

Molecules Come to Life

scialog2016[®]

The Second Annual Scialog Conference
March 31-April 3, 2016 at Westward Look Resort
Tucson, Arizona

GORDON AND BETTY
MOORE
FOUNDATION

RESEARCH CORPORATION
for SCIENCE ADVANCEMENT



Conference Objectives and Process

Objectives

Engage in dialog with the goal of accelerating high-risk/high-reward research.

Identify and analyze scientific bottlenecks and develop approaches for breakthroughs.

Build a creative, better-networked community that is more likely to produce breakthroughs.

Form teams to write proposals to seed novel projects based on highly innovative ideas that emerge at the conference.

Process

Brainstorming is welcome; don't be afraid to say what comes to mind.

Consider the possibility of unorthodox or unusual ideas without immediately dismissing them.

Discuss, build upon and constructively criticize each other's ideas – in a spirit of cooperative give and take.

Make comments concise to avoid monopolizing the dialog.

Contents

| | |
|---|----|
| From the Research Corporation for Science Advancement President | 2 |
| From the Gordon and Betty Moore Foundation President | 3 |
| From the Program Officers | 5 |
| Agenda | 6 |
| Keynote Speakers | 8 |
| 2015 Scialog Molecules Come to Life Collaborative Awards | 11 |
| Proposal Guidelines | 12 |
| Discussion Facilitators | 13 |
| Scialog Fellows | 14 |
| Research Corporation Scientific Staff | 16 |
| Gordon and Betty Moore Foundation Scientific Staff | 16 |
| Foundation Representatives | 16 |
| Support Staff | 16 |

Scialog: Molecules Come to Life

From the Research Corporation for Science Advancement President

Welcome to the second annual **Scialog: Molecules Come to Life**.

Once again Research Corporation for Science Advancement (RCSA) is delighted to be joined in this multi-year program by our co-sponsor, the Gordon and Betty Moore Foundation. Together we continue to focus on untested ideas and to champion innovative thinking in an effort to understand more completely the cellular processes fundamental to life.

As a result of the first Scialog: MCL, we awarded 13 grants to five teams of investigators. These grants, totaling \$731,000, enable awardees to pursue ambitious, high-risk, highly impactful discovery research on untested ideas in physical cell biology. Each investigator has received \$56,250 and works in a team of two or three. We are eager to fund more teams as an outcome of this second Scialog.

Again, we encourage you to engage in lively discussions over the next few days, and to be bold in bringing up that wild idea or nagging hunch that may have occurred while you were performing research of a more “incremental” bent. In the process we hope you feel you are becoming a part of a long-lived, creative, cross-disciplinary community that is prone to producing breakthrough science.

Richard Wiener, Silvia Ronco (both RCSA) and Gary Greenburg (Moore Foundation) are here once again to facilitate this conference along with respected senior scientists. We are grateful for their efforts and dedication.

Over all, Scialog continues to focus on solving real-world problems of global significance through an unwavering dedication to basic research; and its funding is aimed squarely at early career scientists. Our fundamental premise, which applies to science philanthropies such as Gordon and Betty Moore Foundation and Research Corporation as well as to the talented people we support, is that in a complex, dynamic world collaboration and innovation are essential keys to success.

We welcome equally the new Scialog Fellows who join us for the first time and those Fellows who were here for the initial Scialog: MCL. Participate, communicate—and enjoy!

Robert N. Shelton

President

Research Corporation for Science Advancement

From the Gordon and Betty Moore Foundation President

The Gordon and Betty Moore Foundation, in partnership with the Research Corporation for Science Advancement, warmly welcomes you to the second **Scialog: Molecules Come to Life**.

This conference embodies the spirit of the Moore Foundation's Science Program, which supports the world's top scientists in their pursuit of high-risk, high-impact research to advance knowledge in emerging fields and tackle important scientific problems.

By bringing you together for this conference, we hope to generate productive and enduring collaborations that will unite theory and experiment, and entice you to explore creative and exciting new research directions at the interface of biology and physical science.

We encourage you to take this opportunity to engage with one another throughout the conference: interact, break down barriers and cultivate new collaborations that address the pressing questions that underlie biology's complexity.

Enjoy the conference, and have fun!

