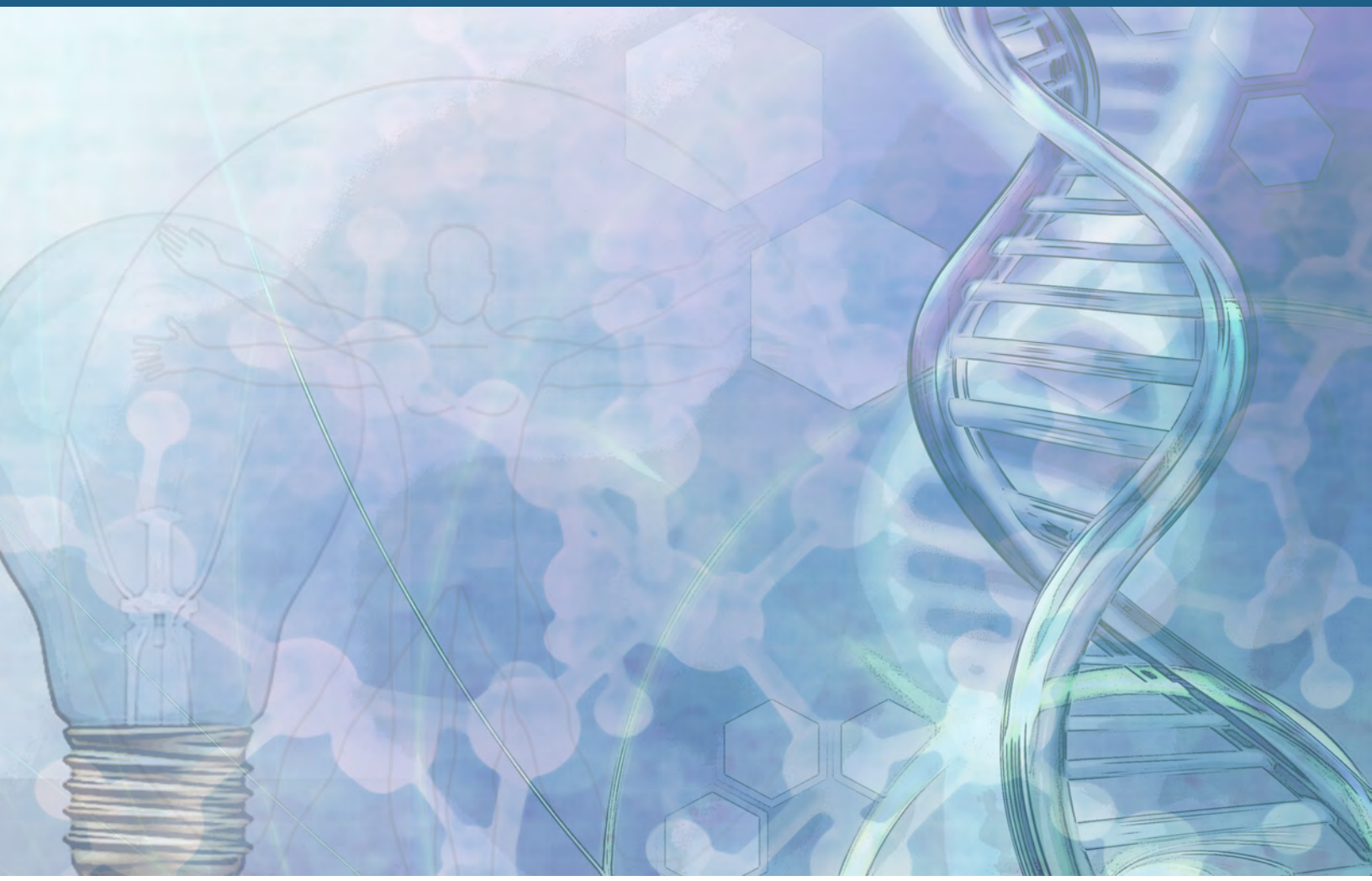
NIH NATIONAL CANCER INSTITUTE

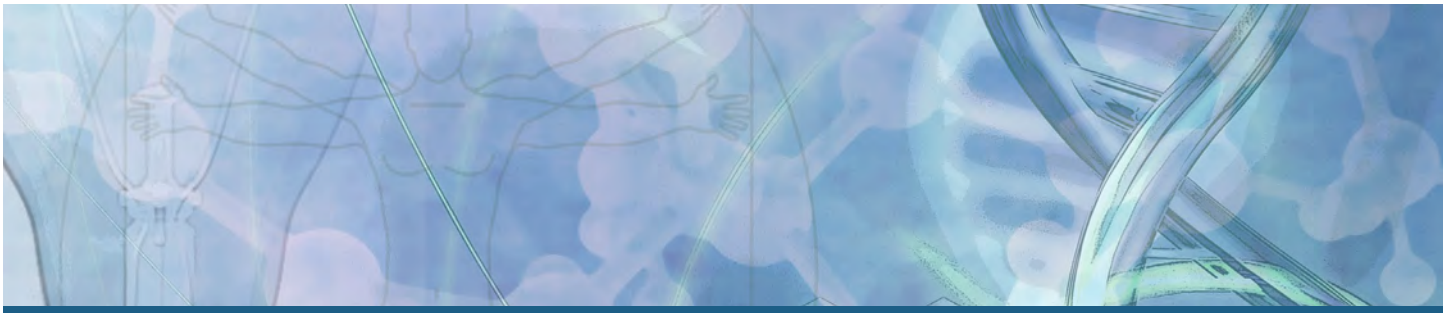


2017 NCI IMAT PI Meeting

18th Annual Innovative Molecular Analysis Technologies Principal Investigators Meeting

December 6–8, 2017

NCI at Shady Grove, Rockville, Maryland



Welcome

Welcome to the the **National Cancer Institute's Innovative Molecular Analysis Technologies (IMAT) Principal Investigators Meeting** to be held December 6-8, 2017, at the new NCI at Shady Grove building in Rockville, MD.

Since 1998, the IMAT program (http://innovation.cancer.gov) has been a key component of NCI's strategy for supporting innovative and emerging technologies for cancer research and clinical care and your involvement as a grantee is important. This annual meeting is organized to address two important aims of the IMAT program:

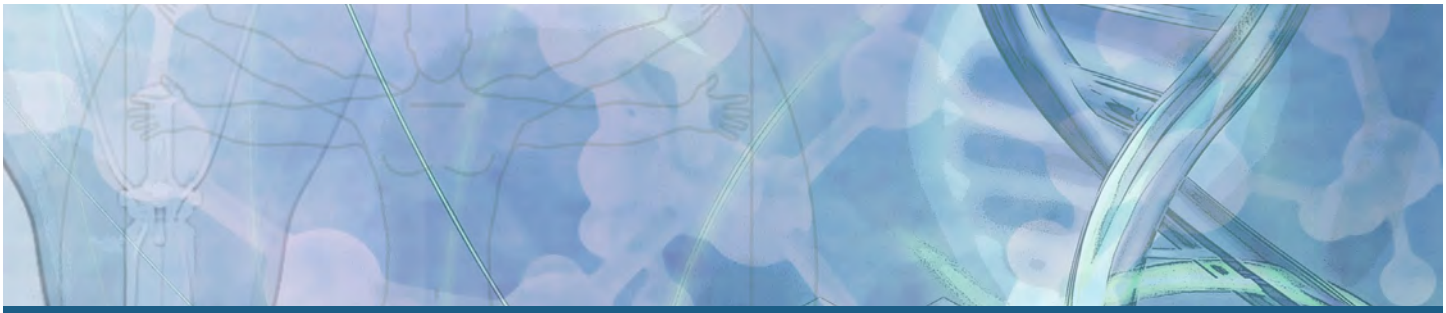
- Provide NCI program staff a chance to interact directly with PIs and receive an update on progress to date of supported research
- Present opportunities for interactions and exchanges of ideas among meeting participants, which is critical to sparking potentially transformative project collaborations, receiving critical feedback and guidance from the community, and fostering dissemination of the exciting technologies emerging from IMAT-supported researchers.

There are always more exciting active research projects in the IMAT portfolio than we have timeslots to accommodate at the meeting. As has been done for prior years, podium presentation slots will be prioritized for projects nearing the end of their IMAT award period and projects fitting selected themes followed by those indicating noteworthy progress. We will continue the short "Poster Highlights" presentations to further capture selected investigators with significant progress to report involving very short overview talks on their research, noting that more detailed information may be gleaned from their posters.

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.

