

Microbiome, Neurobiology and Disease

The Third Annual Scialog Conference
April 20-23, 2023

scialog2023[®]



THE
PAUL G. ALLEN
FRONTIERS GROUP

THE FREDERICK GARDNER
COTTRELL FOUNDATION

RESEARCH CORPORATION
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Scialog: Microbiome, Neurobiology and Disease

Objectives

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

Identify and analyze bottlenecks related to the fundamental science of the gut-brain axis and develop approaches to surmount those barriers.

Build a creative, better-networked, collegial community that that crosses disciplinary silos.

Form teams to write proposals to seed novel projects based on highly innovative ideas that emerge from the dialogue

Most importantly, enjoy the discussions about where this field should go and how we can work together to get there.

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 dialogue.

Diversity, Inclusion and No Harassment

Research Corporation for Science Advancement fosters an environment for listening and considering new ideas from a diverse group, with respect for all participants without regard to gender, race, ethnicity, sexual orientation, age, ability or any other aspect of how we identify ourselves other than as fellow scientists.

RCSA does not tolerate any form of harassment, which could include verbal or physical conduct that has the purpose or effect of substantially interfering with anyone else's participation or performance at this conference, or of creating an intimidating, hostile, or offensive environment; any such harassment may result in dismissal from the conference.

[Read RCSA's Code of Conduct](#)



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Scialog: Microbiome, Neurobiology and Disease

From the President

Welcome to the 2023 Scialog: Microbiome, Neurobiology and Disease meeting, cosponsored by Research Corporation, the Paul G. Allen Frontiers Group and Frederick Gardner Cottrell Foundation. This is the third and final Scialog meetings on this theme and it is great to see so many people returning. It also marks the first time that this group is able to meet in person. Take the opportunity to catch up with colleagues you met over the past two years and welcome some new Scialog Fellows who are joining us for the first time.



The goal of this Scialog is to catalyze the creation of multidisciplinary collaboration to explore new and innovative projects that accelerate fundamental science on the gut-brain axis and how the microbiome contributes to and affects neurobiology and neuropathologies.

Scialog's overarching purpose is to advance cutting-edge science of great significance to humanity by catalyzing innovative, basic research leading to fundamental discoveries. Our focus is on scientists in the early years of their independent careers. Through the unique Scialog process, we seek to lay the foundation for an ongoing, highly creative, cross-disciplinary community of scientists that will prove adept at identifying exciting areas for research advances for decades to come.

This initiative continues under the guidance of Program Directors **Andrew Feig**, **Richard Wiener** and **Silvia Ronco** (Research Corporation), and with assistance from our initiative partners **Alexandra Basford** and **Kathryn Richmond** (Paul G. Allen Frontiers Group) and **Shaun Kirkpatrick** (Frederick Gardner Cottrell Foundation), we hope you will be engaged in passionate discussions with colleagues, many of whom you will have met for the first time at Scialog. We would also like to acknowledge our ongoing partnership with the **Walder Foundation** which is providing additional support across all of the biologically related Scialog initiatives this year. The process may push you out of your comfort zone with the goal of stimulating new and better ideas. The result, we expect, will be a meeting unlike others that you attend. We are confident that you will find the next three days to be extremely worthwhile.

This is your opportunity to air that wild idea you have been reluctant to share with others, or to discuss a nagging hunch that does not yet have sufficient supporting data, or to take a leap on a high-impact/high-risk project instead of concentrating all your effort on somewhat more "incremental" studies. This is the time to come up with, and be open to, completely new ideas that may truly change the world and to find new colleagues and collaborators with whom to pursue them.

We hope this meeting yields a crop of outstanding team proposals, which will make our job of determining who receives funding very challenging. I wish you every success in exploring new and compelling ideas over the next two days.

Have a terrific meeting!

Daniel Linzer

President

Research Corporation for Science Advancement

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From the Program Director

Research Corporation's highly interactive Scialog meetings have the goal of catalyzing new collaborations based on blue-sky ideas among Scialog Fellows who constitute a highly select group of exemplary early-career scientists from the U.S. and Canada. The emphasis is on dialog, networking, and building new collaborations to pursue novel, high-risk discovery research. While we would all rather hold this meeting in person, we are excited to hold the meeting virtually and will do our best to make it a great experience for participants.



