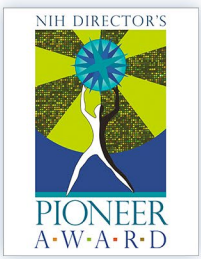
National Institutes of Health
Office of Strategic Coordination–The Common Fund

NIH Common Fund

2015 High-Risk, High-Reward Research Symposium

Program Book

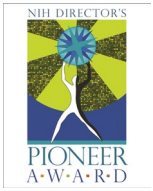


Natcher Conference Center (Building 45)
National Institutes of Health
Bethesda, MD

December 7–9, 2015

Program Description

The goal of the NIH Common Fund's High-Risk, High-Reward Research Program is to accelerate the pace of biomedical discoveries by supporting exceptionally creative scientists with highly innovative research ideas of unusually broad potential impact. Four initiatives within this program—the Pioneer Award, New Innovator Award, Transformative Research Award, and Early Independence Award—serve distinct purposes in achieving this goal.



Pioneer Award: The Pioneer Award supports individual scientists of exceptional creativity at any career stage who propose bold approaches to address major challenges in biomedical and behavioral research.

New Innovator Award: The New Innovator Award supports unusually creative early career stage investigators with highly innovative research ideas with the potential for broad impact.

Transformative Research Award: The Transformative Research Award supports exceptionally innovative and/or unconventional research projects that have the potential to create or overturn fundamental paradigms. The initiative permits multiple principal investigators and flexible budgets.

Early Independence Award: The Early Independence Award provides a mechanism for outstanding early career scientists to move rapidly into independent research positions by omitting the traditional postdoctoral training period.

Agenda

Monday, December 7, 2015

8:30 a.m. – 8:45 a.m. **Lawrence Tabak**, Principal Deputy Director, National Institutes of Health

Opening Remarks and Announcement of 2015 High-Risk, High-Reward Research Program Awardees

8:45 a.m. – 9:00 a.m. **James Anderson**, Director, Division of Program Coordination, Planning, and Strategic Initiatives; Office of the Director; National Institutes of Health

Opening Remarks

Session 1

9:00 a.m. – 9:20 a.m. **Lihong Wang** (Washington University in St. Louis; Pioneer Awardee; National Institute of Biomedical Imaging and Bioengineering*#)

Compressed Ultrafast Photography: World's Fastest 2-D Receive-Only Camera Captures Light Propagation at Light Speed

9:20 a.m. – 9:40 a.m. **Ming C. Hammond** (University of California, Berkeley; New Innovator Awardee; National Institute of General Medical Sciences#)

Illuminating Bacterial Signaling with RNA-Based Biosensors

9:40 a.m. – 10:00 a.m. **Liguo Wang** (University of Washington; Transformative Research Awardee; National Institute of General Medical Sciences*#$)

Cryo-EM Structure of the BK Ion Channel in a Lipid Membrane

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10:00 a.m. – 10:20 a.m.	**Adam de la Zerda** (Stanford University; Early Independence Awardee; National Cancer Institute[$]; National Institute of Dental and Craniofacial Research[#]) MOZART: High-Resolution Optical Molecular Imaging System
10:20 a.m. – 10:40 a.m.	Break

Session 2

10:40 a.m. – 11:00 a.m.	**Steven T. Kosak** (Northwestern University; New Innovator Awardee; National Institute of General Medical Sciences[#]) Regulatory Protein Translation in the Human Nucleus
11:00 a.m. – 11:20 a.m.	**Carissa Perez Olsen** (Fred Hutchinson Cancer Research Center; Early Independence Awardee; National Institute of Dental and Craniofacial Research[#]) Ether-Linked Phospholipids Modulate Stress Response in *C. elegans*
11:20 a.m. – 11:40 a.m.	**Bruce Yankner** (Harvard Medical School; Pioneer Awardee; National Institute on Aging*[#$]) Conservation of a Fundamental Pathway of Stress Resistance From Worms to Man
11:40 a.m. – 12:10 p.m.	Photo shoots for awardees (all years)
12:10 p.m. – 1:40 p.m.	Lunch (on your own)

Session 3

1:40 p.m. – 2:00 p.m.	**Alexei Aravin** (California Institute of Technology; New Innovator Awardee; National Institute of General Medical Sciences[#]) piRNA Biogenesis and Trans-Generational Epigenetic Inheritance
2:00 p.m. – 2:20 p.m.	**Haifan Lin** (Yale University; Pioneer Awardee; National Cancer Institute*[#$]) Uniting Major Constituents of the Genome: A Novel Function of the PIwi-piRNA Pathway in the Germline

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2:20 p.m. – 2:40 p.m. **Diana Laird** (University of California, San Francisco; New Innovator Awardee; National Institute of General Medical Sciences[#])

