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

NIH Common Fund

2016 High-Risk, High-Reward Research Symposium

Program Book

NIH DIRECTOR'S PIONEER AWARD

NIH DIRECTOR'S NEW INNOVATOR AWARD

NIH DIRECTOR'S TRANSFORMATIVE RESEARCH AWARD

NIH DIRECTOR'S EARLY INDEPENDENCE AWARD

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

December 5–7, 2016

Program Description

The NIH Common Fund, in the Office of the Director, supports programs that address key roadblocks in biomedical research impeding basic scientific discovery and its translation into improved human health. Common Fund programs are designed to have broad impact, be catalytic, and tackle challenges that no other entity, including individual NIH Institutes, will be likely or able to do. Currently, 27 different Common Fund programs span the broad mission of NIH. More information is available at commonfund.nih.gov.

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

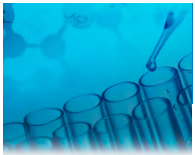
Pioneer Award: Supports individual scientists of exceptional creativity at any career stage who propose bold approaches to address major challenges in biomedical and behavioral research.

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

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: Provides a mechanism for outstanding early career scientists to move rapidly into independent research positions, bypassing the traditional postdoctoral training period.

Agenda



Monday, December 5, 2016

9:00 a.m. **Francis Collins,** Director, NIH (pending)

Opening Remarks and Announcement of 2016 High-Risk, High-Reward Research Program Awardees

9:15 a.m. **James Anderson,** Director, Division of Program Coordination, Planning, and Strategic Initiatives (DPCPSI), Office of the Director, NIH

Opening Remarks

Session 1

9:30 a.m. **Andreas Tolias** (Baylor College of Medicine; Pioneer Awardee; National Eye Institute*#$)

The Fabric of the Neocortex: Canonical Structure and Computations

9:50 a.m. **Ken Solt** (presenting), **Edward Boyden, Emery Brown,** and **Matthew Wilson** (Massachusetts Institute of Technology; Transformative Research Awardees; National Institute of General Medical Sciences*#)

Redesigning Recovery From General Anesthesia

10:10 a.m. **Alan Anticevic** (Yale University; Early Independence Awardee; National Institute of Dental and Craniofacial Research#)

Developing Mechanistically Informed Neuroimaging Markers for Mental Illness via Pharmacology and Computation

10:30 a.m. Break

NIH Institutes are designated by program responsibilities (*), grants management responsibilities (#), and/or award co-funding ($) [excludes the Office of the Director].

Session 2

10:50 a.m. **Christina Smolke** (Stanford University; Pioneer Awardee; National Center for Complementary and Integrative Health*#$)

Synthetic Biology Platforms for Natural Product Biosynthesis and Discovery

11:10 a.m. **Leor Weinberger** (University of California, San Francisco; Pioneer Awardee; National Institute of Dental and Craniofacial Research*#$)

A Hardwired HIV Latency Program

11:30 a.m. **Daniela Witten** (University of Washington; Early Independence Awardee; National Institute of Dental and Craniofacial Research#)

Learning From Time

11:50 a.m. Photo Shoots for Awardees (all years)

12:20 p.m. Lunch (on your own)

Session 3

1:50 p.m. **Stephen Aller** (University of Alabama at Birmingham; New Innovator Awardee; National Institute of General Medical Sciences*#)

Structure of Human Membrane Transporters by Cryo-EM and X-Ray Crystallography

2:10 p.m. **James Fraser** (University of California, San Francisco; Early Independence Awardee; National Institute of Dental and Craniofacial Research#)

The Impact of Mutation on the Function, Conformations, and Recognition of Ubiquitin

2:30 p.m. **Songi Han** (University of California, Santa Barbara; New Innovator Awardee; National Institute of General Medical Sciences*#)

Signature of an Aggregation-Prone Conformation of Tau

NIH Institutes are designated by program responsibilities (*), grants management responsibilities (#), and/or award co-funding ($) [excludes the Office of the Director].

2:50 p.m. **Brian Paegel** (The Scripps Research Institute; New Innovator Awardee; National Institute of General Medical Sciences*#)

Finches and Seeds, Proteases and Beads: Evolution of New Protease Tools for High-Throughput Post-Translational Modification Mapping

Poster Session 1

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

Early Independence Award Session

5:00 p.m. Closed Session

Tuesday, December 6, 2016

Session 4

8:30 a.m. **Ravi Basavappa,** Office of Strategic Coordination, DPCPSI, Office of the Director, NIH

High-Risk, High-Reward Research Program Updates

8:40 a.m. **Helen Blau** (Stanford University; Transformative Research Awardee; National Institute of Arthritis and Musculoskeletal and Skin Diseases*#)