Research Corporation, the Paul G. Allen Frontiers Group and Frederick Gardner Cottrell Foundation chose to focus on Microbiome, Neurobiology and Disease because we believe this critical area of science requires major breakthroughs in fundamental understanding of the gut-brain axis and the interplay between the microbiome and neuropathologies. Just as firmly, we believe these breakthroughs can be accelerated by chemists, bioengineers, microbiologists, geneticists, neurobiologists, and many others, working collaboratively on novel, high-risk projects.

We have an outstanding keynote speaker: **Barbara Bendlin**, University of Wisconsin-Madison.

We also have a small team of dedicated discussion facilitators: **Barbara Bendlin** (University of Wisconsin-Madison), **Ali Keshavarzian** (Rush University Medical Center, Chicago), and **Raghuveer Parthasarathy** (University of Oregon).

Scialog meetings focus on dialog and team building with the goal of creating novel strategies and collaborative approaches. An important feature is the opportunity for Scialog Fellows to form teams and write proposals to pursue particularly creative ideas that emerge throughout the conference. We hope this competition is exciting, but regardless of which proposals are funded, the primary purpose is to catalyze a deeper and more meaningful exchange of ideas than ordinarily occurs at scientific conferences. Our intent is for this process to help participants gain new insights and connections that significantly advance fundamental science to enable major advances in microbiome, neurobiology and disease technologies.

We hope each participant finds the Scialog experience of great value. Please do not hesitate to provide feedback on how to make the conference better. My fellow Program Directors, **Richard Wiener** and **Silvia Ronco**, the RCSA staff, and I are here to help make the meeting a great experience!

Andrew Feig

Senior Program Director

Research Corporation for Science Advancement

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Conference Agenda

April 20 – 23, 2023

Thursday, April 20

2:00 – 6:00 pm	Registration	Sonoran Foyer
2:00 – 5:00 pm	Snacks & Informal Discussions	Sonoran Foyer
5:00 – 6:30 pm	Reception	Sonoran Terrace
6:00 – 6:30 pm	Meeting for Discussion Facilitators & Funding Partners	Coyote
6:30 – 7:30 pm	Dinner	Palm Room/Palm Terrace
7:30 – 8:30 pm	Welcome Dan Linzer, President, RCSA Conference Overview, Outcomes and Proposal Guidelines Andrew Feig, Senior Program Director, RCSA Introductions/Ice Breakers	Coyote
8:30 – 11:00 pm	Starlight Cafe	Palm Terrace

Friday, April 21

7:00 – 8:00 am	Breakfast	Palm Room/Palm Terrace
8:00 – 8:45 am	Keynote Presentation <i>Gut Microbiome as a Potential Target for Intervention in Alzheimer's Disease</i> Barbara Bendlin, University of Wisconsin	Coyote
8:45 – 9:00 am	Breakout Session Overview and Instructions	Coyote
9:00 – 10:15 am	Breakout Session I	Mesa, Quail, Javelina
10:15 – 10:35 am	Report Out	Coyote
10:35 – 11:15 am	Conference Photo and Morning Break	Stairs Near the Main Pool
11:15 – 11:45 am	Mini Breakout Session I (Fellows)	All spaces
	Facilitator and Funding Partners Meeting	Coyote
11:45 – 1:00 pm	Lunch	Palm Room/Palm Terrace
1:00 – 2:15 pm	Breakout Session II	Mesa, Quail, Javelina
2:15 – 2:35 pm	Report Out	Coyote
2:35 – 3:05 pm	Mini Breakout Session II (Fellows)	All spaces
3:05 – 5:15 pm	Afternoon Break, Informal Discussions and Leisure Time	Sonoran Foyer
5:15 – 6:45 pm	Reception	Sonoran Terrace
6:45 – 7:45 pm	Dinner	Palm Room/Palm Terrace
7:45 – 8:30 pm	Previous Team Awards Discussion	Coyote
8:30 – 11:00 pm	Starlight Cafe	Palm Terrace