Apoptosis During Fetal Development Eliminates Clonally Related Germ Cells

2:40 p.m. – 3:00 p.m. **Hara Levy** (Lurie Children's Hospital of Chicago; New Innovator Awardee; National Institute of General Medical Sciences[#]; National Heart, Lung, and Blood Institute[$])

Identification of Molecular Signature in Cystic Fibrosis Using Serum-Based Functional Genomics

Poster Session 1

3:00 p.m. – 5:00 p.m. Natcher Conference Center, Upstairs Atrium

5:00 p.m. Adjournment

Early Independence Award Session

5:00 p.m. – 8:00 p.m. Closed Session

Tuesday, December 8, 2015

Session 4

8:30 a.m. – 8:40 a.m. **Ravi Basavappa** (Office of Strategic Coordination; Division of Program Coordination, Planning, and Strategic Initiatives; Office of the Director; National Institutes of Health)

High-Risk, High-Reward Research Program Updates

8:40 a.m. – 9:00 a.m. **Nathan Gianneschi** (University of California, San Diego; New Innovator Awardee; National Institute of General Medical Sciences[#])

Seek, Destroy, and Heal: Disease-Responsive Nanoparticles as *In Vivo* Targeted Delivery Systems

9:00 a.m. – 9:20 a.m. **Michelle Khine** (University of California, Irvine; New Innovator Awardee; National Institute of General Medical Sciences[#])

Shrink-Induced Manufacturing Platform for Low-Cost Diagnostics (SIMPL-CD)

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9:20 a.m. – 9:40 a.m.	**Michael Roukes** (California Institute of Technology; Pioneer Awardee; National Institute of General Medical Sciences*#$)
	Nanoscale Tools to Advance Biomedical Frontiers
9:40 a.m. – 10:00 a.m.	**Hongrui Jiang** (University of Wisconsin–Madison; New Innovator Awardee; National Institute of General Medical Sciences;# National Eye Institute$)
	An Accommodative Contact Lens for Presbyopic Correction
10:00 a.m. – 10:20 a.m.	Break

Session 5

10:20 a.m. – 10:40 a.m.	**Thomas Hartung** (Johns Hopkins University; Transformative Research Awardee; National Institute of Environmental Health Sciences*#)
	Mapping the Human Toxome by Systems Toxicology
10:40 a.m. – 11:00 a.m.	**Utpal Banerjee** (University of California, Los Angeles; Pioneer Awardee; National Institute of Diabetes and Digestive and Kidney Diseases*#)
	Metabolic Control of Early Mammalian Development
11:00 a.m. – 11:20 a.m.	**Michael Petrascheck** (The Scripps Research Institute, New Innovator Awardee, National Institute of General Medical Sciences#)
	Extending Caenorhabditis elegans Lifespan by Extending the Duration of Young Adulthood
11:20 a.m. – 11:40 a.m.	**Jun Liu** (Johns Hopkins University; Pioneer Awardee; National Cancer Institute*#$)
	Rapafucins, a New Type of Natural Product-Inspired Macrocycles as Chemical Probes and Drug Leads
11:40 a.m. – 12:00 p.m.	**Erin Carlson** (University of Minnesota; New Innovator Awardee; National Institute of General Medical Sciences#$)
	Chemical Probes for Histidine Kinase Protein Profiling and Inhibitor Discovery
12:00 p.m. – 1:30 p.m.	Lunch (on your own)

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Session 6

1:30 p.m. – 1:50 p.m. **David Schneider** (Stanford University; Pioneer Awardee; National Center for Complementary and Integrative Health*#)

Improving Resilience to Infectious Diseases

1:50 p.m. – 2:10 p.m. **David Tobin** (Duke University; New Innovator Awardee; National Institute of General Medical Sciences#)

From Zebrafish to Humans: Reprogramming the Host Response to Tuberculosis

2:10 p.m. – 2:30 p.m. **Ellen Yeh** (Stanford University; Early Independence Awardee; National Institute of Dental and Craniofacial Research#)

Reviving the Apicoplast as an Anti-Malarial Drug Target

2:30 p.m. – 2:50 p.m. **James E. K. Hildreth** (Meharry Medical College; Pioneer Awardee; National Institute of Allergy and Infectious Diseases*#$)

Natural Pseudotyping of HIV-1 Facilitates Infection of Female Primary Genital Tract Epithelial Cells Promoting Vaginal Transmission

2:50 p.m. – 3:10 p.m. **Joao Xavier** (Memorial Sloan Kettering Cancer Center; New Innovator Awardee; National Institute of General Medical Sciences#)

Exploiting Social Interaction in New Therapies Against Pathogenic Bacteria

Poster Session 2

3:10 p.m. – 5:10 p.m. Natcher Conference Center, Upstairs Atrium

5:10 p.m. Adjournment

Wednesday, December 9, 2015

Session 7

8:30 a.m. – 8:50 a.m. **Bruce E. Wexler** (presenting) and **James Leckman** (Yale University; Transformative Research Awardees; National Institute of Child Health and Human Development*#)