Telomere Extension Using Nucleoside-Modified mRNA as a Novel Therapeutic

9:00 a.m. **Anne Brunet** (Stanford University; Pioneer Awardee; National Institute on Aging*#$)

Understanding and Modeling Aging

9:20 a.m. **P. Duc Si Dong** (Sanford Burnham Prebys Medical Discovery Institute; New Innovator Awardee; National Institute of Diabetes and Digestive and Kidney Diseases*#$)

Direct *In Vivo* Lineage Reprogramming Without Limits

9:40 a.m. **Christoph Lepper** (Carnegie Institution for Science; Early Independence Awardee; National Institute of Dental and Craniofacial Research#)

Muscle Fiber Signaling Scales the Myogenic Stem Cell Pool

10:00 a.m. Break

NIH Institutes are designated by program responsibilities (*), grants management responsibilities (#), and/or award co-funding ($) [excludes the Office of the Director].

Session 5

10:20 a.m. **Brenda Bass** (University of Utah; Pioneer Awardee; National Institute on Aging*#)

Understanding Self Versus Non-Self: Is That My Double-Stranded RNA or Yours?

10:40 a.m. **Uttiya Basu** (Columbia University; New Innovator Awardee; National Institute of General Medical Sciences*#)

Mechanism of Strand-Specific DNA Mutagenesis During Antibody Gene Diversification

11:00 a.m. **Harvinder Singh Gill** (Texas Tech University; New Innovator Awardee; *Eunice Kennedy Shriver* National Institute of Child Health and Human Development*#)

Pollen Grains as Trojan Horses for Oral Vaccination

11:20 a.m. **Thomas Kupper** (presenting) and **Rachael Clark** (Harvard Medical School/Brigham and Women's Hospital; Transformative Research Awardees; National Institute of Allergy and Infectious Diseases*#$)

Vaccination to Generate Protective Tissue Resident Memory T Cells

11:40 a.m. **Thanos Siapas** (California Institute of Technology; Pioneer Awardee; National Institute of Mental Health*#)

Nanofabricated Neural Probes for Dense 3D Recordings of Brain Activity

12:00 p.m. Lunch (on your own)

Session 6

1:30 p.m. **Wei Min** (Columbia University; New Innovator Awardee; National Institute of Biomedical Imaging and Bioengineering*#)

Live-Cell Bioorthogonal Chemical Imaging for Biomedicine

1:50 p.m. **Alexandros Pertsinidis** (Memorial Sloan Kettering Cancer Center; New Innovator Awardee; National Institute of General Medical Sciences*#)

Visualizing Mechanisms of mRNA Transcription Regulation at the Single-Molecule Level

NIH Institutes are designated by program responsibilities (*), grants management responsibilities (#), and/or award co-funding ($) [excludes the Office of the Director].

2:10 p.m. **Ozgur Sahin** (Columbia University; New Innovator Awardee; National Institute of Biomedical Imaging and Bioengineering*#)

Mechanical Super-Resolution: Imaging Structure, Chemistry, Forces, and Voltage Across Biomolecules and Cells

2:30 p.m. **Ting (C.-ting) Wu** (Harvard Medical School; Pioneer Awardee; National Institute of General Medical Sciences*#)

Technologies for Visualizing the Genome

Poster Session 2

2:50 p.m. Natcher Conference Center, Upstairs Atrium

Wednesday, December 7, 2016

Session 7

8:30 a.m. **Debra Auguste** (Northeastern University; New Innovator Awardee; National Cancer Institute*#)

Engineering Targeted Therapeutics for Breast Cancer

8:50 a.m. **Trever Bivona** (University of California, San Francisco; New Innovator Awardee; National Cancer Institute*#$)

Next-Generation Rational Anti-Cancer Polytherapies

9:10 a.m. **Laura A. Johnson** (University of Pennsylvania; New Innovator Awardee; National Cancer Institute*#)

Gene-Engineered CAR T-Cells: A Platform for Treating Cancer

9:30 a.m. **Jeff Gore** (Massachusetts Institute of Technology; New Innovator Awardee; National Institute on Aging*#)

Understanding Tipping Points in Biology

9:50 a.m. **Pardis Sabeti** (Harvard University; New Innovator Awardee; National Institute of General Medical Sciences*#)

Genomic Surveillance of Microbial Threat

10:10 a.m. Break

NIH Institutes are designated by program responsibilities (*), grants management responsibilities (#), and/or award co-funding ($) [excludes the Office of the Director].