Kind Regards,

Tony Dickherber, Ph.D.
Program Director, IMAT
Center for Strategic Scientific Initiatives
National Cancer Institute, National Institutes of Health
U.S. Department of Health & Human Services



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2017 NCI IMAT PI Meeting

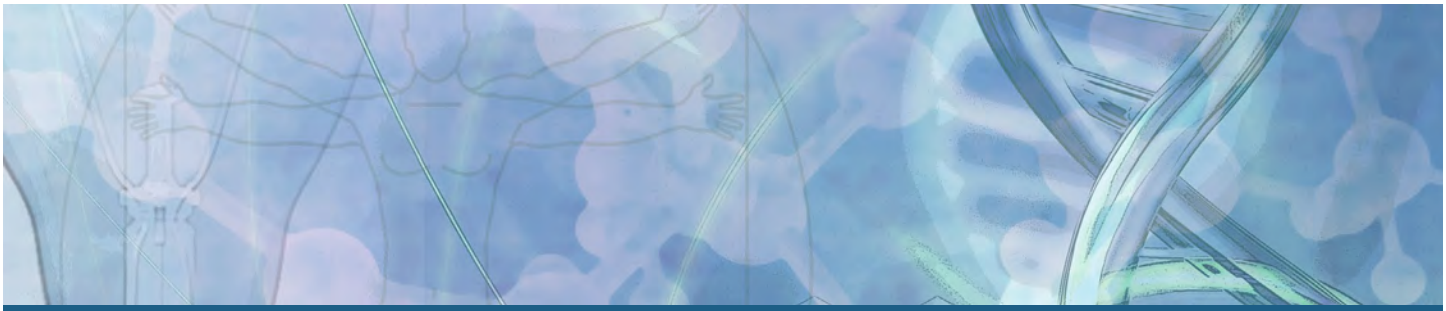
18th Annual
Innovative Molecular Analysis Technologies
Principal Investigators Meeting

December 6-8, 2017

NCI at Shady Grove, Rockville, MD
Room 406, Terrace Level East

For CSSI Information and Resources: https://cssi.cancer.gov

The views expressed in the materials or by presenters or participants at the event do not necessarily reflect the official policies of the U.S. Department of Health & Human Services, the National Institutes of Health, the National Cancer Institute, or any of their components.



Agenda

Day 1 - Wednesday, December 6

9:00 am NCI Welcome and Overview

9:15 am Novel Biosensors

Podium Presentations

9:15 **Novel Biosensors & Biomarker Detection Capabilities**
Peter J. Burke, *University of California-Irvine*

9:35 **Molecular Detection of DNA Hydroxymethylation for Cancer Screening**
Adam Roger Hall, *Wake Forest University Health Sciences*

9:55 **Immobilized Protease Activity Tests (IPATs) for Development of Functional Cancer Biomarkers**
Paul Tempst, *Memorial Sloan-Kettering Cancer Center*

10:15 **Plasmonics-based Nanobiosensor for Gastrointestinal Cancer Diagnostics via MicroRNA Biomarker Detection**
Tuan Vo-Dinh, *Duke University*

Poster Highlights

10:35 **Validating Rapid Microfluidic Isolation of Personalized Aptamers for Monitoring Minimal Residual Disease in Multiple Myeloma**
Qiao Lin, *Columbia University, New York Morningside*

10:40 **Quantitative Label-Free, PCR-Free, Electrochemical Microarray for miRNA Profiling with Zero Background and Sub-zeptomole Responsivity**
Ravi F. Saraf, *University of Nebraska Lincoln*

10:45 **Monitoring Recurrent Bladder Cancer with Electro-Phage Biosensors**
Gregory A. Weiss, *University of California-Irvine*

10:50 am Break

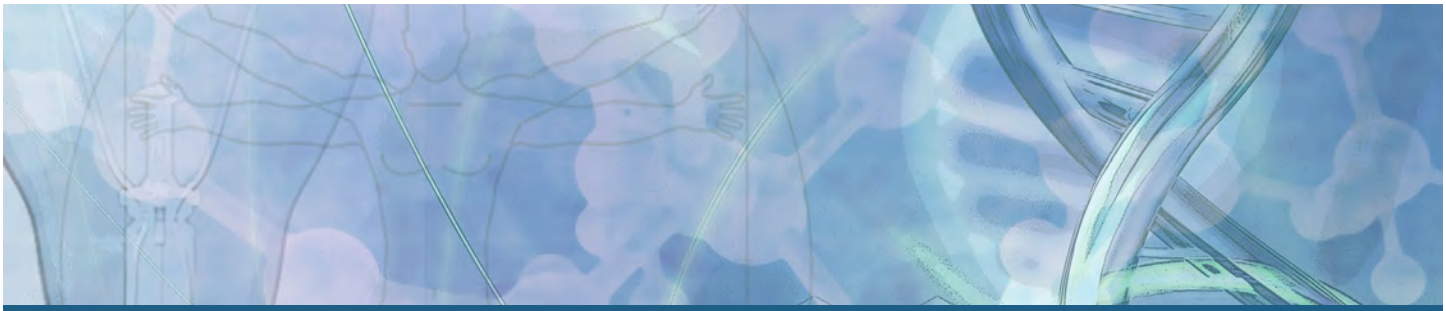
11:10 am Epigenetics Tools

Podium Presentations

11:10 **PIXUL-ChIP: High Throughput Sample Preparation and Analytical Platform for Epigenetic Studies**
Karol Bomsztyk, *University of Washington*

11:30 **Digital Detection of Tumor-Derived Circulating Methylated DNA**
Jeff Wang, *Johns Hopkins University*

11:50 **Droplet Microfluidics for Low Input Epigenetics**
Ryan C. Bailey, University of Michigan



Agenda

Day 1 - Wednesday, December 6 (cont.)

Epigenetics Tools (cont.)

Poster Highlights

12:10 **Development of Enhancer RNA-Based Biomarkers in FFPE Tissue**
Jason Gertz, *University of Utah*

12:15 **CRISPR-Based Epigenetic Modifiers**
David J. Segal, *University of California at Davis*

12:20 pm Lunch (at attendees' expense)

1:25 pm NCI Program Presentation on Commercialization, SBIR and I-Corps™ for IMAT

1:25 **NCI Support for Innovative Technologies from Small Business Entities**
Jonathan Franca-Koh, NCI SBIR Development Center

1:35 **The NCI I-Corps™ Program**
Christie Canaria, NCI SBIR Development Center

1:45 pm Advancing Cancer Treatment Options

Podium Presentations

1:45 **Development of a Virion Display (VirD) Array to Profile Human GPCR Interactions**
Guan-Da Syu, *Johns Hopkins University*

2:05 **Disease-Directed Protein Biofactories**
Parijat Bhatnagar, *SRI International*

Poster Highlights

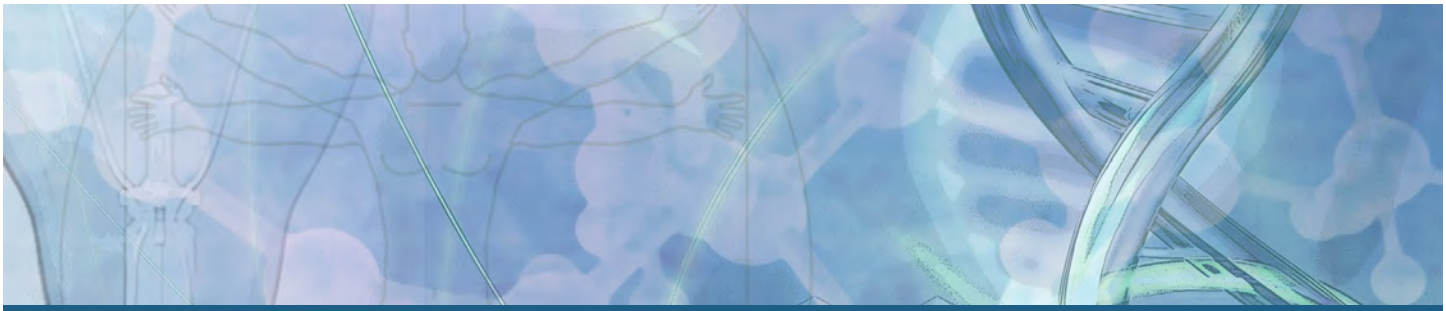
2:25 **Novel Bi-functional Inhibitors Blocking OncomiR Biogenesis**
Fu-Sen Liang, *University of New Mexico*

2:30 **An Optimized Design for Single Copy Short Hairpin RNAi**
Scott M. Hammond, *University of North Carolina - Chapel Hill*

2:35 **Multiplex In-Solution Protein Array (MISPA) for High Throughput, Quantitative Profiling of Protein Interactions in B-Cell Receptor Pathway and Detection of Immune Responses to Multiple Serotypes of HPV**
Femina Rauf, *Arizona State University - Tempe Campus*

2:40 **High-throughput Screening Platform for Cancer Drug Discovery**
Michael Recht, *Palo Alto Research Center*

2:45 pm Break



Agenda

Day 1 - Wednesday, December 6 (cont.)