Harnessing Neuroplasticity with Computer-Presented and Physical Brain-Training Exercises: Medical and Educational Outcomes

8:50 a.m. – 9:10 a.m. **Florian Engert** (Harvard University; Pioneer Awardee; National Institute of Neurological Disorders and Stroke*#)

Neural Circuits Underlying Operant Learning in Larval Zebrafish

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9:10 a.m. – 9:30 a.m.	**Lorna Role** (State University of New York at Stony Brook; Pioneer Awardee; National Institute of Neurological Disorders and Stroke*#) Manipulating Memory Through Cholinergic Signaling in the Brain
9:30 a.m. – 9:50 a.m.	**Tamas Horvath** (Yale University; Pioneer Awardee; National Institute of Diabetes and Digestive and Kidney Diseases*#) Hypothalamic AgRP Neurons Are Determinants of Healthy Lifespan and Higher Brain Functions
9:50 a.m. – 10:10 a.m.	**Paul D. Marasco** (Cleveland Clinic; Transformative Research Awardee; National Institute of Neurological Disorders and Stroke*#) Engineered Perception of Complex Bionic Hand Movements Through Kinesthetic Illusions
10:10 a.m. – 10:30 a.m.	Break

Session 8

10:30 a.m. – 10:50 a.m.	**Megan C. King** (Yale University; New Innovator Awardee; National Institute of General Medical Sciences#) The Nuclear Periphery Acts as a Regulator of Recombinatorial Potential
10:50 a.m. – 11:10 a.m.	**Erez Lieberman Aiden** (Baylor College of Medicine; Rice University; New Innovator Awardee; National Institute of General Medical Sciences#) Reading and Writing Genomes in 3-D: Hacking the CTCF Code
11:10 a.m. – 11:30 a.m.	**Arjun Raj** (University of Pennsylvania; New Innovator Awardee; National Institute of General Medical Sciences#) The Spatial Organization of Transcription
11:30 a.m. – 11:50 a.m.	**Xiaowei Zhuang** (presenting) and **Sunney Xie** (Harvard University; Transformative Research Awardees; National Institute of General Medical Science*#) *In Situ* Imaging of Genome and Transcriptome in Single Cells
11:50 a.m. – 11:55 a.m.	Closing remarks
11:55 a.m.	Adjournment

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Poster Sessions

Monday, December 7, 2015

Poster Number 1

Eric Bennett
University of California, San Diego

Regulatory Ribosomal Ubiquitylation Communicates Protein Homeostasis Stress to the Translation Machinery

Poster Number 2

Helen M. Blau
Baxter Laboratory for Stem Cell Biology

Stanford University School of Medicine
Increasing Healthspan by Rapid and Transient Telomere Extension

Poster Number 3

Roberto Bonasio
University of Pennsylvania

Epigenetic Regulation of Social Behavior in Ants

Poster Number 4

Giovanni Bosco
Geisel School of Medicine at Dartmouth

Trans-Generational Effects of Social Learning

Poster Number 5

Jan Carette
Stanford University

Hunting Viral Receptors Using Haploid Cells

Poster Number 6

Ibrahim Cissé
Massachusetts Institute of Technology

An Input-Output Relation Between RNA Polymerase II Clustering and Gene Output in Living Cells

Poster Number 7

Francesca Cole
The University of Texas MD Anderson Cancer Center

Suppression of Mitotic Holliday-Junction Resolvases Promotes Crossover Assurance in Mouse Meiosis

Poster Number 8

Shadmehr Demehri
Massachusetts General Hospital

Immune Regulation of Early Carcinogenesis

Poster Number 9

Matthew Disney
The Scripps Research Institute

Using a Disease-Affected Cell to Synthesize Its Own Drug

Poster Number 10

Jeffrey Dvorin
Boston Children's Hospital
Harvard Medical School

Progress Toward Essential Gene Discovery in the Malaria Parasite *Plasmodium falciparum*

Poster Number 11

Andrew Ellington
The University of Texas at Austin

Engineering Robust Ionotropic Activators for Brain-Wide Manipulation of Neurons

Poster Number 12

Adam Feinberg
Carnegie Mellon University

Bottom-Up Engineering of the Heart Using Developmentally Inspired Protein Scaffolds

Poster Number 13

Ethan Garner
Center for Systems Biology
Harvard University

Watching Rods Form Out of Spheres—Short-Axis Sensing by MreB Orients Cell Wall Synthesis, Allowing Robust Rod-Shaped Growth and Recovery