Session 8

10:30 a.m. **Sebastian Lourido** (Whitehead Institute for Biomedical Research; Early Independence Awardee; National Institute of Dental and Craniofacial Research[#])

Genome-Wide Approaches to Characterize Apicomplexan Parasitism

10:50 a.m. **Baljit Khakh** (University of California, Los Angeles; Pioneer Awardee; National Institute of Mental Health[*#$]; National Institute of Neurological Disorders and Stroke[$])

Astrocytes and Neural Circuits: Signaling, Function, Dynamics, and Diversity

11:10 a.m. **Long Cai** (California Institute of Technology; New Innovator Awardee; National Institute of General Medical Sciences[*#])

In Situ Transcription Profiling of Single Cells Reveals Spatial Organization of Cells in the Mouse Hippocampus

11:30 a.m. **Rafael Yuste** (Columbia University; Pioneer Awardee; National Eye Institute[*#$])

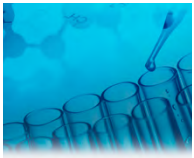
The Brain Activity Map of *Hydra vulgaris*

11:50 a.m. Closing Remarks

11:55 a.m. Adjournment

NIH Institutes are designated by program responsibilities (*), grants management responsibilities (#), and/or award co-funding ($) [excludes the Office of the Director].

Poster Sessions



Monday, December 5, 2016

Poster Number 1
Jennifer Ahern
University of California, Berkeley

Novel Study Designs to Leverage Large-Scale Population Health Data to Quantify Health Impacts of Policies and Programs

Poster Number 2
Nancy Allbritton
The University of North Carolina at Chapel Hill

Development of Human Intestinal Simulacra

Poster Number 3
Christopher Allen
University of California, San Francisco

The Initiation of Allergic Inflammatory Responses in the Lung

Poster Number 4
Gregory Alushin
National Heart, Lung, and Blood Institute
National Institutes of Health

Cytoskeletal Structural Plasticity in Force-Generation and Mechanosensation: A Case Study of the Myosin VI Motor Protein

Poster Number 5
Yimon Aye
Weill Cornell Medical College

Targeting Privileged First Responders in Isozyme-Specific Redox Response

Poster Number 6
Ramsey Badawi
University of California, Davis

EXPLORER: Changing the Molecular Imaging Paradigm with Total Body PET

Poster Number 7
Mona Batish
Rutgers University

Transcriptional Regulation of STEAP1 in Ewing's Sarcoma

Poster Number 8
Roberto Bonasio
University of Pennsylvania

Epigenetic Regulation of Social Behavior in Ants

Poster Number 9
Meg Bruening
Arizona State University

Validating the DevilSPARC Mobile-Ecological Momentary Assessment App for Eating and Physical Activity Behaviors

Poster Number 10
Hannah Carter
University of California, San Diego

Germline Immune Variation Restricts the Cancer Mutational Landscape

Poster Number 11
Francesca Cole
The University of Texas MD Anderson Cancer Center

Why Juvenile Spermatocytes Have Chromosome Segregation Errors—Programmed Suppression of Two DNA Repair Pathways Is Required for Crossover Assurance

Poster Number 12
Jeffery Cox
University of California, Berkeley

Host-Directed Strategies to Create Synergistic Antibacterial Therapies

Poster Number 13
Adam de la Zerda
Stanford University

MOZART: High-Resolution Optical Molecular Imaging System for Medical and Functional Biological Applications

Poster Number 14
Les Dethlefson
Stanford University

Predicting Resilience in the Human Microbiome

Poster Number 15
Christopher Faulk
University of Michigan

Development of piRNAs for Target-Specific DNA Methylation

Poster Number 16
Kamil Godula
University of California, San Diego

Controlling Cellular Fate Through Glycan Engineering

Poster Number 17
Daniel Heller
Memorial Sloan Kettering Cancer Center
Weill Cornell Medical College

Targeting Personalized Nanomedicines to the Tumor Microenvironment

Poster Number 18
Nicholas Ingolia
Carnegie Institution
University of California, Berkeley

An Unbiased Survey of mRNA Regulators

Poster Number 19
Michelle Janelsins
University of Rochester

Clinical and Translational Approaches to Cognitive Impairments in Breast Cancer

Poster Number 20
Martin Jonikas
Princeton University

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

Poster Number 21
Robert L. Judson
University of California, San Francisco

CRISPR/Cas9-Mediated Engineering of Clinically Relevant Mutations into the Endogenous Loci of Primary Human Melanocytes Reveals Novel Roles for BRAF and CDKN2A During Melanoma Progression

Poster Number 22
Arthur Laganowsky
Texas A&M University

Ion Mobility Mass Spectrometry of Intact Membrane Protein-Lipid Complexes

Poster Number 23
Chenxiang Lin
Yale University School of Medicine

DNA-Origami Templated Membrane Structure and Dynamics

Poster Number 24
Meena Madhur
Vanderbilt University Medical Center

Immunophenotyping of Human Hypertension Using Single-Cell Multiplex Mass Cytometry to Identify Novel Therapeutic Targets