Harvey V. Fineberg

President

Gordon and Betty Moore Foundation

From the Program Officers

This year we are holding the second **Scialog: Molecules Come to Life** conference, which continues Research Corporation's tradition of highly interactive Scialog meetings on scientific topics of great importance with a focus on identifying bottlenecks and finding innovative ideas for potential breakthroughs. The emphasis of Scialog meetings is on science dialog, networking and building new collaborations to pursue novel high risk discovery research.

The Gordon and Betty Moore Foundation and Research Corporation chose to focus this Scialog on the topic of quantitatively understanding the physical biology of cells and their interactions because we believe this critical area of science is on the cusp of major breakthroughs. But we just as firmly believe these breakthroughs can be accelerated by physicists, biologists and those in related fields crossing disciplinary boundaries to work collaboratively, particularly with theorists and experimentalists combining efforts. The goal of **Scialog: Molecules Come to Life** is to catalyze multidisciplinary collaborations between Scialog Fellows, a highly select group of exemplary early career U.S. scientists.

We have two outstanding keynote speakers:

- **Ken Dill** Director, Louis and Beatrice Laufer Center for Physical and Quantitative Biology at Stony Brook University
- **Jennifer Lippincott-Schwartz** Group Leader at Janelia Farm Research Campus

We also have outstanding discussion facilitators including **Myriam Cotten**, Hamilton College; **Daniel Cox**, University of California, Davis; **Michael Graham Espey**, National Cancer Institute; **Daniel Fisher**, Stanford University; **Holly Goodson**, University of Notre Dame; **Martin Gruebele**, University of Illinois at Urbana-Champaign; **Rigoberto Hernandez**, Georgia Institute of Technology; **Jané Kondev**, Brandeis University; and **Boris Shraiman**, University of Santa Barbara, California. We are delighted to have several representatives from other foundations in attendance, including **Marian Carlson**, Simons Foundation; **Mark Cardillo**, Camille and Henry Dreyfus Foundation; and **Kathy Richmond**, the Paul G. Allen Family Foundation.

Scialog conferences focus on dialog and team building with the goal of creating novel strategies for overcoming research bottlenecks that require collaborative approaches. An important feature of Scialog meetings is the opportunity for Scialog Fellows to form teams and write proposals to pursue particularly creative ideas that emerge through the dialog. We hope this competition is exciting, but regardless of which proposals are funded, the purpose is to catalyze a deeper and more meaningful exchange of ideas than ordinarily occurs at scientific conferences. This year 25% of Scialog Fellows are attending for the first time. We hope their new perspectives along with those of the outstanding returning Fellows help make this a great meeting!

We hope each participant finds the Scialog experience of great value. Please do not hesitate to provide feedback – we are here to listen and make this a great meeting for you!

Richard Wiener
Senior Program Director
Research Corporation

Gary Greenburg
Program Officer
Gordon and Betty Moore Foundation

Scialog: Molecules Come to Life

Conference Agenda Westward Look Resort March 31-April 3, 2016

Thursday, March 31

| | | |
|----------------|--|---------------------|
| 1:00 pm | Registration Opens | Lobby |
| 1:00 - 3:00 pm | Lunch | Palm Room & Terrace |
| 5:00 - 6:30 pm | Poster Session and Reception | Sonoran Ballroom |
| 6:30 - 7:30 pm | Dinner | Ocotillo & Saguaro |
| 7:30 - 7:45 pm | Welcome Robert Shelton, <i>President, RCSA</i> Robert Kirshner, <i>Chief Program Officer, Moore</i> | Ocotillo & Saguaro |
| 7:45 - 8:00 pm | Conference Overview, Hoped for Outcomes & Guidelines for Collaborative Proposals Richard Wiener, <i>Senior Program Director, RCSA</i> Gary Greenburg, <i>Program Officer, Moore</i> | Ocotillo & Saguaro |
| 8:00 - 9:00 pm | Introductions | Ocotillo & Saguaro |

