opportunity for interactions and exchange of ideas among meeting participants. The latter aim serves as a critical opportunity to spark new project collaborations for exploring technology gaps and opportunities, to further improve supported technology platforms or to potentially launch the development of entirely new technologies. The interactions are an important opportunity for receiving critical feedback and guidance from a broad community, as well as for fostering dissemination of the exciting technologies emerging from IMAT-supported research.

As usual, there are more exciting active research projects in the IMAT portfolio than we could possibly allow sufficient speaking time for, so we will continue our practice of having short "Poster Highlight" talks for those investigators presenting particularly interesting progress relevant to different sessions. As these presentations are short, you are encouraged to seek additional details from the poster during one of the two poster sessions or during the breaks.

An important issue in general from the perspective of any investor is the need to *engage end-users early and often*, and so the meeting includes various mechanisms for facilitating that communication. Beyond your fellow IMAT grantees, researchers from NCI's intramural laboratories of the Center for Cancer Research will be in attendance and asking questions throughout the meeting (including during the poster sessions). You are very much encouraged to engage them to understand their interests and needs, as they represent that important end-user community. Many of the IMAT-supported technologies are multidisciplinary endeavors, and as such your fellow supported investigators also represent important end-user perspectives that might be engaged. The relatively long breaks between sessions are meant to allow for such interaction and dialog, as well as gatherings outside the official agenda. Also note that NCI program officers representing a broad array of actively supported research areas will be in attendance to answer any questions associated with active funding opportunities (especially those found in the Resource Listings section of this book). In addition to the agenda and presentation abstracts, a list of resources and funding opportunities we thought might be of interest to participants are included toward the back of this program 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

Thursday, November 12

8:15 a.m. - 8:30 a.m. **Welcome**
Tony Dickherber, Ph.D.
Director, IMAT Program
Center for Strategic Scientific Initiatives
National Cancer Institute, NIH

8:30 a.m. - 10:00 a.m. **Session 1: Cancer Imaging**

8:30 a.m. - 8:50 a.m. ***Photonic Crystal Enhanced Fluorescence: Development of Sensor Structures and Detection Instrumentation for Early Cancer Biomarker Detection***
Brian T. Cunningham, Ph.D., M.S.
University of Illinois at Urbana-Champaign

8:50 a.m. - 9:10 a.m. ***Kinase Binding Fluorescent Probes for Assaying Cellular Receptor Populations***
James N. Wilson, Ph.D.
University of Miami, Coral Gables

9:10 a.m. - 9:30 a.m. ***Highly Multiplexed Ion-Beam Tissue RNA In Situ Imaging With Sub-Micron Resolution***
Richard M. Levenson, M.D., FCAP
University of California, Davis

9:30 a.m. - 9:50 a.m. ***Compact Microfluidic PET Tracer Concentrator for Preclinical Imaging and In Vitro Studies***
R. Michael van Dam, Ph.D., M.S.
University of California, Los Angeles

9:50 a.m. - 10:00 a.m. ***Session Discussion***

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

10:20 a.m. - 12:10 p.m. **Session 2: Panel Discussion on Liquid Biopsies: The CTC Perspective**
Moderator: Lynn Sorbara, Ph.D.
Division of Cancer Prevention
National Cancer Institute, NIH

10:20 a.m. - 10:30 a.m. ***Introduction and Overview***
Lynn Sorbara, Ph.D.

10:30 a.m. - 11:20 a.m. ***Highlights of Relevant Projects Supported by IMAT***
Rafael V. Davalos, Ph.D.
Virginia Polytechnic Institute and State University

Dino Di Carlo, Ph.D.
University of California, Los Angeles

Dmitri Simberg, Ph.D.
University of Colorado

Peter Kuhn, Ph.D.
University of Southern California

Hsian-Rong Tseng, Ph.D.
University of California, Los Angeles

Stefanie S. Jeffrey, M.D., M.A., FACS
Stanford University

Lydia L. Sohn, Ph.D.
University of California, Berkeley

Youli Zu, M.D., Ph.D.
Houston Methodist Research Institute

11:20 a.m. - 12:10 p.m. ***Panel Discussion***

12:10 p.m. - 1:20 p.m. **LUNCH (on your own) and Discussion Groups**

1:20 p.m. - 2:30 p.m. **Session 3: Biomarker Discovery Tools**
Session Chair: Christos Patriotis, Ph.D.
Division of Cancer Prevention
National Cancer Institute, NIH