Poster Number 25
Michael McAlpine
University of Minnesota

3D-Printed Nano-Bionic Organs

Poster Number 26
Eric J. Nelson
Stanford University
University of Florida

If John Snow Had a Smart Phone: Evaluation of a Decision-Support Tool for Diarrheal Disease Outbreak Management

Poster Number 27
Christian Petersen
Northwestern University

Cell Signaling in Control of Regenerative Growth

Poster Number 28
Jeremy Purvis
The University of North Carolina at Chapel Hill

Dynamics of OCT4 Signaling in Human Embryonic Stem Cells

Poster Number 29
Amanda Randles
Duke University

Computing the Ankle-Brachial Index With Computational Fluid Dynamics

Poster Number 30
Rajat Rohatgi
Stanford University School of Medicine

Comparative Genetic Screens in Human Cells Reveal New Regulatory Mechanisms in WNT Signaling

Poster Number 31
Gregory Schwartz
Northwestern University

Circuit Mechanism of a Novel Retinal Ganglion Cell With Non-Canonical Receptive Field Structure

Poster Number 32
Adam Sonabend
Columbia University Herbert Irving Comprehensive Cancer Center

Modulation of PDGFRA and IDH1 Oncogenes by TOP2 Is Associated With Its Promoter Localization in Gliomas

Poster Number 33
Christa Van Dort
Massachusetts General Hospital
Massachusetts Institute of Technology

Optogenetic Activation of Cholinergic Neurons in the PPT or LDT Induces REM Sleep

Poster Number 34
Ting (C.-ting) Wu
Harvard Medical School

Culling the Human Genome of Disease Variants Using Ultraconserved Elements

Poster Number 35
Lili Yang
University of California, Los Angeles

Propagating Humanized BLT Mice for the Study of Human Immunology and Immunotherapy

Poster Number 36
John Zhang
Dartmouth College

Implantable Cardiac Power Generation Using Flexible 3D Porous Thin Films

Poster Number 37
Richard White
Memorial Sloan Kettering Cancer Center

Adipocytes in the Melanoma Microenvironment

Tuesday, December 6, 2016

Poster Number 1
Amir Al-Khami
Louisiana State University Health Sciences Center

Exogenous Lipid Uptake Induces Metabolic and Functional Reprogramming in Cancer-Associated Myeloid-Derived Suppressor Cells

Poster Number 2
Manish Arora
Icahn School of Medicine at Mount Sinai

Biologic Hard Drives to Reconstruct the Prenatal and Early Childhood Environment

Poster Number 3
Alexander Barnes
Washington University in St. Louis

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

Poster Number 4
Artem Barski
Cincinnati Children's Hospital

Epigenomics of T Cell Activation and T Cell Memory

Poster Number 5
Elika Bergelson
Duke University

Effects of Home Environment and Semantic Structure on Early Lexical Development

Poster Number 6
Joseph Bondy-Denomy
University of California, San Francisco

Inhibition of CRISPR-Cas9 with Bacteriophage Proteins

Poster Number 7
Erin Carlson
University of Minnesota

Activity-Based Probes for Selective Imaging of an Essential PBP in *Streptococcus pneumoniae*

Poster Number 8
Yvonne Chen
University of California, Los Angeles

Combating Antigen Escape With CD19/CD20 Bispecific CAR-T Cell Therapy

Poster Number 9
Brandon DeKosky
Vaccine Research Center
National Institute of Allergy and Infectious Diseases
National Institutes of Health
University of Kansas

High-Resolution Profiling of Anti-HIV Immune Responses Using Paired Antibody Heavy and Light Chain Sequencing

Poster Number 10
Aaron Esser-Kahn
University of California, Irvine

Chemical Biology Approaches to Controlling and Understanding the Innate Immune System

Poster Number 11
Sunil Gandhi
University of California, Irvine

Restoring High-Acuity Vision Using Inhibitory Neuron Transplantation

Poster Number 12
Alexander Gimelbrant
Harvard Medical School

Autosomal Monoallelic Expression as a Mechanism of Variation Between Individuals

Poster Number 13
Chenghua Gu
Harvard Medical School

New Tools for Understanding the Blood-Brain Barrier

Poster Number 14
Thomas Hartung
Johns Hopkins University

Mapping the Human Toxome by Systems Toxicology

Poster Number 15
William Israelsen
The University of Texas Southwestern Medical Center

Hibernation: Insights From Comparative Genomics of *Zapus* Species

Poster Number 16
Daniel Jarosz
Stanford University

Intrinsically Disordered Proteins Drive the Emergence and Inheritance of Biological Traits

Poster Number 17
Rahul Kohli
Perelman School of Medicine, University of Pennsylvania

Targeting the SOS Pathway to Combat the Evolution of Antibiotic Resistance

Poster Number 18
Cecília Leal
University of Illinois at Urbana-Champaign

A New Paradigm in Nanomedicine: Can Structural Interiors of Nanoparticles Regulate Cellular Delivery?