Friday, April 1

| | | |
|---------------------|--|---------------------|
| 7:00 - 8:00 am | Breakfast | Palm Room & Terrace |
| 8:00 - 9:30 am | Keynote Presentations Ken Dill Jennifer Lippincott-Schwartz | Ocotillo & Saguaro |
| 9:30 - 9:50 am | Conference Photo & Break | |
| 9:50 - 10:00 am | Breakout Sessions Description & Goals | Ocotillo & Saguaro |
| 10:00 - 11:00 am | Breakout Session I | Ocotillo & Saguaro |
| 11:00 - 11:30 am | Report Out | Ocotillo & Saguaro |
| 11:30 am - 12:00 pm | Mini Breakout Session I | Multiple Rooms |
| 12:00 - 1:00 pm | Lunch | Palm Room & Terrace |
| 1:00 - 2:15 pm | Collaborative Team Presentations | Ocotillo & Saguaro |
| 2:15 - 3:15 pm | Breakout Session II | Ocotillo & Saguaro |
| 3:15 - 3:40 pm | Report Out | Ocotillo & Saguaro |
| 3:40 - 4:10 pm | Mini Breakout Session II | Multiple Rooms |
| 4:10 - 5:45 pm | Afternoon Break | |
| 5:45 - 6:45 pm | Poster Session and Reception | Sonoran Ballroom |
| 6:45 - 8:00 pm | Dinner | Ocotillo & Saguaro |

Saturday, April 2

| | | |
|---------------------|--|---------------------|
| 6:15 - 7:15 am | Optional Nature Walk | WL Trails |
| 7:00 - 8:00 am | Breakfast | Palm Room & Terrace |
| 8:00 - 8:50 am | Collaborative Team Presentations | Ocotillo & Saguaro |
| 8:50 - 9:50 am | Breakout Session III | Ocotillo & Saguaro |
| 9:50 - 10:15 am | Report Out | Ocotillo & Saguaro |
| 10:15 - 10:45 am | Mini Breakout Session III | Multiple Rooms |
| 10:45 - 11:00 am | Morning Break | |
| 11:00 am - 12:00 pm | Breakout Session IV | Ocotillo & Saguaro |
| 12:00 pm - 12:30 pm | Report Out | Ocotillo & Saguaro |
| 12:30 - 1:30 pm | Lunch | Palm Room & Terrace |
| 1:30 - 6:00 pm | Team Formation, Informal Discussion, & Proposal Writing Proposals due 8:00 am Sunday morning | Multiple Rooms |
| 6:00 - 6:30 pm | Reception | Ocotillo & Saguaro |
| 6:30 - 7:30 pm | Dinner | Ocotillo & Saguaro |

Sunday, April 3

| | | |
|------------------|--|---------------------|
| 7:00 - 8:00 am | Breakfast | Palm Room & Terrace |
| 8:00 - 10:30 am | Presentations of Proposal Ideas | Ocotillo & Saguaro |
| 10:30 - 11:00 am | Assessment Survey & Wrap-up | Ocotillo & Saguaro |
| 11:00 - 12:00 pm | Lunch Available to go | Cholla Room |

Keynote Speaker

Will biology ultimately be understood in terms of “Grand Principles,” as physics is?

Ken Dill

Director, Louis and Beatrice Laufer Center for Physical and Quantitative Biology at Stony Brook University



Abstract: In 1996, in *Current Biology*, Lewis Wolpert raised the following questions: Do we already know all the principles of biology? Does it just remain for us to fill in the gene-by-gene details? To me, the situation seems very much the opposite of that. Our past forty years of molecular, structural, cellular, computational and “-omics” biology have given us vast knowledge of atom-by-atom and molecule-by-molecule detail. The great opportunity for the future is now to understand what it all means. It’s an opportunity for leadership from physicists and mathematicians, and for much deeper penetration of model-based thinking into biology. As a small illustration, I will briefly describe our interests in minimalist modeling of cell properties.

Bio: Ken Dill is the Louis and Beatrice Laufer Professor of Physics and Chemistry at Stony Brook University and the Director of the Laufer Center for Physical and Quantitative Biology. Previously, he was on the faculty of the University of California, San Francisco. Dill received SB and SM degrees from MIT in Mechanical Engineering, a PhD in Biology at the University of California, San Diego, and did postdoctoral research in Chemistry at Stanford University. He received the Hans Neurath Award in 1998 from the Protein Society, for his research on structures, properties and folding of proteins. He has been president of the Biophysical Society, and is a member of the National Academy of Sciences and the American Academy of Arts and Sciences. With Sarina Bromberg, he co-authored *Molecular Driving Forces*, a textbook in physical chemistry and statistical mechanics.

His research interests are at the intersection of statistical physics and cell biophysics and structural biology. His work has elucidated that protein folding occurs on funnel-shaped energy landscapes and that protein structures are largely determined by hydrophobic interactions. And, with Dr. Ron Zuckermann, he has developed peptoids, a new class of polymer materials that have protein-like properties.