Poster Number 14

Zev J. Gartner
University of California, San Francisco

Toward the Total Synthesis of the Human Mammary Gland

Poster Number 15

Marc Gershow
New York University

An Optical Investigation of Olfaction in the *Drosophila* Larva

Poster Number 16

Vadim Gladyshev
Brigham and Women's Hospital
Harvard Medical School

Natural Control of Lifespan

Poster Number 17

Kamil Godula
University of California, San Diego

Controlling Stem Cell Differentiation by Chemical Editing of Glycan Signals at the Cell-Matrix Interface

Poster Number 18

Jesse Goldberg
Cornell University

Identifying Pathways for Motor Variability in the Mammalian Brain

Poster Number 19

Andrew Goodwin
University of Colorado Boulder

Rapid, Multiscale Sensing Using Acoustic Detection Mechanisms

Poster Number 20

Daniel A. Heller
Memorial Sloan Kettering Cancer Center
Weill Cornell Medical College

Nanotechnologies for Biomedical Imaging and Optical Sensors

Poster Number 21

Richard E. Honkanen
University of South Alabama

Enabling Cholesterol Catabolism in Human Cells: Lessons From Nature

Poster Number 22

Michelle Janelsins
University of Rochester

Clinical and Translational Approaches to Cognitive Impairments in Breast Cancer

Poster Number 23

Jakob D. Jensen
University of Utah

Communal Feedback as an Innovative Alternative to Skin Self-Exam

Poster Number 24

Martin Kampmann
University of California, San Francisco

Elucidating the Protein Homeostasis Network in Disease States of Human Cells by Next-Generation Functional Genomics

Poster Number 25

Rahul M. Kohli
University of Pennsylvania

Targeting the Evolution of Antibiotic Resistance

Poster Number 26

Pamela Kreeger
University of Wisconsin–Madison

Analysis of How Quantitative Cellular Network Variation Impacts Tumor Progression

Poster Number 27

Chang Liu
University of California, Irvine

Orthogonal Replication for Rapid Evolution and Synthetic Biology

Poster Number 28

Axel Nimmerjahn
Salk Institute for Biological Studies

Modulating Plasma Membrane Phosphatidylserine Exchange Controls Innate Immune Responses by Microglia

Poster Number 29

Timothy P. Padera
Massachusetts General Hospital
Harvard Medical School

Characterizing Lymphatic Micrometastases

Poster Number 30

Sallie Permar
Duke University Medical Center

Maternal Neutralizing Antibodies Protect Against Severe Fetal Outcome in a Novel Nonhuman Primate Model of Congenital Cytomegalovirus Infection

Poster Number 31

Christian Petersen
Northwestern University

Cell Signaling in Control of Regenerative Growth

Poster Number 32

Ozgur Sahin
Columbia University

Mechanical Superresolution: Imaging Structure, Chemistry, Forces, and Voltage Across Biomolecules and Cells

Poster Number 33

Steven Schiff
The Pennsylvania State University

Control of the Neonatal Septisome and Hydrocephalus in Sub-Saharan Africa

Poster Number 34

Gregory Schwartz
Northwestern University

Cardinal Orientation Selectivity Is Represented by Two Distinct Ganglion Cell Types in Mouse Retina

Poster Number 35

Evan Scott
Northwestern University

Development of Combination Immunotherapies for Atherosclerotic Inflammation

Poster Number 36

Marco Seandel
Weill Cornell Medical College

Age-Dependent Clonal Enrichment of Pathogenic Mutations in the Male Germline

Poster Number 37

Mohammad Seyedsayamdost
Princeton University

A New High-Throughput Platform for the Discovery of Therapeutic Molecules

Poster Number 38

Marmar Vaseghi
University of California, Los Angeles Cardiac Arrhythmia Center

Parasympathetic Neural Remodeling in the Setting of Myocardial Infarction and Electrical Stabilization by Vagal Nerve Stimulation

Poster Number 39

Hao Wu
Boston Children's Hospital
Harvard Medical School

Novel Signal Transduction Complexes as New Targets for Drug Discovery

Poster Number 40

Ting (C.-ting) Wu
Harvard Medical School

Single-Molecule Super-Resolution *in Situ* Imaging of Chromosomal DNA and Haplotype Visualization Using Oligopaints

Poster Number 41

Wenjun Zhang
University of California, Berkeley

De Novo Biosynthesis of Terminal Alkyne-Tagged Natural Products and Applications

Poster Number 42

Siyang Zheng
The Pennsylvania State University

Nanomaterial Integrated Microfluidic Devices for Virus Analysis

Tuesday, December 8, 2015

Poster Number 1

Gregory M. Alushin
National Heart, Lung, and Blood Institute
National Institutes of Health

Direct Observation of Force-Induced Conformational Transitions in F-actin

Poster Number 2

Amy Arnsten
Yale School of Medicine

Molecular Vulnerabilities for Higher Cognitive Disorders in the Newly Evolved Primate Association Cortex