3:00 pm — Clinical Diagnostics - Genomics

Podium Presentations

3:00 **Central Nervous System Tumor-Associated Cell Free Nucleic Acids in Cerebral Spinal Fluid**
Melanie Hayden Gephart, *Stanford University*

3:20 **Precise and Ultrasensitive Quantitation of Low Prevalence Somatic Mutations using Single Molecule Molecular Inversion Probes (smMIPs)**
Stephen J. Salipante, *University of Washington*

3:40 **Scalable Cancer Genomics via Nanocoding and Sequencing**
David Schwartz, *University of Wisconsin-Madison*

4:00 **TempO-Seq Gene Expression Profiling from FFPE**
Bruce Seligmann, *Biospyder Technologies, Inc.*

Poster Highlights

4:20 **A Novel Mitochondria, Bioenergetics & Apoptosis in Cancer**
Xiaowei Chen, *Research Institute of Fox Chase Cancer Center*

4:25 **High Throughput GO Chip Isolation of Lung CTCs for Molecular Diagnosis and Drug Testing**
Sunitha Nagrath, *University of Michigan*

4:30 **Doxorubicine Stabilization and Monitoring in Saliva of Children with Cancer**
David R.M. Graham, *Johns Hopkins University*

4:40 to 6:15 pm — Poster Session I (Room 110, Terrace Level East)

Day 2 - Thursday, December 7

9:00 am — Cell Sorting

Podium Presentations

9:00 **Towards a Droplet-Based Radiometric Assay for Single Cells**
Guillem Pratx, *Stanford University*

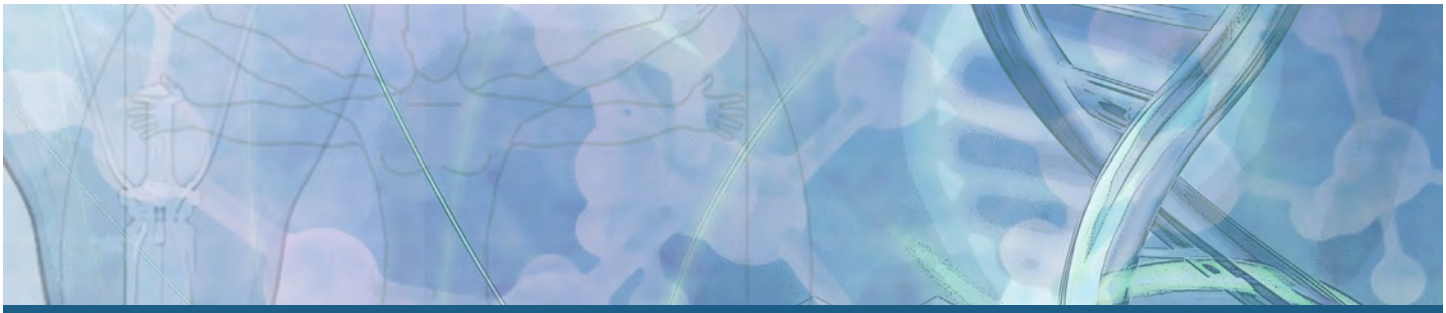
9:20 **High Throughput Single-Cell Phenotype Isolation by Protrusion Analysis Chip (PAC)**
Lidong Qin, *Methodist Hospital Research Institute*

9:40 **Isolating Circulating Tumor Cells**
Lydia L. Sohn, *University of California, Berkeley*

Poster Highlights

10:00 **Label-free Microfluidic Enrichment of Cancer Cells from Noncancer Cells in Ascites Fluid**
Todd Sulchek, *Georgia Institute of Technology*

10:05 **Validation of a Microdissection Method to Advance Precision Medicine**
Donald Johann & Michael Tangrea, *University of Arkansas for Medical Science*



Agenda

Day 2 - Thursday, December 7 (cont.)

10:10 am — Break

10:30 am — Single Cell Technologies

Podium Presentations

10:30 **Single Cell Growth Assay for Residual Cells in Acute Lymphoblastic Leukemia**
Scott Manalis, *Massachusetts Institute of Technology*

10:50 **Single Cell Technologies for Rapid Detection of Tumor Heterogeneity**
Karen Anderson, *Arizona State University - Tempe Campus*

11:10 **Direct Profiling of Proteins in Circulating Tumor Cells**
Amy Herr, *University of California, Berkeley*

Poster Highlights

11:30 **Single Cell Cytokine Analysis of Circulating Malignant Hematopoietic Cells**
Donjoo Kim, *Yale University*

11:35 **Large-Scale Integration of Single-Cell RNA-Seq and Live Cell Imaging**
Peter Alan Sims, *Columbia University Health Sciences*

11:40 **Analysis of Scant Cancer Cells in Fine Needle Aspirates**
Ralph Weissleder, *Massachusetts General Hospital*

11:50 am — Lunch (at attendees' expense) – Discussion Groups

2:00 pm — Advanced Imaging

Podium Presentations

2:00 **High-throughput ex vivo Microscopy of Cancer Biospecimens using Structured Illumination Microscopy**
J. Quincy Brown, *Tulane University of Louisiana*

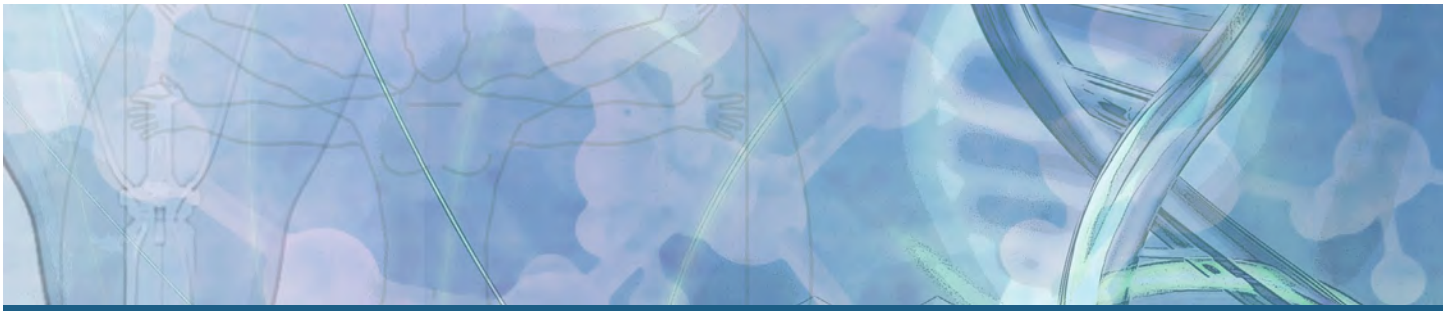
2:20 **An Integrated Imaging Tool for Probing EGFR Subcellular Trafficking in Real Time**
H.C. Tim Yeh, *University of Texas at Austin*

2:40 **Fast Interference-Based Super-Resolution Microscope for Cancer Mechanobiology**
Warren R. Zipfel, *Cornell University*

Poster Highlights

3:00 **Transforming FLIM into a High-Content Molecular Analysis Platform**
Jered Haun, *University of California - Irvine*

3:05 **Microscopy with UV Surface Excitation (MUSE): Rapid, Simple, Slide-Free Histology Consistent with Downstream Molecular Testing**
Richard Levenson, *University of California at Davis*



Agenda

Day 2 - Thursday, December 7 (cont.)

