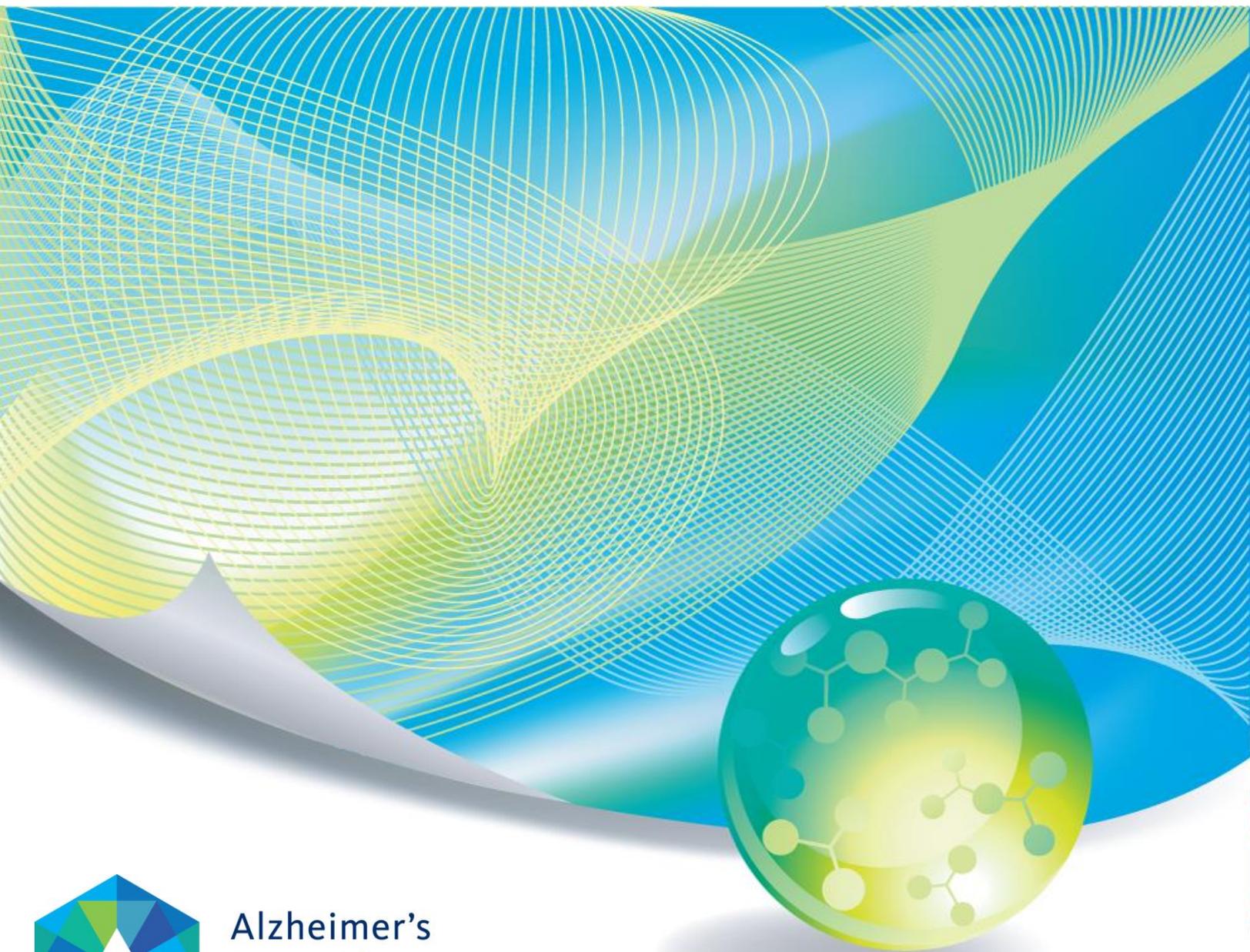


# 12<sup>th</sup> ANNUAL DRUG DISCOVERY FOR NEURODEGENERATION CONFERENCE:

An Educational Course on Translating Research into Drugs

February 4-6, 2018 • Arlington, VA

*Presented by the Alzheimer's Drug Discovery Foundation*



Alzheimer's  
**Drug Discovery**  
Foundation

[www.alzdiscovery.org](http://www.alzdiscovery.org)  
#CNSDrugCourse

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# LIST OF ABBREVIATIONS

- ADMET (absorption, distribution, metabolism, excretion, toxicity)
  - Absorption-ability of drug to penetrate the GI tract to the circulatory system
  - Distribution-solubility of drug in blood, binding to plasma proteins
  - Metabolism -chemical modifications of drug (e.g. by cytochrome P), amount available to reach target
  - Excretion-mechanisms of drug elimination from the body
  - Toxicity-deleterious on- or off-target effects of drug
- API-Active pharmaceutical ingredient
- AUC (Area Under the Curve)-The definite integral of the plot of drug concentration versus time in blood plasma. It is used to represent the total drug exposure over time, and can be helpful when comparing the total drug exposure from different formulations of the same drug
- BBB-Blood brain barrier
- CMC-Chemistry, manufacturing, control
- CNS-Central nervous system
- CRO-Contract research organization
- CSF-Cerebral spinal fluid
- CYP450-Cytochrome P450 enzyme family
- DMPK-(Drug Metabolism and Pharmacokinetics)- Usually a part of ADMET (Absorption, Distribution, Metabolism, and Excretion, Toxicity) studies
- FDA-Food and Drug Administration
- EMA-European Medicines Agency
- FBLD-Fragment based lead discovery
- FDG-PET- fludeoxyglucose positron emission tomography
- FTE-Full time employee
- FIH-First-in-humans
- GCP-Good clinical practice
- GLP-Good laboratory practice
- GMP-Good manufacturing practices (cGMP)
- HCS-High content screening
- hERG-Human ether-a-go-go gene hERG ion channel binding assay is an indicator of cardiotoxicity and predicts cardiac channel blockade through automated patch clamp.
- IHC – International Conference on Harmonisation-A set of guidelines enacted by the regulatory agencies of several different countries and the European Union
- HTS-High throughput screening
- IND-Investigational new drug
- IRB-Institutional review board
- LC-MS/MS-Liquid chromatography coupled with tandem mass spectrometry
- LOAEL-Lowest observable adverse effect level-The lowest dose of a drug that causes an adverse (harmful) event in the test subject, animal or human.
- LOEL-Lowest observed effect level
- logP-Octanol-water partition coefficient
- MW-Molecular weight
- Magnetic Resonance Imaging (MRI)-A non-invasive imaging technique that allows the study of structural elements of tissues within the human body
- Magnetic Resonance Spectroscopy (MRS)- A non-invasive imaging technique that allows the study of certain types of metabolic activity w/in tissues
- MTD-Maximum tolerated dose-The highest dose that can be administered without the subject experiencing unacceptable side effects
- MOA-Mechanism of action-How the drug acts to affect the biological pathways in the organism that lead to its therapeutic affect
- MW-Molecular weight-The size of a molecule, for drugs, normally given in Daltons (da)
- MDR1-MDCK cells-Madin Darby Canine Kidney cells, that stably express the Multi-drug resistance protein 1 (MDR1), otherwise known as P-glycoprotein 1 (P-gp)
- NCE-New chemical entity
- NDA-New drug application
- NIA-National Institute of Aging
- NIH-National Institutes of Health
- NINDS-National Institute of Neurological Disorders and Stroke
- NOAEL-No observable adverse effect level
- NOEL-No observable effect level
- MOA-Mechanism of action
- MTD-Maximum tolerated or minimally toxic dose
- PD-Pharmacodynamics
- PK-Pharmacokinetics
- POC-Proof of concept
- PET-Positron Emission Tomography- An imaging technology that detects gamma rays emitted by certain radioactive isotopes. Radioactive isotopes can be incorporated into a number of compounds, allowing imaging of different structures and processes in the body. PET imaging is especially valuable for assessing metabolic changes and target engagement of drugs in the CNS
- P-gp- p-glycoprotein-1, which is responsible for transporting many foreign substances out of cells.
- PSA-Polar surface area
- QSAR-Quantitative structure activity relationship
- SAR-Structure-activity relationship
- SBIR-Small Business Innovation Research Award