Poster Number 3

Maria Barna
Stanford University

Specialized Ribosomes: A New Frontier in Gene Regulation, Organismal Biology, and Evolution

Poster Number 4

Alexander B. Barnes
Washington University in St. Louis

High-Sensitivity NMR at Room Temperature for Molecular Structure and Dynamics

Poster Number 5

Hans Tomas Bjornsson
Johns Hopkins University School of Medicine

A Ketogenic Diet Rescues Hippocampal Memory Defects in a Mouse Model of Kabuki Syndrome

Poster Number 6

Joseph Bondy-Denomy
University of California, San Francisco

Multiple Mechanisms for CRISPR-Cas Inhibition by Anti-CRISPR Proteins

Poster Number 7

Ed Boyden
Massachusetts Institute of Technology

Expansion Microscopy: Toward Comprehensive *In Situ* Biomolecular Imaging

Poster Number 8

Arvin Dar
Icahn School of Medicine at Mount Sinai

A Small Molecule Mimic of the Kinase Suppressor of Ras Phenotype Antagonizes MAPK Complexes and Signaling

Poster Number 9

Dana C. Dolinoy
University of Michigan School of Public Health

Development of piRNAs for Target-Specific Methylation

Poster Number 10

Brian Feldman
Stanford University

Elucidating *In Vivo* Regulation of Adipocyte Stem Cell Activity

Poster Number 11

Brandon K. Fornwalt
Geisinger Health System

DNA Variants That Are Reported as Pathogenic for Arrhythmogenic Cardiomyopathy Are Highly Prevalent and Show Minimal Association with Heart Disease: A Study in 31,036 Participants Who Underwent Opportunistic Whole Exome Sequencing

Poster Number 12

Terence P. Gade
Penn Image-Guided Interventions Lab
University of Pennsylvania

Characterizing the Metabolic Stress Response in Hepatocellular Carcinoma Cells Surviving Severe Ischemia Using Dynamic Nuclear Polarization Carbon-13 MR Spectroscopy

Poster Number 13

Dylan G. Gee
Weill Cornell Medical College

Safety Signal Learning as a Novel Mechanism for Fear Reduction During Adolescence

Poster Number 14

Robert W. Gereau
Washington University School of Medicine in St. Louis

John A. Rogers
University of Illinois

Michael R. Bruchas
Washington University School of Medicine in St. Louis

Fully Implantable, Soft, Stretchable Optoelectronics Systems for Wireless Optogenetics

Poster Number 15

Matthew Greenblatt
Weill Cornell Medical College

Promoting Bone Formation Through the SHN3 Pathway

Poster Number 16

Robert Gregg
The University of Texas at Dallas
The University of Texas Southwestern Medical Center

High-Performance Control of Powered Prosthetic Legs with Human-Inspired Phase Variables

Poster Number 17

Randal Halfmann
Stowers Institute for Medical Research

Detection and Functional Characterization of Prion-Like Protein Self-Assembly

Poster Number 18

Songi Han
University of California, Santa Barbara

Decoding Water Dynamics and Interaction Landscape of Proteins

Poster Number 19

Scott B. Hansen
The Scripps Research Institute

A Molecular Basis for Force Transduction in the Cell Membrane

Poster Number 20

Amy E. Herr, Ph.D.
University of California, Berkeley

Next-Generation Targeted Proteomics Reaches Single-Cell Resolution

Poster Number 21

Bo Huang
University of California, San Francisco

Versatile Protein Tagging in Cells Using Split Fluorescent Protein

Poster Number 22

William Israelsen
The University of Texas Southwestern Medical Center

The Meadow Jumping Mouse: A Novel Hibernation Model

Poster Number 23

Sanjay K. Jain
Johns Hopkins University School of Medicine

Characterization of Matrix Metalloproteinases in Cavitary Lesions in a Tuberculosis Murine Model

Poster Number 24

Daniel Jarosz
Stanford University

Protein-Based Molecular Memories in Gene Regulation, Disease, and Development

Poster Number 25

Andrea M. Kasko
University of California, Los Angeles

Direct Gradient Photolithography of Photodegradable Hydrogels With Patterned Stiffness Control With Sub-Micron Resolution

Poster Number 26

Chenxiang Lin
Yale University

DNA-Origami Templated Membrane Structure and Dynamics

Poster Number 27

Leonard Lipovich
Wayne State University

Life, Death, and Function: The Primate-Specific Long Non-Coding RNA Transcriptome