Poster Number 19
Eric Lieberman Greer
Harvard Medical School
Children's Hospital Boston

DNA Methylation on N6 Adenine

Poster Number 20
Darren Lipomi
University of California, San Diego

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

Poster Number 21
Brent Martin
University of Michigan

Probing Cysteine Posttranslational Modifications

Poster Number 22
Monica Mugnier
Johns Hopkins University

Variant Surface Glycoprotein Expression and Diversification in the Protozoan Parasite *Trypanosoma brucei*

Poster Number 23
Hidde Ploegh
Whitehead Institute for Biomedical Research

A New Strategy to Disrupt Protein-Protein Interactions in Eukaryotic Cells

Poster Number 24
Yakeel Quiroz
Massachusetts General Hospital

Amyloid Beta Deposition Precedes Tau Tangle Formation in Autosomal-Dominant Alzheimer's Disease

Poster Number 25
Jesse Rodriguez
University of Pennsylvania

Rational Design of Cytomegalovirus-Specific Chimeric Antigen Receptor T Cells for the Treatment of Glioblastoma Multiforme

Poster Number 26
Alex Shalek
Massachusetts Institute of Technology

"Bottom-Up" Profiling of Interacting Cellular Systems

Poster Number 27
Jason Sheltzer
Cold Spring Harbor Laboratory

Tumor-Suppressive Effects of Aneuploidy

Poster Number 28
Nikolai Slavov
Northeastern University

Differential Stoichiometry Among Core Ribosomal Proteins

Poster Number 29
Norman Taylor
Massachusetts General Hospital
Massachusetts Institute of Technology

The Analgesic Effects of Periaqueductal Gray Dopamine Neurons

Poster Number 30
Bozhi Tian
The University of Chicago

Subcellular-Scale Silicon for Bioelectric Interfaces

Poster Number 31
Alexander Urban
Stanford University

Large Copy Number Variants in the Human Genome Are Associated With Common Psychiatric Disorders and Can Be Analyzed on the Molecular Level in Neuronal Models Based on Induced Pluripotent Stem Cells

Poster Number 32
Joshua Vogelstein
Johns Hopkins University

NeuroData Synaptone Project: Toward an AT-Based Platform for Single-Synapse Analysis of Diverse CNS Synapse Populations

Poster Number 33
Leo Wan
Rensselaer Polytechnic Institute

Chiral Traction Forces Observed on 2D Geometrically Defined Surfaces

Poster Number 34
Jessica Whited
Harvard Medical School
Brigham and Women's Hospital

Identifying Roadblocks to Regeneration by Repeat Deployment of the Limb Regeneration Program

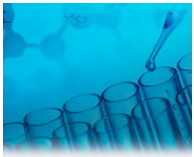
Poster Number 35
Kevin Yackle
University of California, San Francisco

Cellular and Molecular Characterization of the Breathing Pacemaker

Poster Number 36
Weian Zhao
University of California, Irvine

Mechano-Responsive Stem Cells to Target Cancer Metastases Through Biophysical Cues

2016 Awardees



NIH Director's Pioneer Awardees

Kristin Baldwin, Ph.D.
The Scripps Research Institute

Defining a Transcriptional Periodic Table of the Human Brain Using Reprogramming

Bradley Bernstein, M.D., Ph.D.
Broad Institute of MIT and Harvard
Massachusetts General Hospital

Epigenetic Plasticity in Tumor Initiation and Evolution

Michael Fischbach, Ph.D.
University of California, San Francisco

A Complete Map of the Top 100 Molecules From the Gut Microbiome

Uri Hasson, Ph.D.
Princeton University

Speaker-Listener Coupling: A Novel Neural Approach for Assessing Communication

Juan Carlos Izpisua Belmonte, Ph.D.
The Salk Institute for Biological Studies

Generation of Functional Human Organs and Tissues Using Interspecific Blastocyst Complementation

Nancy Kanwisher, Ph.D.
Massachusetts Institute of Technology

How Does the Functional Organization of the Human Brain Arise in Development?