- SPR (surface plasmon resonance)- A powerful biophysical technique used for measuring the interaction of proteins and ligands
- SWOT (Strength Weaknesses Opportunities and Threats) Analysis-An evaluation undertaken by a company to understand its position in the market
- SOP-Standard operating procedure
- STTR-Small Business Technology Transfer
- TI-Therapeutic index, ratio between the dose that produces toxic effects to the dose needed for therapeutic response.
- Toxicokinetic parameters:
  - $AUC$  = area under the plasma concentration vs. time curve
  - $C_{max}$  = max. plasma concentration
  - $T_{max}$  = time to achieve maximum plasma concentration
  - $T_{1/2}$  = elimination half-life
  - $F$  = percent bioavailability
- TPP-Target product profile
- $IC_{50}$  – Inhibition concentration – concentration that reduces activity by 50%
- $K_i$  - Inhibition constant- an indication of how potent an inhibitor is
- $EC_{50}$  – Effective concentration – median concentration that causes 50% of the maximal response

# ABOUT THE ALZHEIMER'S DRUG DISCOVERY FOUNDATION

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Alzheimer's  
Drug Discovery  
Foundation

## CONQUERING ALZHEIMER'S THROUGH DRUG DISCOVERY

**Our mission: To accelerate the discovery of drugs to prevent, treat, and cure Alzheimer's disease, related dementias and cognitive aging.**

Founded in 1998 by Co-Chairmen Leonard and Ronald Lauder, the Alzheimer's Drug Discovery Foundation (ADDF) awards grants to leading scientists conducting breakthrough drug discovery and early clinical research. The ultimate goal of our unique organization is to support the science that will drive the development of drug therapies for Alzheimer's.

### WHAT WE'VE ACCOMPLISHED

- The ADDF has granted more than \$105 million to fund more than 570 Alzheimer's drug discovery programs and clinical trials in academic centers and biotechnology companies in 18 countries.
- As a measure of success, programs funded by the ADDF have gone on to receive commitments of nearly \$2 billion in follow-on commitments from the government, pharmaceutical companies and venture capital firms.
- In 2017, the ADDF raised over \$14 million to support clinical development programs and preclinical drug discovery. 100% of funds raised went directly to drug research and related scientific programs, thanks to the generosity of a private Lauder Family Foundation that covered all administrative and operational expenses.

### OUR CONFERENCES

The Alzheimer's Drug Discovery Foundation organizes two annual scientific conferences as part of our ongoing efforts to increase researchers' knowledge about Alzheimer's disease and the drug discovery process. The ADDF also plans smaller "catalyst conferences" that center on a relevant topic in the field of neurodegeneration.

Our **International Conference on Alzheimer's Drug Discovery**, held each year in fall, in Jersey City, NJ, brings together academic and industry scientists intent on accelerating the development of innovative treatments for Alzheimer's disease and related dementias. Top-level scientists in the field and the ADDF's funded investigators present on their current research progress and stimulate discussion.

And our **Drug Discovery for Neurodegeneration Conference** held each year in spring, is designed as a comprehensive course on the drug discovery process, from target validation through to clinical development. This annual conference provides participants with the fundamental knowledge and resources to translate their research into new drugs to treat and prevent Alzheimer's disease and related neurodegenerative diseases.

# SCIENTIFIC ADVISORY COMMITTEE

---

**Kurt Brunden, PhD**, University of Pennsylvania

**Howard Fillit, MD**, Alzheimer's Drug Discovery Foundation

**Lauren Friedman, PhD**, Alzheimer's Drug Discovery Foundation

**Marcie Glicksman, PhD**, Orig3n, Inc.

**Andrew Koemeter-Cox, PhD**, Alzheimer's Drug Discovery Foundation

**Frank Longo, MD, PhD**, Stanford School of Medicine

**Suzana Petanceska, PhD**, National Institutes of Health, National Institute on Aging

**Edward Spack, PhD**, MedaRed, Inc.

**D. Martin Watterson, PhD**, Northwestern University

## CONFERENCE DELIVERABLES

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A webcast of the entire conference will be made available on the Alzheimer's Drug Discovery Foundation Conference website (<http://www.worldeventsforum.com/addf/drugdiscovery/videocasts>), where you may also access a webcast of past year conferences.