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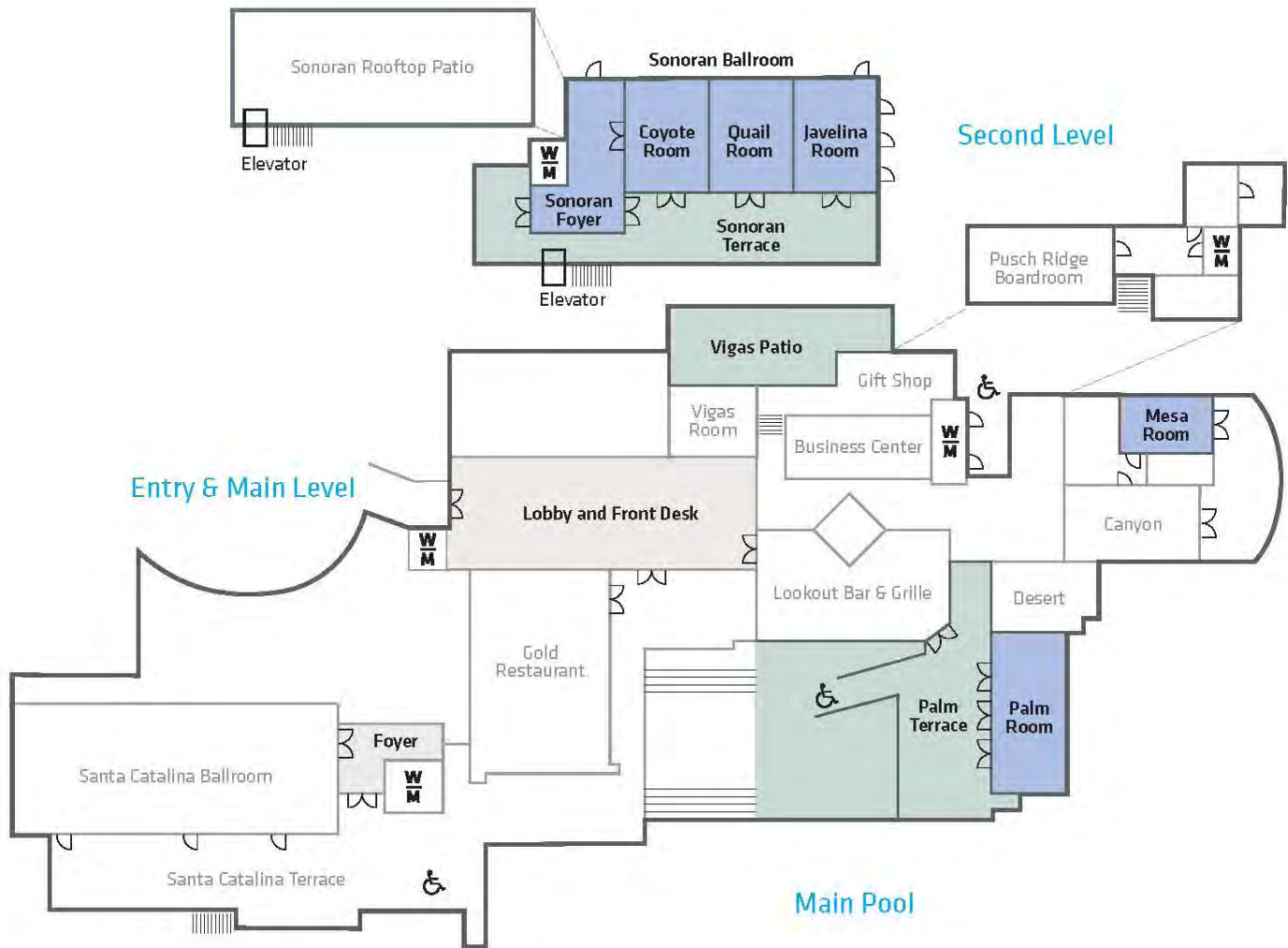
Saturday, April 22