Stephen D. Liberles, Ph.D.
Harvard Medical School

Sensory Receptors of the Vagus Nerve

Christine Mayr, M.D., Ph.D.
Memorial Sloan Kettering Cancer Center

3'UTR-Mediated Protein-Protein Interactions Determine Protein Functions

Joshua D. Rabinowitz, M.D., Ph.D.
Princeton University

Metabolism in Action: Quantitative Fluxes in Mammals

Meng Wang, Ph.D.
Baylor College of Medicine

Decode the Chemical Language That Orchestrates Cellular and Organismal Homeostasis

Sing Sing Way, M.D., Ph.D.
Cincinnati Children's Hospital

Immunological Identity Redefined by Genetically Foreign Microchimeric Cells

Seok-Hyun "Andy" Yun, Ph.D.
Harvard Medical School
Massachusetts General Hospital

Massive Wavelength-Division Multiplexing and Imaging With Laser Particles

NIH Director's New Innovator Awardees

Bassem Al-Sady, Ph.D.
University of California, San Francisco

Reconstructing Dynamic Epigenetic Genome Partitioning in Single Stem Cells

Jason R. Andrews, M.D., S.M.
Stanford University

Congregate Air Sampling for Population-Based Detection of Tuberculosis

Effie Apostolou, Ph.D.
Weill Cornell Medical College

Defining the Role of Chromatin Architecture in Cell Fate Inheritance

Daniel E. Bauer, M.D., Ph.D.
Dana-Farber/Boston Children's Cancer and Blood Disorders Center
Harvard Medical School

High-Throughput Discovery of Essential Noncoding Sequences for Erythropoiesis

Sean Bendall, Ph.D.
Stanford University School of Medicine

Origins of Human Blood Lineages in Regenerative Medicine

Parijat Bhatnagar, Ph.D.
SRI International

Self-Assembled Therapeutics With Spatiotemporal Resolution

Stephen Brohawn, Ph.D.
University of California, Berkeley

New Approaches to Understanding Biological Force Sensation

Irene A. Chen, M.D., Ph.D.
University of California, Santa Barbara

Understanding How Bacteriophages Affect Wound Ecologies and Developing New Tools to Harness Bacteria-Phage Interactions

Isaac Chiu, Ph.D.
Harvard Medical School

Sensory Neuron-Bacteria Interactions in Modulating Pain and the Host Microbiota

Kwanghun Chung, Ph.D.
Massachusetts Institute of Technology

Proteome-Driven Holistic Reconstruction of Organ-Wide Multi-Scale Networks

Forrest W. Crawford, Ph.D.
Yale School of Public Health

Network-Based Epidemiology for Hidden and Hard-to-Reach Populations

Alia Crum, Ph.D.
Stanford University

Harnessing Mindset in 21st Century Health Care

Monica Dus, Ph.D.
University of Michigan

The Role of Neuroepigenetics in Bidirectional Behavioral States

Elizabeth S. Egan, M.D., Ph.D.
Stanford University School of Medicine

Identifying Critical Erythrocyte Host Factors for *Plasmodium falciparum* Malaria

Polly Fordyce, Ph.D.
Stanford University

Leveraging Spectral Encoding for High-Dimensional Biological Multiplexing

Eric Lieberman Greer, Ph.D.
Boston Children's Hospital
Harvard Medical School

Characterization of DNA N6-Methyl Adenine and Its Role in Epigenetic Memory

Shangqin Guo, Ph.D.
Yale University

Molecular Definition of Cancer Cell-of-Origin

Sue Hammoud, Ph.D.
University of Michigan

Contributions of Sperm Chromatin to Development: A Myth or Reality?

Jesse V. Jokerst, Ph.D.
University of California, San Diego

Therapeutic Drug Monitoring With a Wearable Ultrasound-Based Sensor

Ahmad S. Khalil, Ph.D.
Boston University

Combating Antibiotic Resistance With Synthetic Biology Technologies

Sebastian Klinge, Ph.D.
The Rockefeller University

Trapping and Reconstituting Early Stages of Eukaryotic Ribosome Assembly

Amnon Koren, Ph.D.
Cornell University

Personal Mutational Landscapes Encoded in Our DNA

Joel Kralj, Ph.D.
University of Colorado Boulder

Neuronal Electromics in Health and Disease

Anshul Kundaje, Ph.D.
Stanford University

Deep Learning Frameworks for Regulatory Genomics

Gabe Kwong, Ph.D.
Georgia Institute of Technology
Emory University

Noninvasive and Predictive Biomarkers of Organ Transplant Rejection

Arthur Laganowsky, Ph.D.
Texas A&M University

Native Ion Mobility Mass Spectrometry Studies of Potassium Inward Rectifier Channels: Insight Into Gating and Lipid Binding

Cecília Leal, Ph.D.
University of Illinois at Urbana-Champaign

A New Paradigm in Nanomedicine: Can Structural Interiors of Nanoparticles Regulate Cellular Delivery?