1:20 p.m. - 1:40 p.m. ***Controlled Premature Termination of Translation***
Luca Cartegni, Ph.D.
Rutgers University

1:40 p.m. - 2:00 p.m. ***Protein Painting Reveals Hidden "Hot Spots" of Protein-Protein Interaction***
Lance Liotta, M.D., Ph.D.
George Mason University

2:00 p.m. - 2:20 p.m. ***Poster Highlights***

New Reagents for Tracking Protein Oxidation in Cells by MS and Imaging Methods
Cristina M. Furdui, Ph.D., M.S.
Wake Forest School of Medicine

Kinase Profiling With Quantitative Chemoproteomics
Dustin J. Maly, Ph.D.
University of Washington

2:20 p.m. - 2:30 p.m. ***Session Discussion***

2:30 p.m. - 4:00 p.m. **Session 4: Cancer Detection and Diagnosis**
Session Chair: Rao L. Divi, Ph.D., M.S.
Division of Cancer Control and Population Sciences
National Cancer Institute, NIH

2:30 p.m. - 2:50 p.m. ***Genome-Wide Location Analysis of DNA Adducts in Whole Cells***
Olivier Harismendy, Ph.D.
University of California, San Diego

2:50 p.m. - 3:10 p.m. ***Single Molecule Targeted Sequencing for Detecting Cancer Genetic Aberrations and Clonal Delineation***
Hanlee P. Ji, M.D.
Stanford University

3:10 p.m. - 3:30 p.m. ***Sensitive and Integrated Microfluidic ChIP Assays for Studying Transcriptional Regulation in Cancer Development Based on Primary Cells***
Chang Lu, Ph.D., M.S.
Virginia Polytechnic Institute and State University

3:30 p.m. - 3:50 p.m. ***Poster Highlights***

Single-Cell Sequencing Reveals Distinct Genomic Profiles in Epithelial and Mesenchymal Tumor Cells
Jessica Sang, Ph.D.
Harvard University

Acute Myeloid Leukemia: MRD Analysis Using Modular Microfluidics and Microflow Cytometry
Steven A. Soper, Ph.D.
The University of North Carolina at Chapel Hill

3:50 p.m. - 4:00 p.m. ***Session Discussion***

4:00 p.m. - 5:30 p.m. **POSTER SESSION I**

5:30 p.m. - 7:00 p.m. **Session 5: Drug Development and Improved Treatment Technologies**

Session Chair: Brian Sorg, Ph.D., M.S.
Division of Cancer Treatment and Diagnosis
National Cancer Institute, NIH

5:30 p.m. - 5:50 p.m. ***In Vivo Metal-Free Cycloaddition Chemistry-Driven Pretargeted Cancer Radiotherapy***
Thomas Quinn, Ph.D.
University of Missouri

5:50 p.m. - 6:10 p.m. ***Optimization of Multivalent Ligands by Super-Resolution Microscopy to Treat Cancer***
John C. Williams, Ph.D., and Tijana Talisman, Ph.D.
Beckman Research Institute of City of Hope

6:10 p.m. - 6:30 p.m. ***A Novel Theranostic Platform for Targeted Cancer Therapy and Treatment Monitoring***
Mingfeng Bai, Ph.D.
University of Pittsburgh

6:30 p.m. - 6:50 p.m. ***A Novel High-Throughput Tumor Spheroid Microtechnology***
Hossein Tavana, Ph.D.
The University of Akron

6:50 p.m. - 7:00 p.m. ***Session Discussion***

7:00 p.m. **Adjournment for the Day**

Friday, November 13

8:20 a.m. - 8:30 a.m. **Welcome**
Tony Dickherber, Ph.D.