**Alzheimer's Drug Discovery Foundation**

**12th ANNUAL DRUG DISCOVERY FOR NEURODEGENERATION CONFERENCE**  
An Educational Course on Translating Research into Drugs  
February 4-6, 2018 • Washington, DC

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**11th ANNUAL DRUG DISCOVERY FOR NEURODEGENERATION**

**Variability Across NHP Species**

- Apes (Superfamily Hominoidea) – most similar to humans
  - Orangutans, gorillas, chimpanzees
  - Diffuse amyloid plaques
- Old world monkeys (Superfamily Cercopithecoidea)
  - Rhesus, cynomolgus, baboons
  - Higher frequency of amyloid plaques with human-like distribution
  - No neuronal loss
- New world monkeys (Parvorder Platyrrhini)
  - Squirrel, marmosets, tamarins
  - Early amyloid deposits, CAA (particularly squirrel monkeys)
- Pylmative Monkeys (Suborder Strepsirhini)
  - Lemurs show early amyloid plaques and CAA

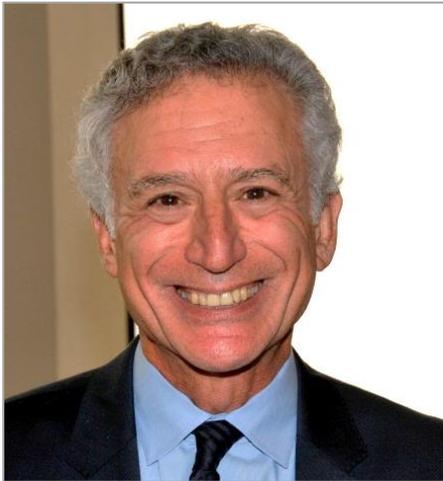
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PHILIPS et al., 2014; ROSENFELD et al., 2016

ANNUAL DRUG DISCOVERY FOR NEURODEGENERATION

# WELCOME REMARKS

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On behalf of the Alzheimer's Drug Discovery Foundation (ADDF), I am pleased to welcome you to the 12th Drug Discovery for Neurodegeneration Conference: An Educational Course on Translating Research into Drugs.

Designed as a comprehensive course on the drug discovery process, from target validation through to clinical development, this annual Drug Discovery for Neurodegeneration conference provides participants with the fundamental knowledge and resources to translate their research into new drugs to treat and prevent Alzheimer's disease and related neurodegenerative diseases.

I would like to personally thank our scientific advisory committee session chairs, and speakers for their dedication and commitment to this meeting. Your expertise in the field and willingness to share lessons learned has

helped to make this course possible.

We encourage you to visit the poster presentations which showcases our talented Young Investigator Award winners. Poster presentations are scheduled for 30 minutes before the lunch breaks.

Our meeting is made possible by the generous support of our sponsors: National Institute of Aging, Merck, the Centers for Therapeutic Innovation (CTI), Taub Institute for Research on Alzheimer's Disease and the Aging Brain, Harrington Discovery Institute, The National Multiple Sclerosis Society, and our exhibitors: Canopy Biosciences, Charles River, Forschungszentrum Jülich GmbH, InterVivo Solutions Inc., PsychoGenics, Inc., and ADDF ACCESS. We would also like to thank our media partners for their commitment to making this meeting a success.

This year, we are pleased to host the meeting in Washington DC metro area, home to 13 nationally ranked universities and 2 Nobel Laureates in the sciences are graduates of DC areas universities. The National Institutes of Health (NIH) was founded in 1887 in Bethesda and today it is one of the world's foremost medical research centers. Also here, the life science cluster known as "DNA Alley" is home to 170 biotech companies. DNA Alley consists of nearly 60,000 private sector and government employees. The DC metro area is the top paying region for biological scientists (R&D makes up the majority of life science employment in the metropolitan area) and is home to prestigious research-heavy universities and major labs, like the Institute for Bioscience and Biotechnology Research and the Lawrence Livermore National Laboratory. We are thrilled to be able to participate in this community and bring our conference to this progressive state.

Looking forward to a stimulating and educational two and half days, we thank you for joining us!

A handwritten signature in cursive script that reads "Howard".

Howard Fillit, MD  
*Founding Executive Director and Chief Science Officer*  
Alzheimer's Drug Discovery Foundation

# PROGRAM

General Sessions will be held in Salon 1 and 2; breakfasts, breaks, & lunches, in the Plaza Ballroom.