7:00 – 8:00 am	Breakfast	Palm Room/Palm Terrace
8:00 – 8:45 am	Previous Team Awards Discussion	Coyote
8:45 – 9:15 am	Mini Breakout Session III (Fellows)	All Spaces
9:15 – 9:45 am	Morning Break	Sonoran Foyer
9:45 – 11:00 am	Breakout Session III	Mesa, Quail, Javelina
11:00 – 11:20 am	Report Out	Coyote
11:20 – 11:50 am	Mini Breakout Session IV (Fellows)	All Spaces
	Facilitator and Funding Partners Discussion	Coyote
11:50 – 1:00 pm	Lunch	Palm Room/Palm Terrace
1:00 – 5:45 pm	Team Formation, Informal Discussions and Proposal Writing	All Spaces
5:45 – 6:30 pm	Reception	Sonoran Terrace
6:30 – 7:30 pm	Dinner	Palm Room/Palm Terrace
7:30 – 11:00 pm	Starlight Cafe	Palm Terrace

Sunday, April 23

6:30 – 7:30 am	Breakfast	Palm Room/Palm Terrace
7:30 – 11:00 am	Presentation of Proposals	Coyote
	Assessment Survey and Wrap-up	
11:00 – 12:00 pm	Lunch (available to go)	Sonoran Foyer

Westward Look Resort



Keynote Speaker

Gut Microbiome as a Potential Target for Intervention in Alzheimer's Disease?

Barbara Bendlin

*Alzheimer's Disease Research Center
University of Wisconsin - Madison*



Abstract:

In the last five years, research on Alzheimer's disease and gut microbiome has grown considerably. Early studies in the field showed that Alzheimer's mice housed in germ-free conditions had reduced pathology, and that humans with Alzheimer's disease dementia had differences in gut microbiome composition compared to people without Alzheimer's disease. More recently, efforts have shifted toward understanding the mechanisms that underlie the interactions between the gut microbiome and the brain in the context of Alzheimer's disease. This talk will provide an introduction on the state of the field and consider the next steps that are needed to translate recent findings into interventions that benefit people with Alzheimer's disease.

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2022 Team Awards

Electrifying Mechanisms of Intestinal α -Synuclein Aggregation in Parkinson's Disease Onset

Elizabeth Bess, Chemistry, University of California, Irvine

Aida Ebrahimi, Electrical Engineering and Biomedical Engineering, Pennsylvania State University

Diurnal Rhythms in Microbiota-Gut-Brain Signaling Leads to Time-of-Day Dependent Susceptibility to Stroke

Annika Barber, Molecular Biology and Biochemistry, Rutgers University

David Durgan, Anesthesiology, Baylor College of Medicine

The Intersection of Age, Microbiome and the Zeal for Continuous Learning by Cells of the Neuro-Immune Network

Linnea Freeman, Biology, Furman University

Gianna Hammer, Immunology, University of Utah

Lisa Osborne, Microbiology & Immunology, University of British Columbia

Understanding the Protective Effect of Helminth Immunotherapy Through the Lens of the Gut-Brain Axis

Lisa Osborne, Microbiology & Immunology, University of British Columbia

Ukpong Eyo, Neuroscience, University of Virginia

Unraveling the Effect and Mechanism of Enteric Microbiota-Neuron Communication in Aging

Yanjiao Zhou, Medicine, UConn Health

Ashley Ross, Chemistry, University of Cincinnati

Identifying Mycobiome-Derived Enteric Neuromodulators

Iliyan Iliev, Medicine, Weill Cornell Medicine

Faranak Fattahi, Biochemistry and Biophysics, University of California, San Francisco

Tracking Alpha-synuclein from Enteroendocrine Cells to the Enteric Nervous System

Elizabeth Bess, Chemistry, University of California, Irvine

Stephanie Cologna, Chemistry, University of Illinois at Chicago

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2021 Team Awards

Harnessing the Microbiome to Combat the Neurotoxic Effects of Dietary Mercury

Elaine Hsiao, Integrative Biology & Physiology, University of California, Los Angeles