3:10 pm — Break

3:30 pm — IMAT Portfolio Highlights

Exposome Technologies

3:30 **Carcinogen DNA Adduct Biomarkers in Formalin Fixed Tissues**
Robert J. Turesky, *University of Minnesota*

3:50 **Assessing the Risk of UV-Induced Skin Cancer via Non-Invasive Epidermal Sampling**
Samir Mitragotri, *Harvard University*

4:10 **Using Adductomics to Characterize Exposures to Carcinogens**
Stephen Rappaport, University of California, Berkeley

Cancer Modeling Technologies

4:15 **A Cancer Rainbow Mouse for Simultaneous Assessment of Multiple Oncogenes**
Joshua Snyder, *Duke University*

4:35 **Bioengineered Lung Tumor Organoids for Development of Personalized Medicine**
Shay Soker, *Wake Forest University Health Sciences*

4:40 **Advanced Development and Validation of 3-Dimensional Spheroid Culture of Primary Cancer Cells using Nano3D Technology**
Timothy Spicer, *Scripps Florida*

4:45 to 6:15pm — Poster Session II (Room 110, Terrace Level East)

Day 3 - Friday, December 8

9:00 am — NCI Presentations

NCI Program Presentation on the Cancer Moonshot℠ Initiative

9:00 **The Human Cancer Atlas Network**
Sudhir Srivastava, *NCI Division of Cancer Prevention*

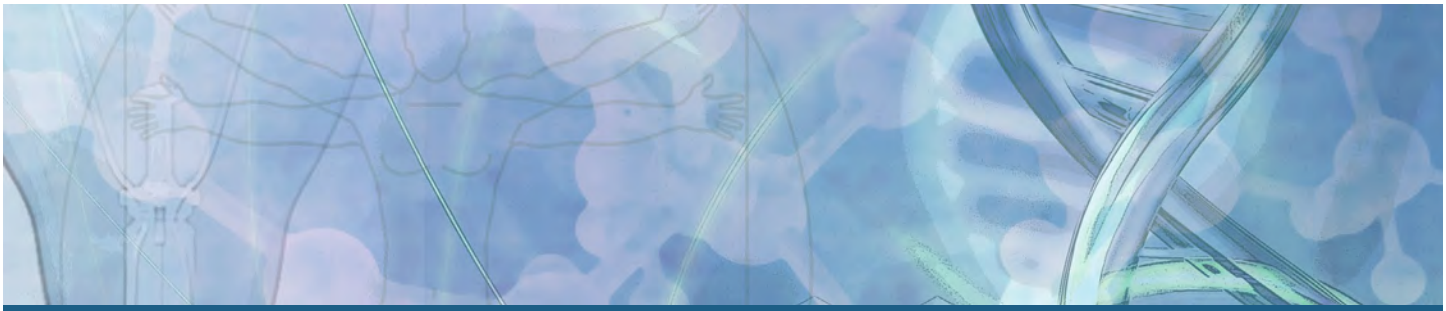
9:15 **The Immuno-Oncology Translation Network**
Elad Sharon, *NCI Division of Cancer Treatment and Diagnosis*

9:30 am — Clinical Imaging

9:30 **Cancer Molecular Analysis using Quantum Dots**
Xiaohu Gao, *University of Washington*

9:50 **Highly Multiplexed FISH for *In situ* Genomics**
Anthony John Iafrate, *Massachusetts General Hospital*

10:10 ***In situ* Imaging of CAR T-cells**
John Williams, *Beckman Research Institute/City of Hope*



Agenda

Day 3 - Friday, December 8 (cont.)

10:30 am	Break
10:50 am	Advances in Mass Spectrometry

10:50 **Histopathology-Linked Mapping of N-Glycan Distributions in Multiple FFPE Tumor Microarrays and Tissues by MALDI Imaging Mass Spectrometry**
Richard R. Drake, *Medical University of South Carolina*

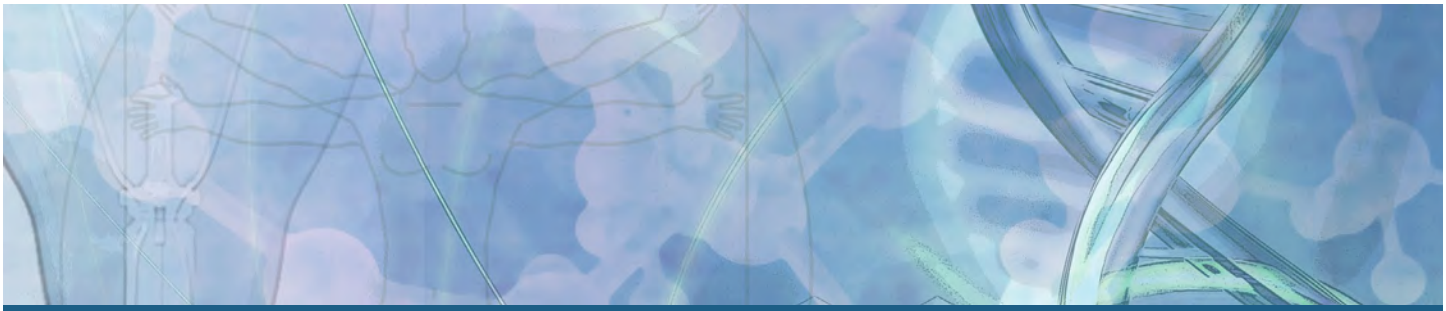
11:10 **Systematic and Comprehensive Sampling of Peptides in Mixtures by Tandem Mass Spectrometry**
Michael Maccoss, *University of Washington*

11:30 **Advanced Proteomic Methods for Tumor ECM Characterization**
Kirk Hansen, *University of Colorado Denver*

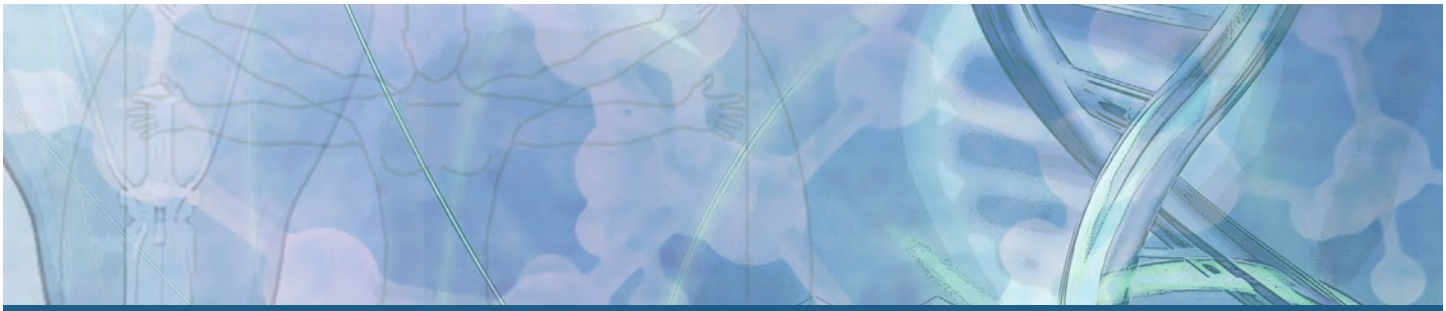
11:50 **Multiplexed Kinase Biosensor Technology to Detect Leukemia Signaling with Mass Spectrometry**
Laurie L. Parker, *University of Minnesota*

12:10 **Validation and Advanced Development of Glycan Node Analysis in Lung Cancer Research**
Chad R. Borges, *Arizona State University-Tempe Campus*