SUNDAY, FEBRUARY 4, 2018	
2:00pm-5:00	Registration
4:00-4:20	<b>Welcome &amp; Opening Remarks: Challenges and Opportunities in Academic Drug Discovery</b> Howard Fillit, MD—Alzheimer's Drug Discovery Foundation
4:20-5:00	<b>KEYNOTE: Executing a Drug Discovery Program with an Eventual Clinical Trial in Mind</b> Richard Mohs, PhD—Global Alzheimer's Platform Foundation
5:00-5:10	<b>Q&amp;A</b>
5:10-7:00	<b>Welcoming Reception</b>
MONDAY, FEBRUARY 5, 2018	
7:30am-8:30	Breakfast
8:30-8:40	<b>Opening Remarks and ADDF Funding Opportunities</b> Andrew Koemeter-Cox, PhD—Alzheimer's Drug Discovery Foundation
8:40-8:50	<b>NIA Opportunities for Translational Research Funding</b> Lorenzo Refolo, PhD—National Institutes of Health, National Institute on Aging
8:50-9:00	<b>NINDS Opportunities for Translational Research Funding</b> Amir Tamiz, PhD—National Institutes of Health, National Institute for Neurological Diseases and Stroke
<b>Session I. Embarking on a Drug Discovery Campaign</b> Chair: Marcie Glicksman, PhD—Orig3n, Inc.	
9:00-9:05	<b>Session Overview:</b> Marcie Glicksman, PhD—Orig3n, Inc.
9:05-9:25	<b>What Makes a Good Translational Target?</b> Richard Margolin, MD—Pfizer, Inc.
9:25-9:35	<b>Q&amp;A</b>
9:35-9:55	<b>New Trends and Technology in Assay Development</b> Marcie Glicksman, PhD—Orig3n, Inc.
9:55-10:05	<b>Q&amp;A</b>
10:05-10:25	<b>Phenotypic Screening in Drug Discovery: An Industry Perspective</b> Claire Steppan, PhD—Pfizer, Inc.
10:25-10:35	<b>Q&amp;A</b>
10:35-11:00	<b>EXHIBITOR SESSION AND BREAK</b>
<b>Session II. Starting at the End: The Pharmacology—Chemistry Interface in Preclinical Drug Development</b> Chair: D. Martin Watterson, PhD—Northwestern University	
11:00-11:05	<b>Session Overview:</b> D. Martin Watterson, PhD—Northwestern University
11:05-11:25	<b>Ask Your Chemist Which Chemical Series Is Right for You</b> Amy Ripka, PhD—Lucy Therapeutics
11:25-11:35	<b>Q&amp;A</b>
11:35-11:55	<b>PK/PD in Preclinical Development</b> Sharon Rosenzweig-Lipson, PhD—AgeneBio, Inc.
11:55-12:05pm	<b>Q&amp;A</b>
12:05-12:25	<b>Integrating Smart Biology with Smart Chemistry: Risk Reduction through Secondary Pharmacology and Exploratory Drug Safety</b> D. Martin Watterson, PhD—Northwestern University
12:25-12:35	<b>Q&amp;A</b>
12:35-12:45	<b>Young Investigator Scholarship Awards Presented</b> Nicholas McKeehan—Alzheimer's Drug Discovery Foundation
12:45-1:15	<b>YOUNG INVESTIGATOR SCHOLARSHIP POSTER SESSION</b> Poster Abstracts #1-12
1:15-2:15	<b>LUNCH</b>
<b>Session III. Drug Discovery: From Lead to Clinical Candidate</b> Chair: Edward Spack, PhD—MedaRed, Inc.	
2:15-2:20	<b>Session Overview:</b> Edward Spack, PhD—MedaRed, Inc.
2:20-2:40	<b>Drug Delivery for CNS Disease</b> William Banks, MD—VA/University of Washington

2:40-2:50	<b>Q&amp;A</b>
2:50-3:10	<b>Improving the Translatability of Animal Models of Neurodegeneration</b> Caroline Zeiss, PhD—Yale University School of Medicine
3:10-3:20	<b>Q&amp;A</b>
3:20-3:40	<b>Integrating Biomarkers into Drug Discovery and Development for Increased Changes of Success</b> Kenneth Marek, MD—The Institute for Neurodegenerative Disorders
3:40-3:50	<b>Q&amp;A</b>
3:50-4:10	<b>Requirements for an IND</b> Edward Spack, PhD—MedaRed, Inc.
4:10-4:20	<b>Q&amp;A</b>
4:20-4:40	<b>ADDF ACCESS</b> Lauren Friedman, PhD—Alzheimer's Drug Discovery Foundation
4:50-5:50	<b>Partnering/Mentoring Session (pre-registration required)</b>
4:40-6:40	<b>Networking Reception</b>
<b>TUESDAY, FEBRUARY 6, 2018</b>	
7:30am-8:00	<b>Partnering/Mentoring Session (pre-registration required)</b>
7:30-8:20	<b>Continental Breakfast</b>
8:20-8:25	<b>Welcome &amp; Opening Remarks</b> Lauren Friedman, PhD—Alzheimer's Drug Discovery Foundation
8:25-9:05	<b>KEYNOTE: Changing Ecosystem of Drug Discovery: Rising Role of Academia and Academic-Pharma Partnerships in the Development of New Therapeutics</b> Barbara Slusher, PhD—Johns Hopkins University School of Medicine
9:05-9:15	<b>Q&amp;A</b>
<b>Session IV. Strategies for Challenging CNS Targets—Case Study Examples</b>	
Chair: Kurt Brunden, PhD—University of Pennsylvania	
9:15-9:20	<b>Session Overview:</b> Kurt Brunden, PhD—University of Pennsylvania
9:20-9:40	<b>Microtubule Stabilizing Compounds for Neurodegenerative Diseases</b> Kurt Brunden, PhD—University of Pennsylvania
9:40-9:50	<b>Q&amp;A</b>
9:50-10:10	<b>Imaging Inflammation in Patients with Alzheimer's Disease or Dementia with Lewy Bodies</b> William Kreisl, MD—Taub Institute, Columbia University
10:10-10:20	<b>Q&amp;A</b>
10:20-10:50	<b>EXHIBITOR SESSION AND BREAK</b>
10:50-11:10	<b>Clinical Development of a Selective PDE4D Inhibitor</b> Mark Gurney, PhD—Tetra Discovery Partners Inc.
11:10-11:20	<b>Q&amp;A</b>
11:20-11:40	<b>Neurophysiological Biomarkers for Neurodegenerative Disease Drug Development</b> Daniel Javitt, MD, PhD—Columbia University Medical Center
11:40-11:50	<b>Q&amp;A</b>
11:50-12:20pm	<b>YOUNG INVESTIGATOR SCHOLARSHIP POSTER SESSION</b> Poster Abstracts #13-22
12:20-1:20	<b>LUNCH</b>
<b>Session V. Commercialization Strategies: Developing Science into Products</b>	
Chair: Frank Longo, MD, PhD—Stanford School of Medicine	
1:20-1:25	<b>Session Overview:</b> Frank Longo, MD, PhD—Stanford School of Medicine
1:25-1:45	<b>Intellectual Property Strategies: What and When to File for Patent Protection</b> Leslie Meyer-Leon, JD—IP Legal Strategies Group PC
1:45-1:55	<b>Q&amp;A</b>
1:55-2:15	<b>Finding and Working with Investors/Industrial Partners</b> Rana Quraishi, PhD—UM Ventures, University of Maryland Baltimore
2:15-2:25	<b>Q&amp;A</b>
2:25-2:45	<b>Lessons Learned in Drug Development from an Academic and Small Biotech Perspective</b> Frank Longo, MD, PhD—Stanford School of Medicine
2:45-2:55	<b>Q&amp;A</b>
2:55- 3:00	<b>Closing Remarks</b> Andrew Koemeter-Cox, PhD—Alzheimer's Drug Discovery Foundation

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on Aging ■ ◆ ★ ✨

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## EXHIBITORS

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# 2018 ADDF SCHOLARSHIP AND AWARD WINNERS

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Congratulations to all of the 2018 ADDF Young Investigator Scholarship and Award winners! These scholarships recognize the early achievements of talented young investigators and seek to encourage the career development of the next generation of research scientists in the field of drug discovery for neurodegenerative diseases.