Keynote Speaker

Navigating the Cellular Landscape with New Optical Probes, Imaging Strategies and Technical Innovations

Jennifer Lippincott-Schwartz

Group Leader at Janelia Farm Research Campus



Abstract: Emerging visualization technologies are playing an increasingly important role in the study of numerous aspects of cell biology, capturing processes at the level of whole organisms down to single molecules. While developments in probes and microscopes are dramatically expanding the areas of productive imaging, there are still significant roadblocks. Primary challenges include 1) fluorophore bleed-through, which limits the number of fluorophores that can be simultaneously imaged, 2) imaging speeds that are too slow, and 3) labeling densities that are too low for deciphering fine subcellular architecture. Here, I will discuss new imaging methods that can overcome these roadblocks, focusing on their potential for clarifying subcellular organelle dynamics. To surmount fluorophore bleed-through, we combined excitation-based spectral unmixing and lattice light sheet microscopy to visualize up to six organelles (i.e., ER, Golgi, mitochondria, lysosomes, peroxisomes and lipid droplets) simultaneously within cells. This allowed us to track these organelles through time and analyze their inter-organelle contacts. To increase temporal resolution during imaging, we employed total internal reflection fluorescence combined with structured illumination microscopy to visualize organelle dynamics at very high temporal-spatial resolution. Examining the ER, we observed that many peripheral ER sheets seen using diffraction-limited imaging are actually highly perforated structures comprised of tightly latticed groups of dynamic tubules. Within the latticed ER tubule meshwork, subdiffraction-limited holes were observed (~150-250 nm diameter) having transient lifespans (~250 msec). Viewed at higher resolution using lattice light sheet microscopy combined with point accumulation for nanoscale topology (PAINT), the peripheral ER sheets represented a complex meshwork of tightly cross-linked ER tubules. I discuss possible roles this complex ER structural organization has for diverse cellular functions.

Bio: Jennifer Lippincott-Schwartz received her B.A. from Swarthmore College, her M.S. in Biology from Stanford University, and her Ph.D in Biochemistry from Johns Hopkins University. She did post-doctoral training at the National Institutes of Health (NIH) under the mentorship of Dr. Richard Klausner and served as Chief of the Section on Organelle Biology in the Cell Biology and Metabolism Branch of the National Institute of Child Health and Human Development at NIH until 2016. She is currently group leader at Janelia Farm Research Campus, Ashburn, VA.

Lippincott-Schwartz's research uses live cell imaging approaches to analyze the spatio-temporal behavior and dynamic interactions of molecules and organelles in cells. Her group has pioneered the use of green fluorescent protein (GFP) technology for quantitative analysis and modeling of intracellular protein traffic and organelle biogenesis in live cells and embryos, providing novel insights into cell compartmentalization, protein trafficking and organelle inheritance. Most recently, her research has focused on the development and use of photoactivatable fluorescent proteins, which 'switch on' in

Keynote Speaker

Jennifer Lippincott-Schwartz

Continued

response to light. One application of these proteins she has put to use is photoactivated localization microscopy, (i.e., PALM), a superresolution imaging technique that enables visualization of molecule distributions at high density at the nano-scale.

Her work has been recognized with election to the National Academy of Sciences (2008) and the National Institute of Medicine (2009), and with the Royal Microscopy Society Pearse Prize (2010) and the Society of Histochemistry Feulgen Prize (2001). Dr. Lippincott-Schwartz is currently Editor for *Current Protocols in Cell Biology* and *The Journal of Cell Science* and is on the editorial boards of *Cell*, *Physiology* and *Integrative Biology*. She is President-elect of the American Society of Cell Biology and has had leadership roles in the Biophysical Society. She serves on the advisory board for the Searle Scholar Program and scientific review board of Howard Hughes Medical Institute, and is a non-resident Faculty Fellow of the Salk Institute, La Jolla, CA.