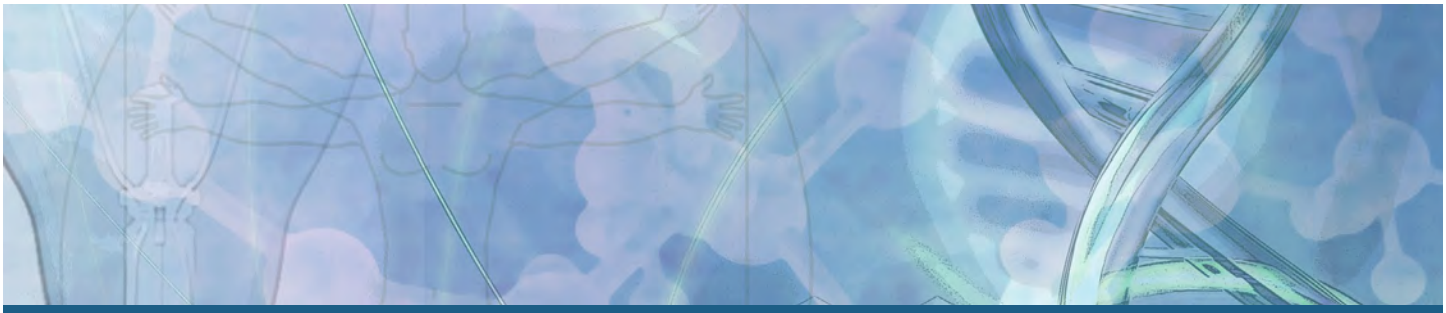
Adjorn by 12:40 pm	NCI Closing Remarks



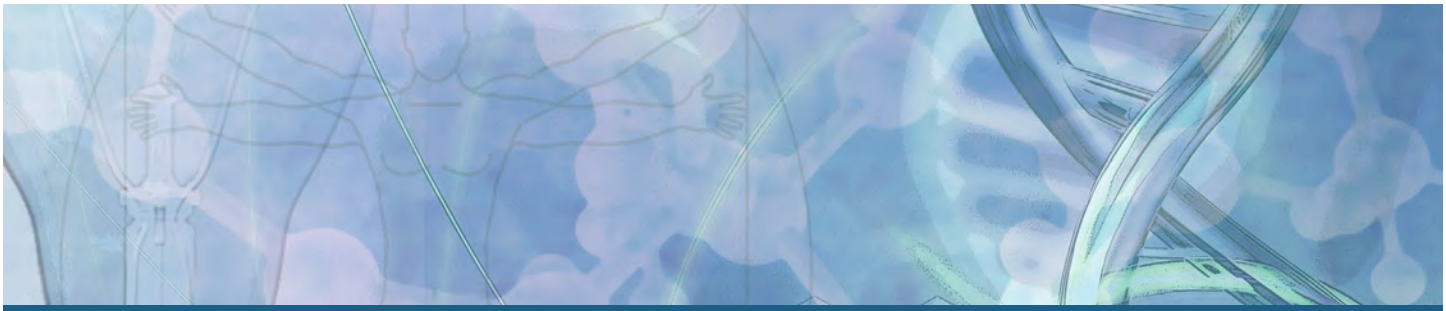
Podium Presentations



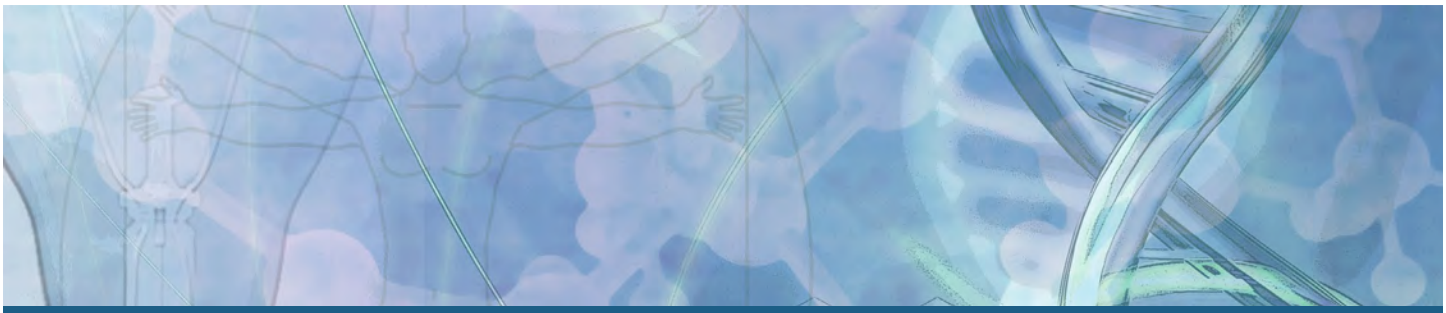
Podium Presentations



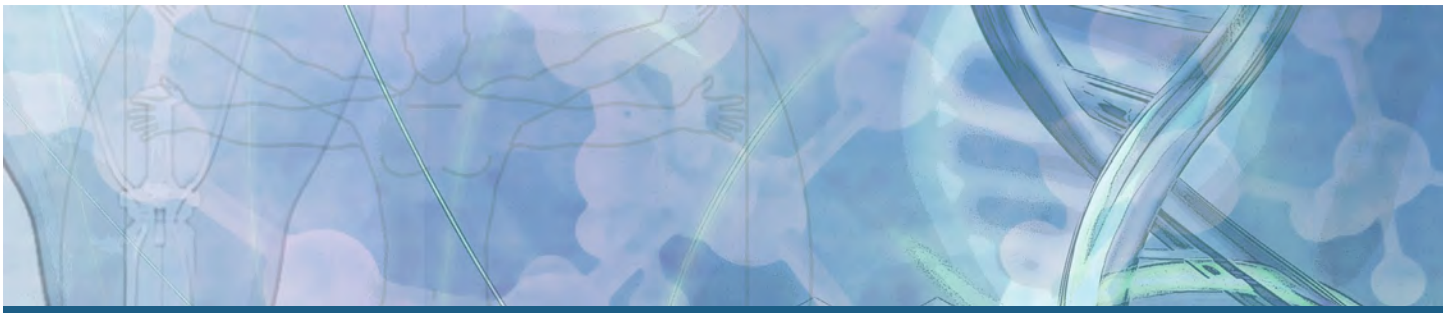
Poster Presentations Day 1 - Wednesday, December 6



Poster Presentations Day 1 - Wednesday, December 6

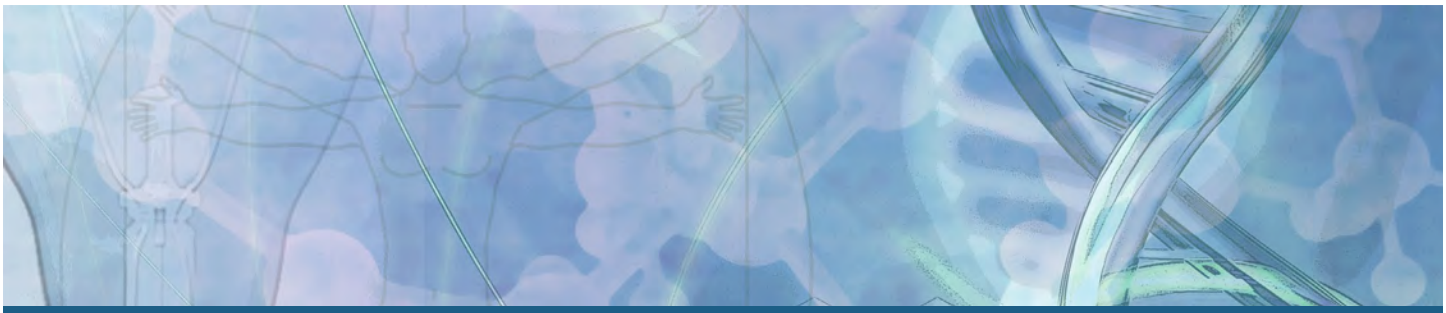


Poster Presentations Day 2 - Thursday, December 7



Poster Presentations Day 2 - Thursday, December 7

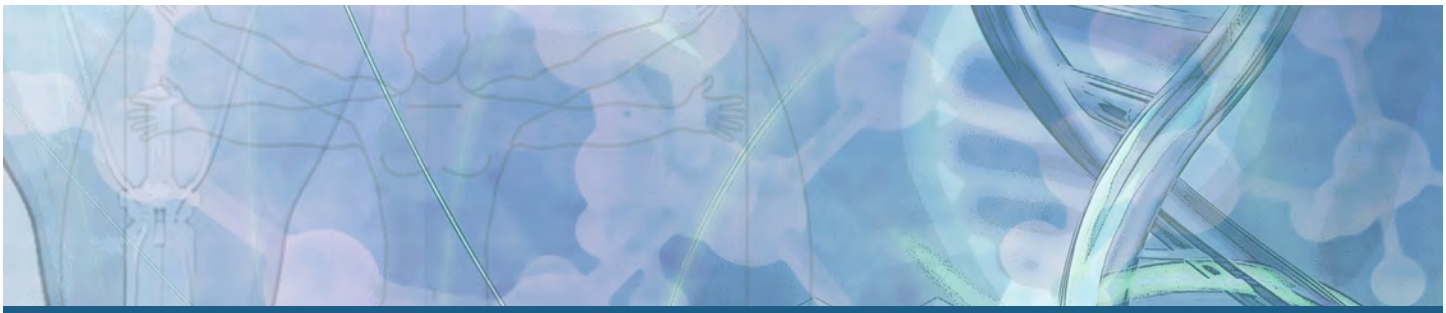
* These abstracts are from work supported by the American Cancer Society