Poster Number 28

Allen Liu
University of Michigan

Constructing Mechanosensitive Vesicles as Artificial Platelets

Poster Number 29

Sebastian Lourido
Whitehead Institute

Genome-Scale Screens for Toxoplasma Gene Function Using CRISPR/Cas9

Poster Number 30

Dmitry Lyumkis
Salk Institute for Biological Studies

Cryo-EM Reveals a Novel Octameric Integrase Structure for ß-retroviral Intasome Function

Poster Number 31

Brent Martin
University of Michigan

Multiscale Approaches to Map Oxidative Stress

Poster Number 32

Michael McAlpine
University of Minnesota

3-D Printed Nano-Bionic Organs

Poster Number 33

John D. Medaglia
University of Pennsylvania

The Foundations and Repair of Cognitive Control in Human Brain Networks

Poster Number 34

Aaron S. Meyer
Koch Institute for Integrative Cancer Research
Massachusetts Institute of Technology

RTK Bypass Resistance Requires Complementary Pathway Reactivation

Poster Number 35

Augusto C. Ochoa
Louisiana State University Health Sciences Center

Inhibition of Fatty Acid Oxidation Modulates Immunosuppressive Functions of Myeloid-Derived Suppressor Cells and Enhances Cancer Therapies

Poster Number 36

Brian M. Paegel
The Scripps Research Institute

Next-Generation Drug Discovery

Poster Number 37

Amanda Randles
Duke University

A Massively Parallel Model of Hemodynamics in the Human Circulatory System

Poster Number 38

Alex K. Shalek
Ragon Institute of MGH, MIT and Harvad
Broad Institute of MIT and Harvard
Massachusetts Institute of Technology

“Bottom-Up” Profiling of Interacting Cellular Systems

Poster Number 39

Matthew D. Simon
Chemical Biology Institute
Yale University

Tracking RNA Populations Using Efficient and Reversible Covalent Chemistry

Poster Number 40

Stephen J. Smith
Allen Institute for Brain Science
Randal Burns
Johns Hopkins University

Synaptomes of Mouse and Man: High-Throughput Array Tomography Methods for Cortical Synapse Taxonomy

Poster Number 41

Lin Tian
University of California, Davis

Fluorescent Biosensors for Imaging Neurotransmitters: Observing Synapses in Action

Poster Number 42

Jessica L. Whited
Brigham and Women's Hospital
Harvard Medical School

Elucidating Mechanisms of Vertebrate Limb Regeneration

Poster Number 43

Lili Yang
University of California, Los Angeles

Genetic Engineering of Hematopoietic Stem Cells to Generate Invariant Natural Killer T Cells

Poster Number 44

Qi Zhang
Vanderbilt University

Graphene as a Novel Tool for Cell Membrane Manipulation and Regulation of Neurotransmission

2015 Awardees

Pioneer Awardees

Giovanni Bosco, Ph.D.
Dartmouth Geisel School of Medicine

Trans-Generational Effects of Social Learning?

Jeffery S. Cox, Ph.D.
University of California, San Francisco

Host-Directed Strategies to Create Synergistic Antibacterial Therapies

Matthew David Disney, Ph.D.
The Scripps Research Institute

Using a Disease-Affected Cell to Synthesize Its Own Drug

Zemer Gitai, Ph.D.
Princeton University

Mechano-Microbiology: How Physical Forces Control Bacterial-Host Interactions

Jonathon Howard, Ph.D.
Yale University

Cell Biological Limitations Constrain Dendritic Branching Morphology and Neuronal Function

Craig Montell, Ph.D.
University of California, Santa Barbara

Creation of a New Generation of Transgenic Mosquitoes to Control Infectious Disease

Coleen T. Murphy, Ph.D.
Princeton University

Toward the Tissue-ome: A Map of the *C. elegans* Cell-Specific Transcriptome

Gwendalyn J. Randolph, Ph.D.
Washington University School of Medicine in St. Louis

Integrating Cell and Lipoprotein Trafficking with Vascular Biology in Human IBD

Steven J. Schiff, M.D., Ph.D
The Pennsylvania State University

Control of the Neonatal Septisome and Hydrocephalus in Sub-Saharan Africa

Hao Wu, Ph.D.
Boston Children's Hospital
Harvard Medical School

SMOCs: Novel Signal Transduction Complexes as New Targets for Drug Discovery

Tony Wyss-Coray, Ph.D.
Stanford University School of Medicine
VA Palo Alto Health Care System

A Bio-orthogonal Approach to Study Mammalian Aging

Ryohei Yasuda, Ph.D.
Max Planck Florida Institute for Neuroscience

Deciphering Biochemical Networks in Single Dendritic Spines

Sheng Zhong, Ph.D.
University of California, San Diego

Mapping RNA Interactomes by Sequencing

New Innovator Awardees

Alexander Barnes, Ph.D.
Washington University in St. Louis

High-Sensitivity NMR at Room Temperature for Molecular Structure and Dynamics

Artem Barski, Ph.D.
Cincinnati Children's Hospital Medical Center
University of Cincinnati
Direct Epigenetic Reprogramming of T Cells