2015 Scialog Molecules Come to Life Collaborative Awards

Building an Artificial Motile Tissue through Self-Organized Rhythmic Contractility

Michael Rust, University of Chicago

Jennifer Ross, University of Massachusetts, Amherst

Rae Robertson-Anderson, University of San Diego

Immersive DNA Force Sensors and Predictive Mechanical Modeling for Tissue Morphogenesis

Justin Kinney, Cold Spring Harbor Laboratory

Lisa Manning, Syracuse University

Margaret Gardel, University of Chicago

Rebooting the Gut Microbial Ecosystem using Bacterial Dueling

Raghuveer Parthasarathy, University of Oregon

Brian Hammer, Georgia Institute of Technology

Joao Xavier, Memorial Sloan-Kettering Cancer Center

Uncovering Essential Gene Functions by Exploiting Differentiation within a Biofilm

Guroi Suel, University of California, San Diego

Kerwyn Huang, Stanford University

Rethinking the Idea of Cell Type

Grégoire Altan-Bonnet, Memorial Sloan Kettering Cancer Center

Pankaj Mehta, Boston University

Proposal Guidelines

Collaborative Awards

1. Awards, which are one year in duration, are intended to provide seed funding for teams of two to four Scialog Fellows formed at this conference.
2. Two-page proposals should describe the proposed project and the role of each team member. No budget is necessary. A third page may be used for references.
3. Awards will be in the amount of \$50K (direct funding) for each team member.
4. A Scialog Fellow can be a member of no more than two teams. If a Scialog Fellow is a member of two teams, the other team members must be different. No team can submit more than one proposal.
5. Scialog Fellows who previously won Scialog Collaborative Awards can be a member of only one team. The other team members must be different from the members of the previously awarded team.
6. Teams may not include members who have previously collaborated with one another.
7. Teams are encouraged to:
 - a) Include a theory and experimental component.
 - b) Focus on fundamental research rather than disease-oriented research.
 - c) Base their proposal on an innovative, high-risk, blue sky idea.
 - d) Address an important question in physical cell biology amenable to quantitative modeling.
 - e) Base the proposal on an idea unlikely to garner federal funding because it is too early, cross-cutting or high risk.
8. Additional funding after one year for the most promising projects is possible but not guaranteed.
9. Proposals must be submitted electronically by Sunday morning at 7:00 am to RCSA Senior Program Directors Richard Wiener (rwiener@rescorp.org) and Silvia Ronco (sronco@rescorp.org) and Moore Program Officer Gary Greenburg (gary.greenburg@moore.org).

Discussion Facilitators

Myriam Cotten

Hamilton College
mcotten@hamilton.edu

Daniel Cox

University of California, Davis
dlcox@ucdavis.edu

Ken Dill

Stony Brook University
dill@laufercenter.org

Michael Graham Espey

National Cancer Institute
sp@nih.gov

Daniel Fisher

Stanford University
dsfisher@stanford.edu

Holly Goodson

University of Notre Dame
hgoodson@nd.edu

Martin Gruebele

University of Illinois at Urbana-Champaign
mgruebel@illinois.edu

Rigoberto Hernandez

Georgia Institute of Technology
hernandez@gatech.edu

Jané Kondev

Brandeis University
kondev@brandeis.edu

Jennifer Lippincott-Schwartz

National Institutes of Health
jlippincott.schwartz@gmail.com

Boris Shraiman

University of California, Santa Barbara
shraiman@kitp.ucsb.edu

Scialog Fellows

Grégoire Altan-Bonnet

National Institutes of Health
gregoire.altan-bonnet@nih.gov

Nihal Altan-Bonnet

National Institutes of Health
nihal.altan-bonnet@nih.gov

David Altman

Willamette University
daltman@gmail.com

Ariel Amir

Harvard University
arielamir@seas.harvard.edu

Timothy Atherton

Tufts University
timothy.atherton@tufts.edu

Gabor Balazsi

Stony Brook University
gabor.balazsi@stonybrook.edu

Aparna Baskaran

Brandeis University
aparna@brandeis.edu

Julie Biteen

University of Michigan
jsbiteen@umich.edu

Paul Blainey

The Broad Institute/Massachusetts Institute of Technology
pblainey@broadinstitute.org