Resources and Funding Opportunities

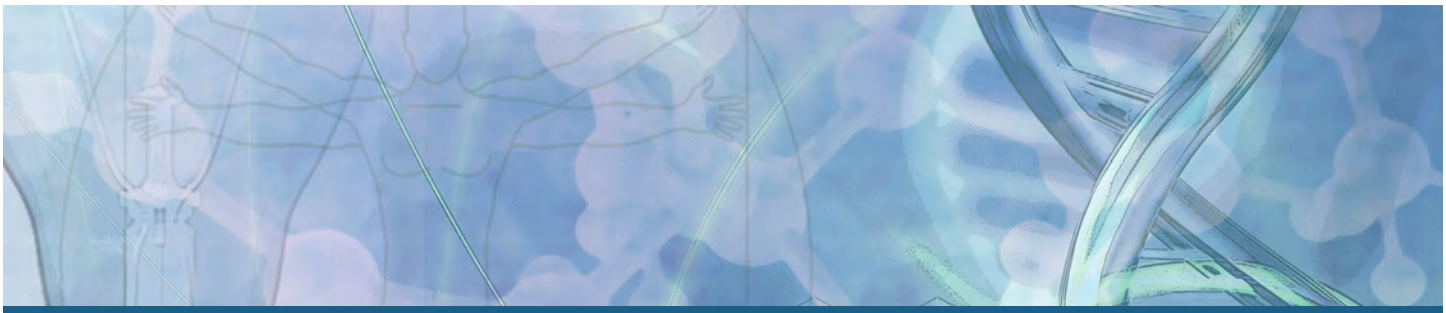
Resources

- The NCI Center for Strategic Scientific Initiatives (CSSI) Data Coordinating Center (DCC) Portal is a public repository of experiment-related information describing cancer research investigations. You can use the portal to browse, search, and access data generated through CSSI funded projects and other user uploaded data sets. This data is in ISA-Tab format.
- NCI's Proteomics Data Portal provides datasets of breast, ovarian, and tumor tissue that have been genomically characterized by TCGA datasets.
- The Antibody Characterization Laboratory 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) within Frederick National Laboratory for Cancer Research performs preclinical characterization of nanomaterials using a comprehensive battery of assays. The operation of NCL relies on collaboration with the Food and Drug Administration and the National Institute of Standards and Technology.
- The cancer Nanotechnology Laboratory (caNanoLab) data portal provides access to nanomaterial characterization data to expedite and validate the use of nanomaterials in biomedicine. Users can search and download cancer-relevant characterization data resulting from physico-chemical, in vitro, and in vivo assays, as well as associated protocols and publication information.
- The Nanomaterial Registry archives research data on nanomaterials and their biological and environmental implications from a broad collection of publicly available nanomaterial resources. All data housed is curated using a set of minimal information about nanomaterials (MIAN) to create criteria for curation and enable nanomaterial comparisons.
- NCI's Physical Sciences-Oncology Network and Cancer Systems Biology Consortium Data Coordinating Center on Synapse provides datasets of genomic characterization and physical characterization of numerous non-malignant and malignant cell lines (https://www.synapse.org/#!Synapse:syn7248578/wiki/405995).
- The NCI Physical Sciences-Oncology Network Bioresource Core Facility (PBCF) at ATCC is a central resource that provides common stocks of authenticated non-malignant and cancerous cell lines, their derivatives, cell culture reagents, and related standard operating protocols (SOPs). The bioresources are available for the cost of shipping and handling only, not only for members of the Physical Sciences-Oncology Network and Cancer Systems Biology Consortium, but also all investigators who are willing to share data sets that are generated using the bioresources provided by the PBCF. Visit the website to view the list of available cell lines and derivatives, the SOPs, order form, and transfer agreements: http://physics.cancer.gov/bioresources.
- The Early Detection Research Network (EDRN) – A consortium that promotes discovery, development, and clinical validation of biomarkers for early detection of cancer. Investigators with promising biomarkers may request for core funds to validate their markers using reference sets and resources within the network.
- The NCI SBIR Development Center oversees all NCI Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) support programs, which includes all grant and contract funding opportunities, as well as a broad variety of additional resources aimed at supporting the innovations and commercial interests of small business entities against cancer.
- The Cancer Genomics Cloud Pilots are designed to explore innovative methods for accessing and computing on large genomic data. Three contracts were awarded to develop infrastructure and a set of tools to access, explore, and analyze molecular data, which are all being implemented through commercial cloud providers and adopting common standards. The three project teams have distinct system designs, data presentation, and analysis resources to serve the cancer research community, which will be made available to researchers in early 2016.
- The Cancer Genome Atlas (TCGA) Data Portal 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.



Resources and Funding Opportunities

- The Alliance of Glycobiologists for Detection of Cancer – A consortium that investigates the molecular basis by which altered glycan expression leads to cancer progression and develop cancer biomarkers based on the aberrant expression of these glycans. Opportunities exist to collaborate in cancer relevant research with a number of experts in glycobiology.
- 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. (https://biospecimens.cancer.gov)
- The Biospecimen Research Database (BRD) is a free and publicly accessible literature database that contains curated, peer-reviewed primary and review articles in the field of human biospecimen science. The database is searchable by various parameters including the biospecimen investigated (type and location, patient diagnosis), preservation method, analyte(s) of interest and technology platform(s) used for analysis. An original summary of relevant results is also provided for each article.
- **The NCI offers the following two resources for research biospecimens:**
  - Specimen Resource Locator (SRL) is a biospecimen resource database designed to help researchers locate resources that may have the samples needed for their investigational use. This publicly searchable database includes information about biospecimen banks and sample procurement services. The specimens and samples come from non-commercial, either NCI or non-NCI-funded resources. Investigators can search the database and gain access to thousands of specimens of various tumor, organ, and preservation methods.
  - The Cooperative Human Tissue Network (CHTN) is a resource developed and supported by the NCI that provides human tissues and fluids from routine procedures open to the scientific community to facilitate basic, early translation research, and assay/technology validation. Unlike tissue banks, the CHTN works prospectively with each investigator to tailor specimen acquisition and processing to meet their specific project requirements.
- The NCI Comprehensive Data Resource (CDR) is a distributed web-based system that manages and maintains multi-dimensional data models on biospecimens. CDR was developed and is currently utilized to collect biospecimen and clinical data on biospecimens collected from cancer patient donors and post-mortem donors, for the NCI's Biospecimen Pre-analytical Variables (BPV) and NIH Genotype-tissue Expression (GTEx) programs.
- NCI has developed the Biobank Economic Modeling Tool (BEMT), a publically available web-based financial planning tool for biobanks. BEMT is designed to enhance the understanding of the economic considerations involved in initiating, operating and maintaining a biobank to assist with long term financial planning and cost recovery.
- The NIH Library of Integrated Network-based Cellular Signatures (LINCS) Program aims to create a network-based understanding of biology using computational tools into a comprehensive view of normal and disease states that can be applied for the development of new biomarkers and therapeutics. By generating and making public data that indicates how cells respond to various genetic and environmental stressors, the LINCS project will help us gain a more detailed understanding of cell pathways and aid efforts to develop therapies that might restore perturbed pathways and networks to their normal states.



Active Research Funding Opportunities[1]

Innovative Molecular Analysis Technology (IMAT) Program

- RFA-CA-18-002: Innovative Molecular and Cellular Analysis Technologies for Basic and Clinical Cancer Research (R21 Clinical Trial Not Allowed)
- RFA-CA-18-003: Advanced Development and Validation of Emerging Molecular and Cellular Analysis Technologies for Basic and Clinical Cancer Research (R33 Clinical Trial Not Allowed)
- RFA-CA-18-004: Innovative Technologies for Cancer-Relevant Biospecimen Science (R21 Clinical Trial Not Allowed)
- RFA-CA-18-005: Advanced Development and Validation of Emerging Biospecimen Science Technologies for Basic and Clinical Cancer Research (R33 Clinical Trial Not Allowed)
- RFA-CA-18-006: Revisions for Incorporation of Novel NCI-supported Technology to Accelerate Cancer Research (R01 Clinical Trials Optional)
- RFA-CA-18-007: Revisions for Incorporation of Novel NCI-supported Technology to Accelerate Cancer Research (U01 Clinical Trials Optional)
- RFA-CA-18-008: Revisions for Incorporation of Novel NCI-supported Technology to Accelerate Cancer Research (U54 Clinical Trials Optional)
- RFA-CA-18-009: Revisions for Incorporation of Novel NCI-supported Technology to Accelerate Cancer Research (P01 Clinical Trials Optional)
- RFA-CA-18-010: Revisions for Incorporation of Novel NCI-supported Technology to Accelerate Cancer Research (P50 Clinical Trials Optional)

Applications for above RFAs due Feb 28, May 26 and Sept 26, 2018.