Meena S. Madhur, M.D., Ph.D.
Vanderbilt University

Immunophenotyping of Human Hypertension Using Single-Cell Multiplex Mass Cytometry to Identify Novel Therapeutic Targets

Nikhil U. Nair, Ph.D.
Tufts University

Metabolic Engineering in Humans: Altered Gut Microbes as a Therapeutic Platform

Tien Peng, M.D.
University of California, San Francisco

Defining the Resident Mesenchymal Stem Cell Niche and Function *In Vivo*

Rushika M. Perera, Ph.D.
University of California, San Francisco

Tracking Tumor Evolution Through *In Vivo* Organelle Profiling

Sabine Petry, Ph.D.
Princeton University

Building the Chromosome Segregation Machinery From Scratch

Jeremy Purvis, Ph.D.
The University of North Carolina at Chapel Hill

Controlling Stem Cell Fate Through Computational Modeling

Dragana Rogulja, Ph.D.
Harvard Medical School

Mechanisms of Arousal Threshold and Sleep Homeostasis

Melanie A. Samuel, Ph.D.
Baylor College of Medicine

Synaptic Reprogramming of Adult Neurons

Rahul Satija, Ph.D.
New York Genome Center
New York University

Learning the Metadata of the Cell With Single-Cell Genomics

Tiffany Schmidt, Ph.D.
Northwestern University

Genetic Mapping of Visual Circuits

Nikolai Slavov, Ph.D.
Northeastern University

Ribosome-Mediated Translational Regulation During Stem Cell Differentiation

William R. Stauffer, Ph.D.
University of Pittsburgh

Neural Correlates of Optimal Value Seeking in the Reward System

Matthew Steinhauser, M.D.
Brigham and Women's Hospital

A New Modality to Image Tumor Metabolic Heterogeneity at Subcellular Resolution

Kelly R. Stevens, Ph.D.
University of Washington

Thermogenetic Activation of Engineered Tissue for Cardiac Repair

Bozhi Tian, Ph.D.
The University of Chicago

Silicon-Based Injectable Micro-Gels for Non-Genetic and Wireless Modulation of Neurons, Cardiomyocytes, and Neuromuscular System

Jared Toettcher, Ph.D.
Princeton University

Harnessing Optogenetics to Diagnose and Therapeutically Rewire Cancer Cell Signaling

Elçin Ünal, Ph.D.
University of California, Berkeley

Illuminating Cellular Aging Pathways Through Gametogenesis

Elizabeth Villa, Ph.D.
University of California, San Diego

Opening Windows Into the Cell: Revealing the Molecular Architecture of the Nuclear Periphery

Arun P. Wiita, M.D., Ph.D.
University of California, San Francisco School of Medicine

In Vivo Monitoring of Oxidative Protein Folding Through Time-Resolved Quantitative Mass Spectrometry

Wen Xue, Ph.D.
University of Massachusetts Medical School

CRISPR-Based Modular Therapy for Precision Medicine

Michael M. Yartsev, Ph.D.
University of California, Berkeley

The First Mammalian Model System for Studying Vocal Learning: A Behavioral and Neurophysiological Approach

NIH Director's Transformative Research Awardees

Ethan Bier, Ph.D.
University of California, San Diego

Mutagenic Chain Reaction-Facilitated Immunotherapy

Amit Choudhary, Ph.D.
Brigham and Women's Hospital
Broad Institute of MIT and Harvard
Harvard Medical School

Leveraging Snakes' Extreme Physiology to Modulate Human Beta-Cell Function

George M. Church, Ph.D.
Harvard University, Harvard Medical School
Massachusetts Institute of Technology

Exploring a Novel Paradigm of Schizophrenia and Bipolar Disorder

Catherine Dulac, Ph.D.
Harvard University
Howard Hughes Medical Institute

In Situ Transcriptome Imaging in Single Cells

Wendy S. Garrett, M.D., Ph.D.
Broad Institute of MIT and Harvard
Dana-Farber Cancer Institute
Harvard Medical School
Harvard T.H. Chan School of Public Health

Designer Probiotics for the Treatment of Intestinal Infection and Inflammation

Ananda W. Goldrath, Ph.D.
University of California, San Diego

Mutagenic Chain Reaction-Facilitated Immunotherapy

Stephen M. Hedrick, Ph.D.
University of California, San Diego

Mutagenic Chain Reaction-Facilitated Immunotherapy

John M. Leong, M.D., Ph.D.
Tufts University School of Medicine

Designer Probiotics for the Treatment of Intestinal Infection and Inflammation

Cammie F. Lesser, M.D., Ph.D.
Harvard Medical School
Massachusetts General Hospital

Designer Probiotics for the Treatment of Intestinal Infection and Inflammation

Henry A. Lester, Ph.D.
California Institute of Technology

Fluorescent Biosensors for Subcellular Pharmacokinetics

Keith Andrew Maggert, Ph.D.
University of Arizona College of Medicine

Induced Transgenerational Inheritance Without Epigenetics

James H. Morrissey, Ph.D.
University of Illinois at Urbana-Champaign

Toolkit for High-Resolution Structure and Dynamics of Functional Lipids

Rama Ranganathan, M.D., Ph.D.
The University of Texas Southwestern Medical Center