Jasna Brujic

New York University
jb2929@nyu.edu

Otger Campas

University of California, Santa Barbara
campas@engineering.ucsb.edu

Ibrahim Cissé

Massachusetts Institute of Technology
icisse@mit.edu

Eva-Maria Collins

University of California, San Diego
emscollins@physics.ucsd.edu

Moumita Das

Rochester Institute of Technology
modsps@rit.edu

Adriana Dawes

Ohio State University
dawes.33@osu.edu

Nikta Fakhri

Massachusetts Institute of Technology
fakhri@mit.edu

Matthew Ferguson

Boise State University
mattferguson@boisestate.edu

Polly Fordyce

Stanford University
pfordyce@stanford.edu

Hernan Garcia

University of California Berkeley
hggarcia@berkeley.edu

Kingshuk Ghosh

University of Denver
kghosh@du.edu

Ido Golding

Baylor College of Medicine
igolding@illinois.edu

Ajay Gopinathan

University of California, Merced
agopinathan@ucmerced.edu

Thomas Gregor

Princeton University
thomas.gregor@gmail.com

Brian Hammer

Georgia Institute of Technology
bhammer@gatech.edu

Kerwyn Huang

Stanford University
kchuang@stanford.edu

Vanessa Huxter

University of Arizona
vhuxter@email.arizona.edu

Justin Kinney

Cold Spring Harbor Laboratory
jkinney@cshl.edu

Scialog Fellows Continued

Kirill Korolev

Boston University
korolev@bu.edu

Seppe Kuehn

University of Illinois at Urbana-Champaign
seppe@illinois.edu

Thomas Kuhlman

University of Illinois Urbana-Champaign
tkuhlman@illinois.edu

Dinah Loerke

University of Denver
dinah.loerke@gmail.com

Casey Londergan

Haverford College
clonderg@haverford.edu

Madhav Mani

Northwestern University
madhav.mani@gmail.com

Pankaj Mehta

Boston University
pankajm@bu.edu

Maiken Mikkelsen

Duke University
m.mikkelsen@duke.edu

Adilson Motter

Northwestern University
motter@northwestern.edu

Daniel Needleman

Harvard University
dan.needleman@gmail.com

Banu Ozkan

Arizona State University
banu.ozkan@asu.edu

Raghuveer Parthasarathy

University of Oregon
raghu@uoregon.edu

Ashok Prasad

Colorado State University
ashokp@engr.colostate.edu

Steve Pressé

Indiana University – Purdue University Indianapolis
stevenpresse@gmail.com

Kimberly Reynolds

University of Texas Southwestern Medical Center
kimberly.reynolds@utsouthwestern.edu

Rae Robertson-Anderson

University of San Diego
randerson@sandiego.edu

Jennifer Ross

University of Massachusetts Amherst
rossj@physics.umass.edu

Alvaro Sanchez

Harvard University
sanchez@rowland.harvard.edu

Jeremy Schmit

Kansas State University
schmit@phys.ksu.edu

Gurol Suel

University of California, San Diego
gsuel@ucsd.edu

Justin Taraska

National Institutes of Health
justin.taraska@nih.gov

Megan Valentine

University of California, Santa Barbara
valentine@engineering.ucsb.edu

Sarah Veatch

University of Michigan
sveatch@umich.edu

Douglas Weibel

University of Wisconsin-Madison
douglas.weibel@wisc.edu

Joao Xavier

Memorial Sloan Kettering Cancer Center
xavierj@mskcc.org

Ahmet Ali Yanik

University of California, Santa Cruz
yanik@ucsc.edu

Full list of Scialog Fellows for 2015 and 2016 meetings available at: <http://rescorp.org/gdresources/docs/Scialog-Fellows-2016-MCL.pdf>

Research Corporation Scientific Staff

Robert Shelton

President
rshelton@rescorp.org

Silvia Ronco

Senior Program Director
sronco@rescorp.org

Richard Wiener

Senior Program Director
rwiener@rescorp.org

Gordon and Betty Moore Foundation Scientific Staff

Gary Greenburg

Program Officer
gary.greenburg@moore.org

Robert Kirshner

Chief Program Officer
rkirshner@cfa.harvard.edu

Foundation Representatives

Kathy Richmond

Paul G. Allen Family Foundation
KathyR@PGAfamilyfoundation.org

Mark Cardillo

Camille and Henry Dreyfus Foundation
mcardillo@dreyfus.org

Marian Carlson

Simons Foundation
mcarlson@simonsfoundation.org

Michael Graham Espey

National Cancer Institute
sp@nih.gov

Support Staff

Lloyd Lee

Gordon and Betty Moore Foundation
lloyd.lee@moore.org

Ceri Shultz

RCSA
cshultz@rescorp.org

Kathleen Eckert

RCSA
kathleen@rescorp.org

4703 East Camp Lowell Dr.
Suite 201
Tucson, Arizona 85712
Phone 520.571.1111
www.rescorp.org

RESEARCH CORPORATION 
for SCIENCE ADVANCEMENT