- PAR-18-303: Innovative Molecular Analysis Technology Development for Cancer Research and Clinical Care (R43/R44 Clinical Trial Not Allowed). **Expires Jan. 8, 2021**.

Alliance for Nanotechnology in Cancer

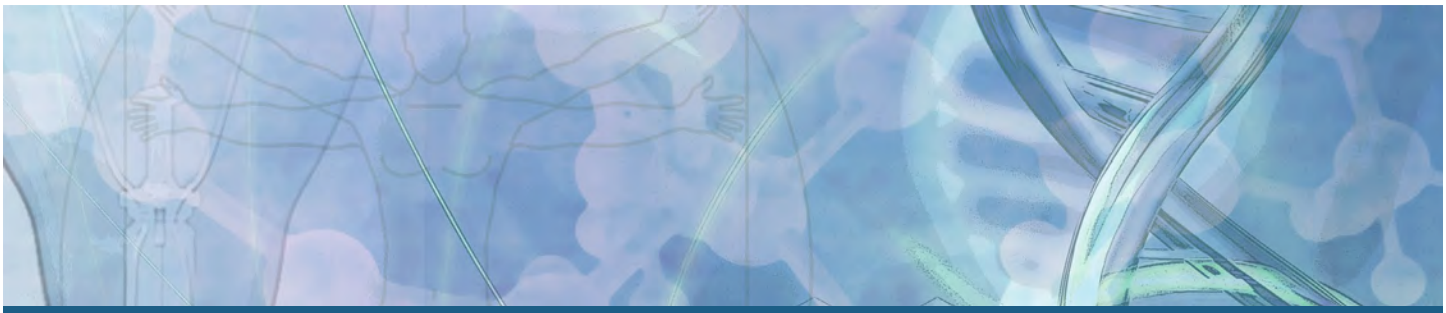
- PAR-17-240: Innovative Research in Cancer Nanotechnology (IRCN) (R01).

3 unique receipt dates per year. Expires May 22, 2020.

Academic-Industrial Partnerships

- PAR-15-075: (R01) Academic-Industrial Partnerships for Translation of Technologies for Cancer Diagnosis and Treatment. **Expires Jan. 8, 2018.**
- PAR-17-093: (R01) Academic-Industrial Partnerships to Translate and Validate in vivo Cancer Imaging Systems. **Expires Nov. 6, 2019.**
- RFA-CA-17-029: (U01) Precompetitive Collaboration on Liquid Biopsy for Early Cancer Assessment. **Applications due Jan. 23, 2017.**

[1]**Standard receipt dates apply, unless specific receipt dates listed.**



Resources and Funding Opportunities

Beau Biden Cancer Moonshot℠ Initiative

Human Tumor Atlas Network (HTAN)

- RFA-CA-17-034: (U2C) Human Tumor Atlas (HTA) Research Centers
- RFA-CA-17-035: (U2C) Pre-Cancer Atlas (PCA) Research Centers
- RFA-CA-17-036: (U24) HTAN Data Coordinating Center

  Applications due January 18, 2018.

Prevention and Early Detection: Implementation Science

- RFA-CA-17-038: (UG3/UH3) Accelerating Colorectal Cancer Screening and Follow-up through Implementation Science (ACCIS)
- RFA-CA-17-039: (U24) Accelerating Colorectal Cancer Screening and Follow-up through Implementation Science (ACCIS): Coordinating Center

  Applications due January 18, 2018.

- RFA-CA-17-041: (U01) Approaches to Identify and Care for Individuals with Inherited Cancer Syndromes

  Applications due January 9, 2018.

Therapeutic Target Identification to Overcome Resistance

- RFA-CA-17-044: (U24) Mechanisms of Cancer Drug Resistance and Sensitivity: Coordinating Center

  Applications due January 5, 2018.

Immuno-Oncology Translation Network (IOTN)

- RFA-CA-17-045: (U01) Cancer Immunotherapy Research Projects
- RFA-CA-17-046: (U01) Cancer Immunoprevention Research Projects
- RFA-CA-17-047: (U24) Data Management and Resource-Sharing Center (DMRC)
- RFA-CA-17-048: (U24) Cellular Immunotherapy Data Resource (CIDR)

  Applications due January 16, 2018.

- PAR-16-228: (R01) Metabolic Reprogramming to Improve Immunotherapy
- PAR-16-229: (R21) Metabolic Reprogramming to Improve Immunotherapy

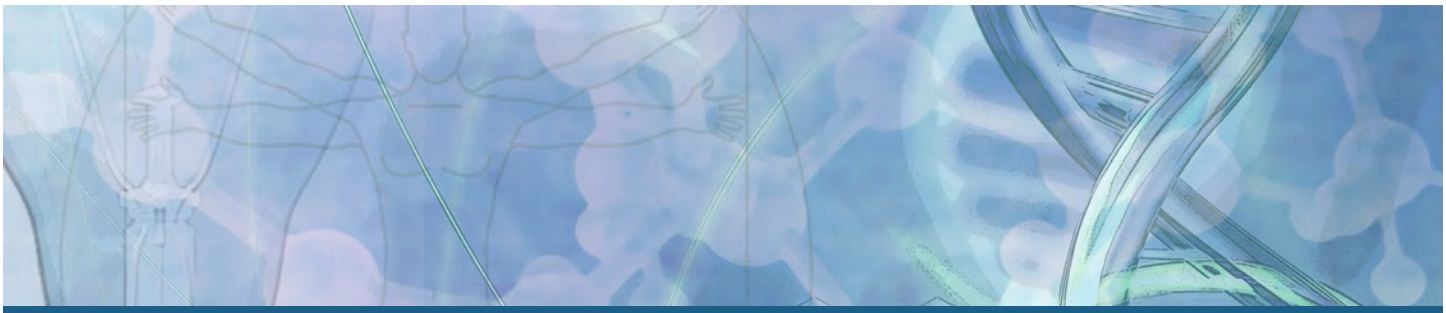
  Standard due dates apply. Expires May 8, 2020.

Fusion Oncoproteins in Childhood Cancer

- PA-16-251: (R01) Gene Fusions in Pediatric Sarcomas
- PA-16-252: (R21) Gene Fusions in Pediatric Sarcomas

  Standard due dates apply. Expires May 8, 2019.

- PA-17-138: (Admin Supp) Administrative Supplements to Promote Research Collaborations on Fusion Oncoproteins as Drivers of Childhood Cancer. **Applications due March 28, 2018.**



Resources and Funding Opportunities

Assay Validation for High Quality Markers for NCI-Supported Clinical Trials

- PAR-18-317 (UH2/UH3 Clinical Trials Not Allowed)
- PAR-18-310 (UH3 Clinical Trials Not Allowed)

3 unique receipt dates per year. Expires Oct. 9, 2020.

Informatics Technologies for Cancer Research (ITCR) Program

- PAR-15-334: (R21) Development of Innovative Informatics Methods and Algorithms for Cancer Research and Management
- PAR-15-332: (U01) Early-Stage Development of Informatics Technologies for Cancer Research and Management
- PAR-15-331: (U24) Advanced Development of Informatics Technologies for Cancer Research and Management
- PAR-15-333: (U24) Sustained Support for Informatics Resources for Cancer Research and Management

Applications due: June 14 and November 20, 2018.

Oncology Models

- PAR-17-244: (Collaborative R01) Collaborative Research Projects to Enhance Applicability of Mouse Models for Translational Research
- PAR-17-245: (R01) Research Projects to Enhance Applicability of Mouse Models for Translational Research.

Standard due dates apply. Expires May 8, 2020.

- PAR-17-171: (U01) Cancer Tissue Engineering Collaborative: Enabling Biomimetic Tissue-Engineered Technologies for Cancer Research

Standard due dates apply. Expires Jan 8, 2019.

- PAR-16-344: (U01) Biological Comparisons in Patient-Derived Models of Cancer

Applications due March 7, 2018; September 6, 2018; and March 6, 2019.