Seeing Protein Mechanics: The Link Between Molecular Structure, Function, and Evolution

Chad M. Rienstra, Ph.D.
University of Illinois at Urbana-Champaign

Toolkit for High-Resolution Structure and Dynamics of Functional Lipids

Stephen M. Secor, Ph.D.
University of Alabama

Leveraging Snakes' Extreme Physiology to Modulate Human Beta-Cell Function

Emad Tajkhorshid, Ph.D.
University of Illinois at Urbana-Champaign

Toolkit for High-Resolution Structure and Dynamics of Functional Lipids

Bridget K. Wagner, Ph.D.
Broad Institute of MIT and Harvard

Leveraging Snakes' Extreme Physiology to Modulate Human Beta-Cell Function

Catherine S. Woolley, Ph.D.
Northwestern University

New Tools to Study Neurosteroid Estrogens

Ting (C.-ting) Wu, Ph.D.
Harvard Medical School

Culling the Human Genome of Disease Variants Using Ultraconserved Elements

Bruce A. Yankner, M.D., Ph.D.
Harvard Medical School

Exploring a Novel Paradigm of Schizophrenia and Bipolar Disorder

John X.J. Zhang, Ph.D.
Dartmouth College

Implantable Cardiac Power Generation Using Flexible 3D Porous Thin Films

Xiaowei Zhuang, Ph.D.
Harvard University
Howard Hughes Medical Institute

In Situ Transcriptome Imaging in Single Cells

NIH Director's Early Independence Awardees

Jonathan Abraham, M.D., Ph.D.
Brigham and Women's Hospital

Antibody Therapeutics for Human Viral Hemorrhagic Fevers and Prevention of Late Neurological Syndromes

Marie-Abèle Bind, Sc.D.
Harvard T.H. Chan School of Public Health

Transporting Established Insights From Classical Experimental Design to Address Causal Questions in Environmental Epidemiology, Including the Understanding of Biological Mediating Mechanisms

Jacob O. Brunkard, Ph.D.
University of California, Berkeley
U.S. Department of Agriculture Agricultural Research Service Plant Gene Expression Center

An Aminoacyl tRNA Synthetase Is a Nitrogen Sensor That Activates TOR in Plants

Brandon DeKosky, Ph.D.
University of Kansas

Comprehensive Analysis of Human Adaptive Immune Receptors to Elucidate Correlates of Epstein-Barr Virus Disease Suppression

Sherrie J. Divito, M.D., Ph.D.
Brigham and Women's Hospital

Investigating a Novel Cell Population in Delayed-Onset Drug Hypersensitivity Reactions

Jesse R. Dixon, M.D., Ph.D.
The Salk Institute for Biological Studies

Mechanisms of Formation of 3D Genome Structures

Valentino M. Gantz, Ph.D.
University of California, San Diego

Development, Characterization, and Application of CRISPR/Cas9 Gene Drive Technologies and Related Active Genetic Elements to Benefit Research and Society at Large

Daniel P. Giovenco, Ph.D., M.P.H.
Rutgers University Biomedical and Health Sciences School of Public Health

Geographic Variation in the Diverse Tobacco Retail Environment and Its Impact on Tobacco Use Disparities

Kristen Koenig, Ph.D.
Harvard University

Investigating Organ Formation and the Emergence of Complexity in the Visual System Using Comparative Developmental Approaches

Aashish Manglik, M.D., Ph.D.
Stanford University School of Medicine

Molecular Mechanisms of Iron Homeostasis

Micaela Elvira Martinez, Ph.D.
Princeton University

Hacking Epidemics: Unlocking the Drivers of Transmission Seasonality to Battle Vaccine-Preventable Diseases

Monica Mugnier, Ph.D.
Johns Hopkins University

Variant Surface Glycoprotein Diversification in *Trypanosoma brucei*

Steve Ramirez, Ph.D.
Harvard University

Artificially Modulating Memories to Alleviate Psychiatric Disease-Like States

Aaron Ring, M.D., Ph.D.
Yale University School of Medicine

Uncoupling Pleiotropy in the LIGHT/HVEM/LTBetaR Signaling Network

Matthew H. Spitzer, Ph.D.
University of California, San Francisco

Quantitatively Modeling Immune Responses to Cancer

Kevin Yackle, M.D., Ph.D.
University of California, San Francisco

Cellular and Molecular Identification of the Breathing Pacemaker Neurons

Notes

Notes

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

Please scan this QR Code to visit
the 2016 High-Risk High-Reward
Research Symposium website.

https://commonfund.nih.gov/highrisk/symposium16