## OUTSTANDING YOUNG INVESTIGATOR AWARDS

**Mohammad Parvez Alam, PhD**, *David Geffen School of Medicine at UCLA*

**Parco Chan, MSc (cand.)**, *University of Toronto*

**Sergio Rodriguez Labra**, *Center for Neurodegenerative Disease Research – University of Pennsylvania*

**Myuri Ruthirakuhan, PhD (cand.)**, *University of Toronto*

**Nupur Verma, PhD**, *University of California, San Francisco*

## YOUNG INVESTIGATOR SCHOLARSHIPS

Diana Acosta, PhD (cand.), *Weill Cornell Medicine*

Aida Adlimoghaddam, PhD, *St. Boniface Hospital Research Centre*

Madhunika Agrawal, PhD, *Panjab University*

Heather Ballance, PhD, *Boston University*

Harshul Batra, PhD, *Georgia State University*

Manoj Govindarajulu, PhD (cand.), *Auburn University*

Sarah Hopp, PhD, *Massachusetts General Hospital*

Karolina Janczura, PhD (cand.), *University of Miami Miller School of Medicine*

Shanya Jiang, PhD, *University of New Mexico*

Priya Kashyap, PhD, *Guru Gobind Singh Indraprastha University, New Delhi, India*

Yujin Kim, DVM, *Mayo Clinic*

Lucas Kraft, PhD (cand.), *University of Sussex*

Aarti Mishra, MS, *University of Southern California*

Ahmed Morsy, MS, *Texas Tech Health Science Center*

Emmanuel Olawode, PhD, *Rhodes University*

Andrea Popelova, PhD, *Institute of Organic Chemistry and Biochemistry AS CR*

Zainuddin Quadri, PhD, *Byrd Alzheimer's Institute*

Deepa Rajan, *Vanderbilt University*

Sindhu Ramesh, PhD (cand.), *Auburn University*

Purnendu Sharma, MS, *The University of Mississippi*

Manjeet Singh, PhD, *INRS-Institut Armand Frappier*

# **CHAIRS AND SPEAKERS**

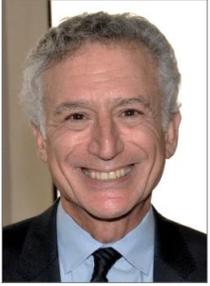
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# **BIOS AND ABSTRACTS**

## DAY 1: Welcome Remarks

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### Howard Fillit, MD, Alzheimer's Drug Discovery Foundation



Howard Fillit, MD, a geriatrician, neuroscientist and a leading expert in Alzheimer's disease, is the founding Executive Director of the Alzheimer's Drug Discovery Foundation (ADDF). The ADDF's mission is to accelerate the discovery and development of drugs to prevent, treat and cure Alzheimer's disease, related dementias and cognitive aging. Dr. Fillit has had a distinguished academic medicine career at The Rockefeller University and The Mount Sinai School of Medicine where he is a clinical professor of geriatrics and medicine and professor of neurobiology. He is a co-author of more than 300 scientific and clinical publications and is the senior editor of the leading international Textbook of Geriatric Medicine and Gerontology.

Previously, Dr. Fillit was the Corporate Medical Director for Medicare at New York Life, responsible for over 125,000 Medicare managed care members in five regional markets. Dr. Fillit has received several awards and honors including the Rita Hayworth Award for Lifetime Achievement. He also serves as a consultant to pharmaceutical and biotechnology companies, health care organizations and philanthropies. Throughout his career, he has maintained a limited private practice in consultative geriatric medicine with a focus on Alzheimer's disease and related dementias.

## DAY I: Keynote Lecture

### Richard Mohs, PhD, Global Alzheimer's Platform Foundation

---



Richard Mohs, PhD, is the Chief Scientific Officer for the Global Alzheimer's Platform (GAP) Foundation. He retired in 2015 from Eli Lilly and Company where he held several leadership positions including Vice President for Neuroscience Early Clinical Development (2012-2015) and Leader of the Global Alzheimer's Drug Development Team (2007-2012).

Dr. Mohs received the PhD in psychology from Stanford University. Before joining Eli Lilly in 2002, Dr. Mohs spent 23 years with the Mount Sinai School of Medicine in New York City where he was Professor in the Department of Psychiatry and Associate Chief of Staff for Research at the Bronx Veterans Affairs Medical Center.

He is the author or co-author of over 350 scientific papers, including those describing clinical trials that led to the approval, in the US and other countries, of cholinergic drug treatments for Alzheimer's disease. In addition to his work for the GAP Foundation, Dr. Mohs serves as a consultant to Agenebio, a Baltimore-based company developing an SV2A antagonist for treatment of mild cognitive impairment. He also serves as a member of the Board of Governors for the Alzheimer's Drug Discovery Foundation in New York, a member of the Board of Directors for CogState, Ltd, based in Melbourne, Australia, and as Senior Associate Editor for Alzheimer's and Dementia, the journal of the Alzheimer's Association.

---

### Executing a Drug Discovery Program with an Eventual Clinical Trial in Mind

Richard Mohs

*Global Alzheimer's Platform Foundation*

This presentation will give an overview of the drug discovery and development process including selection and validation of biological targets, screening of pharmacological agents, development of pharmacokinetic (PK) and pharmacodynamic (PD) biomarkers, and sequencing of non-clinical and clinical studies. Emphasis will be placed on early development of data and tools that improve the decision-making value of later studies so that clear decisions about targets and specific molecules can be made with a minimum of scientific uncertainty. Examples of discovery and development programs that made effective use of early target validation studies and PK and PD biomarkers will be discussed. The use of clinical trial data to inform early discovery and development efforts will also be discussed.