Research Answers to NCI's Provocative Questions

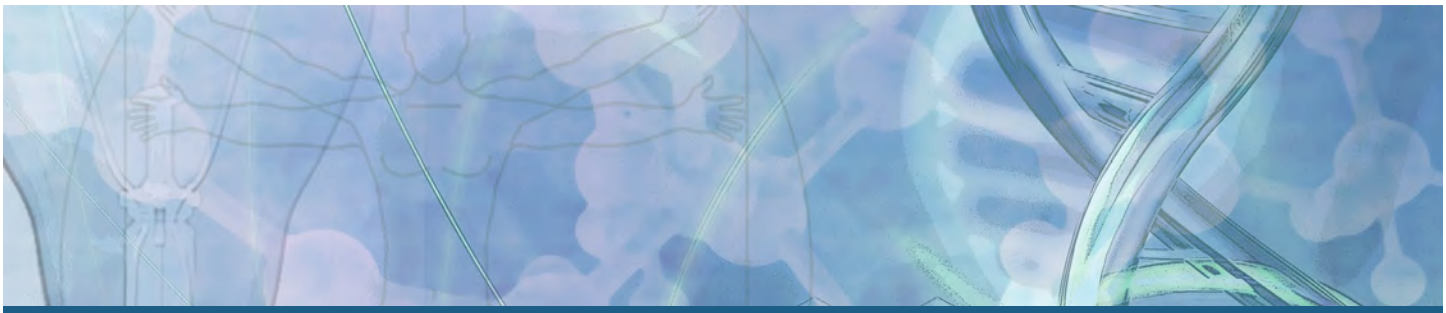
- RFA-17-017: (R01) Research Answers to NCI's Provocative Questions
- RFA-17-018: (R21) Research Answers to NCI's Provocative Questions
- RFA-17-019: (R01) Revision Applications to NCI-supported R01 awards to include Research on NCI's Provocative Questions
- RFA-17-020: (U01) Revision Applications to NCI-supported U01 awards to include Research on NCI's Provocative Questions
- RFA-17-021: (P01) Revision Applications to NCI-supported P01 awards to include Research on NCI's Provocative Questions
- RFA-17-022: (P50) Revision Applications to NCI-supported P50 awards to include Research on NCI's Provocative Questions

Applications due June 28 and October 30, 2018

Alliance of Glycobiologists for Cancer Research

- PAR-17-206: (U01) Translational Tumor Glycomics Laboratories
- PAR-17-207: (U01) Biological Tumor Glycomics Laboratories

Applications due February 7, 2018; June 8, 2018; and February 7, 2019.



Resources and Funding Opportunities

Adducts in Cancer Risk Identification and Prevention

- PAR-15-307: (U01) Translational Research on Adducts in Cancer Risk Identification and Prevention
- PAR-15-308: (R01) Innovative Basic Research on Adducts in Cancer Risk Identification and Prevention
- PAR-15-309: (R21) Innovative Basic Research on Adducts in Cancer Risk Identification and Prevention

Applications due July 11, 2018.

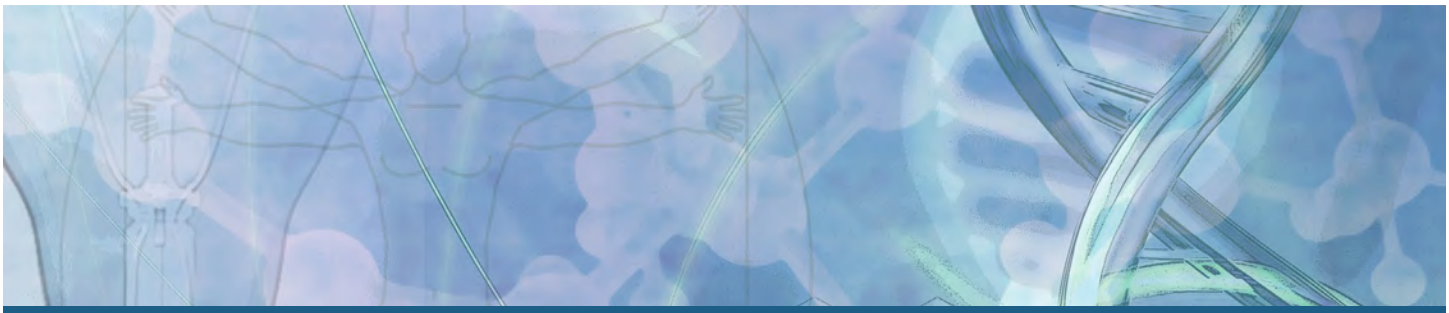
Other NCI Opportunities

- PAR-15-266: (U24) Oncology Co-Clinical Imaging Research Resources to Encourage Consensus on Quantitative Imaging Methods and Precision Medicine. **Applications due Jun 14, 2018**.
- PAR-15-287: (U01) Opportunities for Collaborative Research at the NIH Clinical Center. **Applications due April 11, 2018**.
- PAR-15-289: (U01) The Pancreatic Cancer Detection Consortium. **Applications due April 6, 2018**.
- PAR-15-297: (U01) Utilizing the PLCA Biospecimens Resource to Bridge Gaps in Cancer Etiology and Early Cancer Detection. **Expires Aug. 16, 2018.**
- PAR-16-044: (R01) Image-Guided Drug Delivery. **Applications due June 21 and November 22, 2018**.
- PAR-16-089: (U01) Imaging and Biomarkers for Early Cancer Detection of Aggressive Cancers. **Applications due July 10 and December 11, 2018.**
- PAR-16-131 (U01) Emerging Questions in Cancer Systems Biology. **Applications due June 22 and November 23, 2018.**
- PAR-16-166: (U01) Integrating Biospecimen Science Approaches into Clinical Assay Development.

  Applications due June 22, 2018.
- PAR-16-176: (R21) NCI Clinical and Translational Exploratory/Developmental Studies. **Applications due February 20, 2018; June 19, 2018; October 17, 2018; and February 20, 2019.**
- PA-16-177: (R01) Pilot and Feasibility Studies Evaluating the Role of RNA Modifications (the 'epitranscriptome') in Cancer Biology. **Expires July 17, 2019**
- PAR-16-276: (R01) Program to Assess the Rigor and Reproducibility of Exosome- Derived Analytes for Cancer Detection. **Applications due June 13, 2018; October 15, 2018; and June 13, 2019.**
- PAR-16-277: (R21) Program to Assess the Rigor and Reproducibility of Exosome- Derived Analytes for Cancer Detection. **Applications due June 13, 2017; October 13, 2017; June 13, 2018; October 15, 2018; and June 13, 2019.**

General NIH Bioengineering Research Opportunities

- RFA-MH-18-600: (R21/R33) NIH Blue Print: Development and Validation of Technologies for Rapid Isolation and Characterization of Extracellular Vesicles of Central Nervous System Origin
- PAR-18-205: (P41) NIBIB Biomedical Technology Resource Center. Standard due dates apply. **Expires January 8, 2020.**
- PAR-17-046: (R21) Exploratory Research for Technology Development from the National Institute for General Medical Sciences. **Expires May 8, 2019.**
- PAR-17-045: (R01) Focused Technology Research and Development from the National Institute for General Medical Sciences. **Expires May 8, 2019.**



General NIH Bioengineering Research Opportunities (cont.)

- PAR-17-316: (P41) NIGMS Biomedical Technology Research Resource. **Applications due: January 25, 2018; May 25, 2018; January 25, 2019; May 25, 2019; and January 25, 2020.**
- PA-16-040: (R21) Exploratory/Developmental Bioengineering Research Grant (EBRG). **Expires Jan 8, 2019.**
- PAR-16-242: (R01) Bioengineering Research Grants (BRG). **Expires May 8, 2019.**
- PAR-16-116: (U01) Bioengineering Research Partnerships (BRP). **Expires Jan 8, 2019.**

Diet and Physical Activity Assessment Methodology

- PA-18-010 (R01)
- PAR-18-012 (R21)

Multiple receipt dates, expiring September 8, 2019

Brain Research through Advancing Innovative Neurotechnologies (BRAIN) Initiative

- Various funding opportunities can be found at https://www.braininitiative.nih.gov

Training and Other Support

Ruth L. Kirschstein National Research Service Award (NRSA)

- PA-16-151: (T35) Short-Term Research Training Grant
- PA-16-152: (T32) Institutional Research Training Grant
- PA-16-310: (F33) Individual Senior Fellowship.
- PA-16-309: (F31) Individual Predoctoral Fellowship
- PA-16-308: (F31) Predoctoral Fellowship to Promote Diversity in Health-Related Research
- PA-16-307: (F32) Individual Postdoctoral Fellowship
- PA-16-306: (F30) Fellowship for Students at Institutions Without NIH-Funded Institutional Predoctoral Dual-Doctoral Training Programs
- PA-16-305: (F30) Fellowship for Students at Institutions With NIH-Funded Institutional Predoctoral Dual-Doctoral Training Programs
- PA-16-194: (K25) Mentored Quantitative Research Development Award
- PAR-16-293: (K22) The NCI Transition Career Development Award.

More information on NIH-supported training initiatives here.