Amina Schartup, Scripps Institution of Oceanography

Mei Shen, Chemistry, Neuroscience Program, Beckman Institute, University of Illinois at Urbana-Champaign

Do Aging Microbiomes Evolve Pathogenicity Via Gene Shedding? Using Evolutionary Theory to Deconstruct Microbiome-based Neurodegeneration

Nandita Garud, Ecology and Evolutionary Biology, University of California, Los Angeles

Will Ludington, Embryology, Carnegie Institution

Do Bacterial Outer Membrane Vesicles (OMVs) Act as Modulators of Microbiota-brain Communication Involved in the Development of Neurological Diseases?

David Durgan, Anesthesiology, Baylor College of Medicine

Abhishek Shrivastava, School of Life Sciences, Arizona State University

Species-specific Modulation of Human Enteric Neurons by Gut Microbiome Metabolites

Faranak Fattahi, Biochemistry and Biophysics, University of California, San Francisco

Mark Mimee, Microbiology/Pritzker School of Molecular Engineering, University of Chicago

Engineering Enteric Neuron Activity to Enhance Antimicrobial Immunity in the Gut

Maayan Levy, Microbiology, University of Pennsylvania

Ashley Ross, Chemistry, University of Cincinnati

Kai Zhang, Biochemistry, University of Illinois at Urbana-Champaign

Impact of Missing Microbes on Brain Development

Carolina Tropini, Microbiology and Immunology, School of Biomedical Engineering, University of British Columbia

JP Yu, Radiology, Psychiatry, and Biomedical Engineering, University of Wisconsin-Madison

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2023 Proposal Guidelines & Collaborative Awards

1. Awards are intended to provide seed funding for teams of two to three Scialog Fellows formed at this conference for high-risk, high-impact projects.
2. The application package should be submitted as a single PDF file. Pages one and two should describe the project and role of each team member. A third page may be used for references. No budget is necessary.
3. Awards will be in the amount of \$50K direct funding per team member, plus a small percentage for overhead. Grant duration will be one year.
4. No Scialog Fellow can be a member of more than two teams. If a Scialog Fellow is a member of two teams, other members of the teams must be different. No team can submit more than one proposal.
5. No Scialog Fellow who previously has won a Scialog MND Collaborative Award can be a member of more than one team. The other team members must be different from the members of the previously awarded team.
6. Scialog Fellows who have previously won two Scialog MND Collaborative Awards are not eligible to be funded members of a team, but they can participate as a non-funded team member.
7. Teams cannot include members who have previously collaborated with one another. If you are unsure of your status (e.g., prospective team members were part of a large collaboration but did not significantly interact), please check for clarification with an RCSA Program Director.
8. Teams are encouraged (but not required) to:
 - a) Include members with different research approaches and methods.
 - b) Include members from different disciplines.
9. Proposals must be submitted electronically by **6:30 a.m. PST Sunday, April 23, 2023**. Instructions for submission will be provided at the meeting.
10. Awards are anticipated to start around **August 1, 2023**.

Scialog Fellows

Heather Bean heather.d.bean@asu.edu

Arizona State University, School of Life Sciences

I am a bioanalytical chemist studying how volatile and semi-volatile metabolites mediate microbe-microbe and host-microbe interactions. I also study VOCs as a source of novel biomarkers, with an emphasis on developing breath tests.

Ying-hui Chou yinghuichou@email.arizona.edu

University of Arizona, Psychology

My research has focused on the cognitive and clinical neuroscience of aging, mild cognitive impairment and Alzheimer's disease (AD). I am interested in learning more about the potential role of gut microbiota in preclinical/prodromal AD and looking forward to this MND meeting!

Annie Ciernia annie.ciernia@ubc.ca

University of British Columbia, Biochemistry and Molecular Biology

My current research focuses on understanding gene regulation in microglia and neurons during development and in neurodevelopmental disorders. Using mouse models, we utilize a combination of next generation sequencing, bioinformatics and behaviour analysis.