## DAY 2: Opportunities for Translational Research Funding

---

### Andrew Koemeter-Cox, PhD, Alzheimer's Drug Discovery Foundation



Andrew Koemeter-Cox, PhD, works on the ADDF's scientific initiatives, including the ACCESS program. In this capacity, he assists with reviews of funding proposals and manages the ACCESS website, which connects researchers with CROs and other drug discovery expertise.

Dr. Koemeter-Cox was most recently a postdoctoral fellow at the Icahn School of Medicine at Mount Sinai, where he studied the epigenetics of axon regeneration in the context of spinal cord injury. From 2007 until 2009, he was a research technician with the United States Army Medical Research Institute of Chemical Defense (USAMRICD), assisting with studies on neuroprotection strategies.

Dr. Koemeter-Cox earned a doctorate in biomedical science from The Ohio State University College of Medicine and a bachelor's degree in biochemistry from the University of Delaware. He is a member of the New York Academy of Sciences, where he serves as a mentor for several programs.

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### ADDF Funding Opportunities

Andrew Koemeter-Cox

*Alzheimer's Drug Discovery Foundation, New York, NY, USA*

Dr. Koemeter-Cox will present Alzheimer's Drug Discovery Foundation's spectrum of funding opportunities and programs.

## **Lorenzo Refolo, PhD, National Institutes of Health, National Institute on Aging**



Lorenzo Refolo, PhD, is the Director for Alzheimer's Disease Drug Discovery and Development at the National Institute on Aging (NIA). He received his PhD in Molecular Genetics from the Rutgers University School of Medicine and postdoctoral training at the Laboratory of Neurobiology at Rockefeller University as well as the Department of Psychiatry at Mount Sinai School of Medicine. Following his postdoctoral training, Dr. Refolo held positions as Assistant Professor at Mount Sinai School of Medicine, Associate Consultant and Assistant Professor at the Mayo Clinic, Jacksonville, and Research Scientist at the Nathan Kline Institute for Psychiatric Research at New York University. After leaving academia, Dr. Refolo was the Scientific Director at the Institute for the Study of Aging where he created and managed a large portfolio of Alzheimer's drug discovery programs. In 2005

Dr. Refolo joined the NIH as a Program Director at the National Institute of Neurological Disorders and Stroke (NINDS), managing a portfolio of basic, clinical, and translational research that was focused on neurodegenerative diseases. He has been at the NIA since 2010, and has developed and managed a diverse portfolio of translational research programs.

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## **Bridging the Preclinical to Clinical Gap: An Overview of Translational Research Programs at the NIA**

Lorenzo Refolo

*National Institutes of Health, National Institute on Aging, Bethesda, MD, USA*

The talk will provide an overview of the NIA Translational Research Program and focus on a number of funding opportunities and initiatives available to investigators.

## **Amir Tamiz, PhD, National Institutes of Health, National Institute for Neurological Diseases and Stroke**



Amir Tamiz, PhD, is a Program Director at the National Institute of Neurological Disorders and Stroke (NINDS), Office of Translational Research (OTR). In this capacity, Dr. Tamiz oversees NIH Blueprint Neurotherapeutics network (BPN) and Innovation Grants to Nurture Initial Translational Efforts (IGNITE). Prior to joining NIH in 2012, Dr. Tamiz had held scientific and management positions in research and development of therapeutic programs at Corvus International (acquired by Dendreon), CovX (now part of Pfizer), and Alba Therapeutics. Dr. Tamiz received his PhD at University of Oregon and conducted postdoctoral research at the Department of Neuroscience at Georgetown University Medical Center.

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## **NINDS Opportunities for Translational Research Funding**

Amir Tamiz

*National Institutes of Health, National Institute for Neurological Diseases and Stroke, Bethesda, MD, USA*

The Division of Translational Research (DTR) at the National Institute of Neurological Disorders and Stroke (NINDS) provides many funding opportunities to accelerate leading-edge preclinical research. DTR helps academic and industry researchers create a bridge through which discoveries made in the lab lead to new and improved medical treatments and options for patient care. DTR provides funding and resources (approximately \$100 million annually) through grants, cooperative agreements, and contracts to academic and industry researchers to advance early-stage neurological technologies, devices, and therapeutic programs to industry adoption (i.e., investor funding and corporate partnerships). DTR comprises seven programs that support the design, implementation, and management of research activities to critical translational challenges in neurology. The presentation will cover funding opportunities at DTR/NINDS and provide examples for best practices for converting basic research discoveries into therapeutic modalities for treatment of neurological disorders and stroke.

The presentation will cover funding opportunities at DTR/NINDS and provide examples for best practices for converting basic research discoveries into therapeutic modalities for treatment of neurological disorders and stroke.

# **SESSION I: Embarking on a Drug Discovery Campaign**

**Chair: Marcie Glicksman, PhD—Orig3n, Inc.**

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## **What Makes a Good Translational Target?**

Richard Margolin, MD—Pfizer, Inc.

## **New Trends and Technology in Assay Development**

Marcie Glicksman, PhD—Orig3n, Inc.

## **Phenotypic Screening in Drug Discovery: An Industry Perspective**

Claire Stepan, PhD—Pfizer, Inc.

## SESSION I: Embarking on a Drug Discovery Campaign

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### Richard Margolin, MD, Pfizer, Inc.



Richard Margolin, MD, is a geriatric psychiatrist with extensive academic and pharmaceutical industry experience focused on CNS disorders, especially Alzheimer's disease. He is currently Executive Director, Clinical Neuroscience at Pfizer, Inc.

Dr. Margolin led clinical development for CereSpir, Inc., a biotech company targeting disease-modifying treatments for Alzheimer's disease and other neurodegenerative disorders. Prior to this, he was at Janssen Alzheimer Immunotherapy R&D, where he served as Senior Director of Biomarkers, playing a key role in executing biomarker sub-studies associated with the bapineuzumab Phase 3 program conducted collaboratively by Janssen and Pfizer. Previously, he held positions with

Merck Research Laboratories and i3 Research, and for many years prior to entering the pharmaceutical industry, he had leadership positions in academic medicine, first at Vanderbilt University and then at the Keck USC School of Medicine.