8:30 a.m. - 9:40 a.m. **Session 6: Novel Biosensors**
Session Chair: J. Randy Knowlton, Ph.D.
Division of Cancer Biology
National Cancer Institute, NIH

8:30 a.m. - 8:50 a.m. ***Characterizing Gene Regulation With Single Molecule Sensitive Probes***
Chiara Zurla, Ph.D.
Georgia Institute of Technology

8:50 a.m. - 9:10 a.m. ***Nanoscale Tools for Functional Studies of Cancer-Relevant Chromatin Modifications***
Carlos E. Castro, Ph.D., M.S.
The Ohio State University

9:10 a.m. - 9:30 a.m. ***Poster Highlights***

Monitoring Phosphorylation by SERS
Joseph M.K. Irudayaraj, Ph.D., M.S.
Purdue University

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

9:30 a.m. - 9:40 a.m. ***Session Discussion***

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

10:00 a.m. - 11:40 a.m. **Session 7: Cancer Modeling**
Session Chair: Nastaran Kuhn, Ph.D.
Division of Cancer Biology
National Cancer Institute, NIH

10:00 a.m. - 10:20 a.m. ***Conditionally Reprogrammed Cells as a Novel Tool for Biobanking***
Richard Schlegel, M.D., Ph.D.
Georgetown University Medical Center

10:20 a.m. - 10:40 a.m. ***Establishment, Maintenance, and Characterization of Human Colonic Adenomas and Adenocarcinomas in Enteroid Culture***
James Varani, Ph.D., M.S.
University of Michigan

10:40 a.m. - 11:00 a.m. ***Microfluidic 3D Model of Cancer Metastasis***
Joseph L. Charest, Ph.D., M.S.
Charles Stark Draper Laboratory
Massachusetts Institute of Technology

11:00 a.m. - 11:30 a.m. ***Poster Highlights***

Microfluidic Approach for the Development of a 3D Bone Marrow Microenvironment Model to Test Personalized Multiple Myeloma Treatments
Woo Lee, Ph.D., and Jenny Zilberberg, Ph.D.
Stevens Institute of Technology and Hackensack University Medical Center

Next-Generation Mouse Gene-Targeting Technology to Model Tumorigenesis
Ronald Conlon, Ph.D., M.S.
Case Western Reserve University

Molecular Analysis of Physical Microenvironmental Control of Tumor Cell Invasion
Sanjay Kumar, M.D., Ph.D.
University of California, Berkeley

11:30 a.m. - 11:40 a.m. ***Session Discussion***

11:40 a.m. - 1:20 p.m. **LUNCH (on your own) and POSTER SESSION II**

1:20 p.m. - 2:50 p.m. **Session 8: Improving Sample Preparation and Preservation**
Session Chair: Lokesh Agrawal, Ph.D., M.S.
Division of Cancer Treatment and Diagnosis
National Cancer Institute, NIH

1:20 p.m. - 1:40 p.m. ***Isothermal Vitrification Methodology Development for Non-Cryogenic Storage of Archival Human Sera Samples***
Alptekin Aksan, Ph.D.
University of Minnesota

1:40 p.m. - 2:00 p.m. ***Cavitation Enhancing Nanodroplets Mediate Efficient DNA Fragmentation and Extraction of Chromatin From FFPE Tissue***
Paul A. Dayton, Ph.D.
The University of North Carolina at Chapel Hill

2:00 p.m. - 2:20 p.m. ***Enabling Highly Effective Sample Processing via Temperature-Responsive Reagent Systems***
James Lai, Ph.D.
University of Washington

2:20 p.m. - 2:40 p.m. ***Advanced Development of Immuno-MRM Technology to Analyze Archived Cancer Tissues***
Jacob Kennedy, M.Sc.
Fred Hutchinson Cancer Research Center

2:40 p.m. - 2:50 p.m. ***Session Discussion***

2:50 p.m. - 3:00 p.m. ***Meeting Wrap-up and Adjournment***
Tony Dickherber, Ph.D.
Director, IMAT Program
Center for Strategic Scientific Initiatives
National Cancer Institute, NIH

Speaker Abstracts

NOTE: Any underlining in the abstracts has been provided by the submitting author.

Poster Abstracts

**denotes poster highlighted during meeting session*

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