Stephanie Cologna cologna@uic.edu

University of Illinois Chicago, Chemistry

My background is in biological mass spectrometry and my group studies the dysregulation of proteins and lipids associated with neurodegeneration. The human disease we study is Niemann-Pick Type C, a fatal, genetic, disorder with progressive cerebellar neurodegeneration.

Kendall Corbin krcorb3@uky.edu

University of Kentucky, Horticulture

My research program is broadly interested in understanding the relationship between diet, health, and the human microbiome. To probe these interactions we use microcosm in vitro models.

Santiago Cuesta santiago.cuesta@rutgers.edu

Rutgers University - New Brunswick, Cell Biology and Neuroscience

My laboratory uses a multidisciplinary approach that includes behavioral, pharmacological, and microbiological techniques to identify members of the gut microbiota that modulate the vulnerability to develop addiction and substance use disorders across life.

Faranak Fattahi Faranak.Fattahi@ucsf.edu

University of California, San Francisco, Cellular and Molecular Pharmacology

My research is focused on developing human organoid models of the enteric nervous system. Taking advantage of these models, we investigate how enteric nerves coordinate complex organ-specific activities and dissect the mechanisms of disorders of gut-brain interaction (DGBIs).

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Linnea Freeman linnea.freeman@furman.edu

Furman University, Biology

My research interests include determining sex differences in the gut microbiome and whether that plays a role in changes that occur in the brain following consumption of a high fat diet, including neuroinflammation, as well as changes to behavior

Chun-Jun Guo chg4001@med.cornell.edu

Weill Cornell Medical College, Medicine

My research interests lie in the human microbiome, focusing on the small molecules from the human microbiota and how these molecules regulate the microbe-microbe and host-microbe interactions.

Will Ludington ludington@carnegiescience.edu

Carnegie Institution of Washington, Embryology

*I study host-microbe colonization specificity and the effects of specific microbes on host physiology. I focus primarily on *Drosophila melanogaster* and investigate genetics of both host and microbes.*

Sarah MacEachern sarah.maceachern@ucalgary.ca

University of Calgary, Pediatrics

My research is focused on neurodevelopmental disorders in children and youth, with a special interest in behaviours of concern such as self-harm and aggression. My lab uses precision medicine approaches to understand and help these children and youth and their families.

Thomas Mansell mansell@iastate.edu

Iowa State University, Chemical and Biological Engineering

I am interested in engineering live biotherapeutics for delivery of small molecules, peptides, and proteins in the gut. Our expertise is in synthetic biology and metabolic engineering and we are eager to apply these tools for therapeutic purposes.

Leah Pyter leah.pyter@osumc.edu

Ohio State University, Psychiatry

Gut-immune-brain mechanisms that contribute to behavioral side effects of chemotherapy (fatigue, cognitive and mood deficits) in human subjects and mice

Ashley Ross ashley.ross@uc.edu

University of Cincinnati, Chemistry

My lab is interested in developing real-time electrochemical methods to measure neurotransmitter signaling and developing new microfluidic culture systems to study gut-brain-immune interactions.

Rachel Saylor rsaylor@oberlin.edu

Oberlin College, Chemistry and Biochemistry

As an analytical chemist, my research interests lie in answering neurobiological questions by developing novel analytical instrumentation and employing established analytical and biochemical techniques.

Amina Schartup aschartup@ucsd.edu

Scripps Institution of Oceanography, Scripps Institution of Oceanography

I am a sea-going oceanographer and biogeochemist with cross-cutting interests in marine chemistry, and environmental and public health. I study trace metals cycling and speciation in the environment, biota, and food systems using field and experimental data and models.

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Dhara Shah dhara.shah1@asu.edu

Arizona State University, School of Mathematical and Natural Sciences

We work with gut microbial enzymes that either generate or breakdown neuroactive molecules. The big question we are trying to answer is, can we use enzymes to modulate concentrations of neuroactive molecules in the host?