He has served as PI or co-PI for over 50 clinical trials targeting AD, MCI, and other CNS indications, and was site PI for the NIH-sponsored Alzheimer's Disease Cooperative Study. He has authored or co-authored over 60 scientific publications.

Dr. Margolin is board-certified in psychiatry. Dr. Margolin obtained a Bachelor's degree from Harvard University, a Medical Degree from the University of California, Irvine, and trained in psychiatry at Vanderbilt.

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### What Makes a Good Translational Target?

Richard Margolin

*Pfizer, Inc., Cambridge, MA, USA*

## SESSION I: Embarking on a Drug Discovery Campaign

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### Marcie Glicksman, PhD, Orig3n, Inc.



Marcie Glicksman, PhD, is the Chief Scientific Officer at Orig3n, Inc., a biotechnology company that has established the world's largest uniformly consented HLA-matched cell repository to be used to better understand the cellular and molecular foundations of disease.

Dr. Glicksman has been in the field of drug discovery for more than 20 years. Previously, Dr. Glicksman was the Co-Director of the Laboratory for Drug Discovery in Neurodegeneration (LDDN), which aimed at accelerating the identification of new therapeutics. While at LDDN, she helped start eight new companies, one that now has a commercial product.

Previously, she was at Descartes Therapeutics which focused on pain therapeutics and then, at Cubist, which targeted novel antibiotics. Prior to these positions, she was at DuPont-Merck and at Cephalon, Inc. Dr. Glicksman has led multiple advanced programs for neurodegenerative diseases including co-inventorship of CEPI 347, a drug candidate directed at a kinase that has been in Phase III clinical trials. She has also been part of the team to prepare an IND for a drug for neuropathic pain that has just completed Phase II clinical trials.

From 2005-2009, Dr. Glicksman was elected to the Board of Directors and served as Chairman of the Board for the Society for Biomolecular Sciences (now Society for Laboratory Automation and Screening). Dr. Glicksman is also on the Science Advisory Board for the Alzheimer's Drug Discovery Foundation (ADDF), the California Institute for Regenerative Medicine (CIRM), and reviews grants for NIH, Department of Defense, SBIR, the Michael J Fox Foundation, Alzheimer's Association, and Rett Foundation.

Dr. Glicksman co-founded the Academic Drug Discovery Consortium as a way to build a collaborative network for the academic drug discovery community. She co-designed and developed an annual drug discovery course supported by NIH. She also regularly consults and this has included filing an Investigational New Drug application with the FDA, as well as projects involving the development of new technologies.

Dr. Glicksman received a bachelor's degree from Brown University and a PhD in Neuroscience from Washington University. She has over 75 publications and 16 issued patents.

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## New Trends and Technology in Assay Development

Marcie Glicksman

*Orig3n, Inc., Boston, MA, USA*

Neurodegenerative diseases are challenging from a drug discovery perspective with no disease modifying agents available on the market. To develop new strategies for a successful drug discovery campaign, selecting the best assays is extremely important. The assays you select will determine your starting point and your criteria for moving projects forward. The lack of success is at least partly due to the poor disease models that have been available for a biologically complex system as the brain.

I will talk about what choices need to be made in selecting the best assay based on your target. I will also discuss new assay development trends. For example, the pros and cons for target-based versus phenotypic-based assays, the role of patient-derived induced pluripotent stem cells and primary cells and other technologies that are available for creating better disease models.

## SESSION I: Embarking on a Drug Discovery Campaign

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### Claire Steppan, PhD, Pfizer, Inc.



Claire Steppan, PhD is an Associate Research Fellow at Pfizer, Inc in the Primary Pharmacology group in Discovery Sciences. She has been at Pfizer for 15 years. Previously, Dr. Steppan was Assistant Research Professor in the Division of Endocrinology, Diabetes and Metabolism at University of Pennsylvania School of Medicine. Dr. Steppan is an accomplished pharmacologist with scientific leadership spanning early discovery through clinical development in obesity, diabetes and neurodegenerative diseases. She is an enthusiastic proponent for phenotypic screening and the value it can bring to new medicines. Within Pfizer, Dr. Steppan has been the research project leader for multi-disciplinary teams that produced two FIH starts and one Phase 2 start for the treatment of Type 2 diabetes. Dr. Steppan identified the hormone, resistin that plays a role in obesity associated insulin resistance. She has a long standing interest in SLC transporters beginning with Pfizer's SGLT2 inhibitor in which her group provided all the pharmacology data for the recently approved drug, ertugliflozin to the current global efforts for Pfizer as the project lead on an IMI consortium ReSolute. Dr Steppan obtained a Ph.D. in biochemistry from Boston University School of Medicine and a BS in biochemistry from Lehigh University.

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### Phenotypic Screening in Drug Discovery: An Industry Perspective

Claire Steppan

*Pfizer, Inc., Groton, CT, USA*

Using phenotypic drug discovery (PDD) approaches to identify novel drugs for complex not well-understood diseases is on the rise. In contrast to target based strategies, PDD does not require the identification of a specific molecular target nor its causal role in disease. The focus is on a cellular disease phenotype that is translatable to pathological disease and identification of small molecules that can modulate in a disease modifying manner. The process of hit triage and target deconvolution following a phenotypic screen is extensive and difficult. This talk will focus on practical guidance on what comprises an ideal phenotypic assay and the challenges involved in PDD as learned by researchers participating in PDD in the pharmaceutical industry.

# **SESSION II: Starting at the End: The Pharmacology—Chemistry Interface in Preclinical Drug Development**

**Chair: D. Martin Watterson, PhD—Northwestern University**

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## **Ask Your Chemist Which Chemical Series Is Right for You**

Amy Ripka, PhD—Lucy Therapeutics

## **PK/PD in Preclinical Development**

Sharon Rosenzweig-Lipson, PhD—AgeneBio

## **Integrating Smart Biology with Smart Chemistry:**

### **Risk Reduction through Secondary Pharmacology and Exploratory Drug Safety**

D. Martin Watterson, PhD—Northwestern University

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## **YOUNG INVESTIGATOR SCHOLARSHIP AWARDS PRESENTATION**

Nicholas McKeehan—Alzheimer's Drug Discovery Foundation

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## **YOUNG INVESTIGATOR SCHOLARSHIP POSTER SESSION**

Poster Abstracts #1-12

## SESSION II: Starting at the End: The Pharmacology—Chemistry Interface in Preclinical Drug Development

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### Amy Ripka, PhD, Lucy Therapeutics



Amy Ripka, PhD, has garnered more than 18 years of drug discovery and medicinal chemistry expertise ranging from big pharma to CROs. At Bristol-Myers Squibb, Amy was part of the teams that discovered and developed Asunaprevir and Daclatasvir, for the treatment of Hepatitis C. Later as Head of Chemistry at EnVivo/FORUM, Amy directly led the discovery and development of their PDE10 inhibitor into a Phase I Trial. She has also worked on compounds for GPCRs, kinases, ion channels, phosphatases, ADCs, and HDACs, some of which have also entered clinical trials.