Sanjay Basu, M.D., Ph.D.
Stanford University

Cohort Filtering Models to Identify Social Program Effects on Health Disparities

Eric J. Bennett, Ph.D.
University of California, San Diego

Manipulating Protein Homeostasis Through Specialized Quality Control Ribosomes

Brenda L. Bloodgood, Ph.D.
University of California, San Diego

Charting a New Path for Rapid Signaling from the Synapse to the Nucleus

Gloria A. Brar, Ph.D.
University of California, Berkeley

Dissecting the Roles of Pervasive Short ORFs in Meiosis

Francesca Cole, Ph.D.
The University of Texas MD Anderson Cancer Center

Mechanistic Derivation of Germ Line Mutation by Genome-Wide Mouse Tetrad Analysis

Mohamed S. Abou Donia, Ph.D.
Princeton University

Uncultivated Bacterial Symbionts of Humans: an Untapped Resource for Drug Discovery

Sophie Dumont, Ph.D.
University of California, San Francisco

Rewiring Cellular Architecture to Probe Mechanical Signal Processing at Kinetochores

Jessica Feldman, Ph.D.
Stanford University

Mechanisms Controlling Microtubule Organization During Cell Differentiation

Liang Feng, Ph.D.
Stanford University

Molecular Mechanism and Novel Therapeutic Strategy in Alzheimer's Disease

Karunesh Ganguly, M.D., Ph.D.
University of California, San Francisco
San Francisco VA Medical Center

Neuroprosthetic Control of an Anthropomorphic Exoskeleton in Tetraplegics

Marc Gershow, Ph.D.
New York University

Dissecting Olfactory Decision Making Using Optical Neurophysiology

Kamil Godula, Ph.D.
University of California, San Diego

In Vivo Glycan Engineering at the Cell-Matrix Interface to Control Stem Cell Fate

Jesse H. Goldberg, M.D., Ph.D.
Cornell University

Identifying Pathways for Motor Variability in the Mammalian Brain

Juliana Idoyaga, Ph.D.
Stanford University

Harnessing Human Dendritic Cell Subsets for the Design of Novel Immunotherapies

Daniel Jarosz, Ph.D.
Stanford University

Protein-Based Molecular Memories in Gene Regulation, Disease, and Development

Jakob D. Jensen, Ph.D.
University of Utah

Communal Feedback as an Innovative Alternative to Skin Self-Exam

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Transforming Our Understanding of Eukaryotic Gene Functions Through Chemical Genetics in the Green Alga *Chlamydomonas reinhardtii*

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Rewiring of the Human Protein Homeostasis Network in Normal and Disease Contexts

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Sequencing Neural Circuits Controlling Thermoregulation

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Stretchable, Biodegradable, and Self-Healing Semiconductors for Wearable and Implantable Sensors

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A High-Throughput Continuous Evolution System for *In Vivo* Biosensor Engineering

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A Novel Intervention to Make Heuristics a Source of Power for Physicians

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Structural Dynamics of Single Ebolavirus GP Molecules

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Mechanobiology of the Cellular Glycocalyx

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Engineering 3-D Epigenome Topology with Light

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Mosquitoes Meet Microfluidics: Novel Tools for Ecological Surveillance of Insect-Borne Disease

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Spinal Cord Neural Interface for Neuroprosthetics in a Primate Model

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Feinberg School of Medicine, Northwestern University

Novel Circuit Mapping Strategies to Reverse Engineer the Retina

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Development of Combination Immunotherapies for Atherosclerotic Inflammation

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Princeton University

Implementing Innovative Approaches to Access the Hidden Metabolomes of Bacteria

Alex K. Shalek, Ph.D.
Ragon Institute of MGH, MIT and Harvard
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Bottom-Up Profiling of Interacting Cellular Systems

Matthew D. Shoulders, Ph.D.
Massachusetts Institute of Technology

Continuous Directed Evolution of Biomolecules in Human Cells for Medical Research

Robert C. Spitale, Ph.D.
University of California, Irvine

Cracking the RNA Localization Code

Cole Trapnell, Ph.D.
University of Washington

Charting the Regulatory Topography of the Cell Differentiation Landscape With Single-Cell RNA-Seq

Marmar Vaseghi, M.D., M.S.
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Cardiac Afferent Neurotransmission and Modulation of Ventricular Parasympathetic Control

Melissa R. Warden, Ph.D.
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Imaging the Evolving Neural Circuit Dynamics of Depression

Jessica L. Whited, Ph.D.
Harvard Medical School
Brigham and Women's Hospital

Leveraging Single-Cell Analysis to Elucidate Mechanisms of Vertebrate Limb Regeneration