Karthik Shekhar kshekhar@berkeley.edu

University of California, Berkeley, Chemical & Biomolecular Engineering, Helen Wills Neuroscience Institute

My research is focused on the development and evolution of neural diversity in the brain. Diverse neuronal types are the building blocks of neural circuits. We use single-cell genomics and statistical inference tools to address these challenges in the visual system.

Mei Shen mshen233@illinois.edu

University of Illinois at Urbana-Champaign, Chemistry

We are interested in understanding gut-brain communication by probing the transmission dynamics of key neurochemicals (e.g., acetylcholine and glutamate) with high spatiotemporal resolution in vivo from the brain of mice, as well as chemical transmission at the synaptic cleft.

Abhishek Shrivastava ashrivastava@asu.edu

Arizona State University, Life Sciences and Biological Physics

My lab studies protein secretion machineries and the secretome of Bacteroidetes. We are interested in the regulation of protein secretion systems and their role in the breakdown of complex polymers in the gut and oral cavity.

Jae Sung sung.jaeyun@mayo.edu

Mayo Clinic, Surgery

My research group uses insights from the human microbiome to develop novel computational approaches that advance precision medicine for patients with autoimmune inflammatory disorders.

Hua Wang huawang3@illinois.edu

University of Illinois at Urbana-Champaign, Materials Science and Engineering

My laboratory aims to understand how cells can be manipulated and engineered to facilitate targeted delivery of therapeutics and regulate intercellular interactions, in order to improve and innovate therapies for cancers, injured tissues, autoimmune disorders, and other diseases.

Chris Whidbey whidbeyc@seattleu.edu

Seattle University, Chemistry

Chemical biology, proteomics, whole genome sequencing, maternal-child health

Kai Zhang kaizkaiz@illinois.edu

University of Illinois at Urbana-Champaign, Biochemistry

We study cell signaling and create new ways to restore and enhance cell functions.

Yanjiao Zhou yazhou@uchc.edu

University of Connecticut Health Center, Medicine

Diet, Microbial metabolites, Virome, Aging

Facilitators

Barbara Bendlin bbb@medicine.wisc.edu

University of Wisconsin, Medicine

I study trajectories of aging, including healthy brain aging and Alzheimer's disease and related dementias. My lab studies modifiable factors that may increase or decrease dementia risk, including gut microbiome, vascular risk, metabolic syndrome, and social contextual factors.

Ali Keshavarzian Ali_Keshavarzian@rush.edu

Rush University Medical Center, Rush Center for Integrated Microbiome & Chronobiology Research

Gut Microbiota and Brain-Axis

Raghuveer Parthasarathy Raghu@uoregon.edu

University of Oregon, Physics

Raghuveer Parthasarathy is a Physics professor at the University of Oregon. His group explores the structure and dynamics of the gut microbiome, applying 3D imaging techniques to zebrafish. Lab website: <https://pages.uoregon.edu/raghu/> ; blog: <https://eightenthelephant.com/>

Scialog: Microbiome, Neurobiology and Disease

Paul G. Allen Frontiers Group

Alexandra Basford

alexandra.basford@alleninstitute.org

Program Officer

Kathryn Richmond

kathrynr@alleninstitute.org

Director

Research Corporation for Science Advancement

Jennifer Brown jbrown@rescorp.org

Director of Finance and Human Resources

Jeni Dukes jdukes@rescorp.org

Program & Award Administrator, Senior

Laura Esham lesham@rescorp.org

Program Assistant

Andrew Feig afeig@rescorp.org

Senior Program Director

Danny Gasch dgasch@rescorp.org

Chief Financial Officer

Angela Hagen ahagen@rescorp.org

Communications Director

Kimberly Huynh khuynh@rescorp.org

Data Analytics Specialist

Lisa Jo Kastigar ljkastigar@rescorp.org

Executive Assistant to the President

Dan Linzer dlinzer@rescorp.org

President

Meg Zimlich Martin mmartin@rescorp.org

Director of Program & Award Administration

Aileen Quezada aquezada@rescorp.org

Program & Award Administrator

Silvia Ronco sronco@rescorp.org

Senior Program Director

Richard Wiener rwiener@rescorp.org

Senior Program Director



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

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