Min Yu, M.D., Ph.D.
University of Southern California

Developing Individualized Medicine Targeting Metastatic Breast Cancer Stem Cells

Wenjun Zhang, Ph.D.
University of California, Berkeley

In Situ Natural Product Labeling and Applications

Transformative Research Awardees

Nancy Allbritton, M.D., Ph.D.
University of North Carolina
North Carolina State University

Development of Human Intestinal Simulacra

Ramsey D. Badawi, Ph.D.
University of California, Davis

EXPLORER: Changing the Molecular Imaging Paradigm with Total Body PET

Thomas H. Barker, Ph.D.
Georgia Institute of Technology

Mechanosensors That Detect and Treat Lung Fibrosis

Scott Bultman, Ph.D.
University of North Carolina School of Medicine

Development of Human Intestinal Simulacra

Simon R. Cherry, Ph.D.
University of California, Davis

EXPLORER: Changing the Molecular Imaging Paradigm with Total Body PET

Dana C. Dolinoy, M.Sc., Ph.D.
University of Michigan School of Public Health

Development of piRNAs for Target-Specific Methylation

Shawn M. Gomez, Eng.Sc.D.
University of North Carolina at Chapel Hill
North Carolina State University

Development of Human Intestinal Simulacra

Martin W. Hetzer, Ph.D.
Salk Institute for Biological Studies
The Role of Long-Lived Proteins in the Survival of Nerve Cells

Julie C. Dunning Hotopp, Ph.D.
University of Maryland School of Medicine

Extent and Significance of Bacterial DNA Integrations in the Human Cancer Genome

Scott T. Magness, Ph.D.
University of North Carolina at Chapel Hill

Development of Human Intestinal Simulacra

Edward S. Mocarski, Ph.D.
Emory University School of Medicine

Innate Activation and Death Signals in Health and Disease

Saeed Tavazoie, Ph.D.
Columbia University

Massively Parallel Mapping of All Molecular Interactions in a Single Tube

Feng Zhang, Ph.D.
Broad Institute of MIT and Harvard

Massively Parallel Functional Interrogation of Psychiatric Genetics

Early Independence Awardees

Joseph Bondy-Denomy, Ph.D.
University of California, San Francisco

Discovering New Roles for CRISPR-Cas in Bacterial Pathogenesis

Marie A. Bragg, Ph.D.
New York University

Impact of Racially Targeted Food and Beverage Ads on Adolescent Behavior

Shadmehr Demehri, M.D., Ph.D.
Massachusetts General Hospital

The Mechanism of TSLP Anti-Tumor Effects in the Skin

Terence P. Gade, M.D., Ph.D.
Perelman School of Medicine, University of Pennsylvania

Image-Based Phenotyping of Hepatocellular Carcinoma Cell Survival Under Ischemic Stress: Toward Metabolic Imaging of Cancer Dormancy Using Hyperpolarized Carbon-13 Technology

Dylan G. Gee, Ph.D.
Weill Cornell Medical College
Yale University

Novel Mechanisms of Fear Reduction Targeting the Biological State of the Developing Brain

Matthew B. Greenblatt, M.D., Ph.D.
Weill Cornell Medical College

Modulation of Bone Formation by SHN3

Elaine L. Hill, Ph.D.
University of Rochester School of Medicine

The Health Consequences of Shale Gas Development

Patrick David Hsu, Ph.D.
Salk Institute for Biological Studies

Eukaryotic Transcriptome Engineering via Sequence-Specific Regulation of Endogenous RNA

William J. Israelsen, Ph.D.
The University of Texas Southwestern Medical Center

Development and Use of a Novel, Tractable Rodent Model for Studies of Hibernation Metabolism

Andrew C. Kruse, Ph.D.
Harvard Medical School

Molecular Mechanisms of Adiponectin Signaling and PAQR Function

Dmitry Lyumkis, Ph.D.
Salk Institute for Biological Studies

Breaking Barriers in Structural Biology: Novel CryoEM Methods and Applications

John D. Medaglia, Ph.D.
University of Pennsylvania

Dynamic Network Neuroscience and Control Theory: Toward Interventions for Cognitive Control Dysfunction

Jason Sheltzer, Ph.D.
Cold Spring Harbor Laboratory

Identification and Characterization of Genomic Features Affecting Survival Duration in Cancer

David A. Solomon, M.D., Ph.D.
University of California, San Francisco

Cohesin Gene Mutations in Tumorigenesis

Adam M. Sonabend, M.D.
Herbert Irving Comprehensive Cancer Center
Columbia University College of Physicians and Surgeons

TOP2A Effects on Transcription in Gliomas: Implications for Personalized Therapy

Zhao Zhang, Ph.D.
Carnegie Institution for Science

Somatic Transposition-Mediated Genome Variegation During Development, Disease and Aging Conditions

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