Amy has extensive biotech experience in multiple therapeutic areas including cardiovascular, oncology, pain and CNS having worked at several notable Boston biotechs including Infinity, HydraBiosciences, FoldRx and EnVivo/FORUM. Amy was on the Executive Team at two large life science CROs, Sai Life Sciences in India and WuXiAppTec in China. Her role was to advise and guide clients from academic labs and nascent biotechs/foundations through the preclinical drug discovery process. This included the development of chemical matter, SAR analysis, DMPK triaging as well as screening tree strategies, patenting of chemical matter as well as IND planning and engagement of VC and Foundation partnering contacts.

Most recently Amy founded Lucy Therapeutics, a Boston-based biotech focused on improving mitochondrial function both directly and indirectly for the treatment of neuronal impairment and neurodegenerative diseases. Amy chaired the prestigious Medicinal Chemistry Gordon Conference in 2012 and has been a member of the MEDI Executive Committee at the American Chemical Society since 2012. She has also been on the SABs of several national and international meetings (Frontiers in Medicinal Chemistry, National Medicinal Chemistry Symposium) and is currently on the SAB of the venture capital group Q Biomed.

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### Ask Your Chemist Which Chemical Series Is Right for You

Amy Ripka

*Lucy Therapeutics, Cambridge, MA, USA*

The choice of which chemical series to focus on for a CNS discovery program and how to know when to pursue or abandon it is a difficult one. My talk will develop several areas of thought in this area including the following: hit finding in the lab and in the literature, compound design for PK vs. PD target requirements, use of in silico parameters and filters as well as common misconceptions and pitfalls in the design of compounds for brain penetration, dosing route and exposure.

## SESSION II: Starting at the End: The Pharmacology—Chemistry Interface in Preclinical Drug Development

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### Sharon Rosenzweig-Lipson, PhD, AgeneBio, Inc.



Sharon Rosenzweig-Lipson, PhD, is President of IVS Pharma Consulting. In 2011, Dr. Rosenzweig-Lipson founded IVS Pharma Consulting to bring her expertise in screening strategies, in vivo models, translation and early clinical development strategy to the neuroscience scientific community in pharma, biotech and academia.

She has over 20 years experience developing compounds for psychiatric and neurologic indications in the pharmaceutical industry. She has successfully led teams from the earliest exploratory studies through to Phase II Proof of Concept Trials. Prior to her current positions, Dr. Rosenzweig-Lipson held the roles of Head of Translational Neuroscience and In Vivo Head of Psychiatry at Wyeth Research. Dr. Rosenzweig-Lipson received her BA in Biological Basis of Behavior from the University of Pennsylvania and her PhD in Behavioral Neuroscience from Harvard University.

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### PK/PD in Preclinical Development

Sharon Rosenzweig-Lipson

*AgeneBio, Inc., East Brunswick, NJ, USA*

Pharmacokinetics is the evaluation of how the body Absorbs, Distributes, Metabolizes and Eliminates (ADME) a compound in plasma (and in CSF or brain for CNS indications). Pharmacodynamics is the evaluation of how a compound engages its target and produces the desired action (eg produces behavioral effect indicative of therapeutic benefit). In drug discovery it is critical to understand the PK/PD relationship of a compound to ensure that the compound is dosed in the right amount, at the right time, by the right route of administration to ensure the compound gets to its target at sufficient exposures to produce the desired outcome. Once this exposure relationship is established, a therapeutic index for the exposures of adverse events relative to the exposure of the therapeutic effect can be determined ensuring that a compound is safe to administer to patients. This talk will discuss in vitro predictors of in vivo pharmacokinetics. Examples from preclinical and clinical programs in AD will be used to highlight how these properties influence decision making in drug discovery.

## SESSION II: Starting at the End: The Pharmacology—Chemistry Interface in Preclinical Drug Development

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### D. Martin Watterson, PhD, Northwestern University



Daniel Martin Watterson, PhD, serves in an advisory role to pharmaceutical and biotechnology companies in the areas of process and risk analysis. In addition to industry consulting, Dr. Watterson serves on advisory boards for small business start-ups, biotechnology companies, and non-profit organizations in the area of CNS drug discovery and development. His personal CNS drug development experience includes the discovery and preclinical development of novel small molecule therapeutic candidates that attenuate disease related to synaptic dysfunction, as well as participation in development of protein replacement therapeutics.

Dr. Watterson is the G.D. Searle Endowed Chair Professorship at Northwestern University, where he is also Professor of Pharmacology in the Feinberg School of Medicine. Previous relevant activities at Northwestern include the founding of an academic drug discovery research and training program characterized by the generation of multiple CNS drug candidates taken into preclinical and clinical development through the leveraged use of Foundation and NIH funding. He also served in various administrative positions, including Department Chair, University Center Director, and Curriculum Co-Director.

Prior to Northwestern, he held faculty positions at The Rockefeller University, where he was an Andrew Mellon Fellow, and at Vanderbilt University Medical Center, where he was Professor of Pharmacology and an Investigator in the Howard Hughes Medical Institute.

Dr. Watterson is the recipient of the 2016 Melvin R. Goodes Prize recognizing researchers working in promising areas of drug discovery for Alzheimer's disease and related dementias.

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### **Integrating Smart Biology with Smart Chemistry: Risk Reduction through Secondary Pharmacology and Exploratory Drug Safety**

Daniel Martin Watterson

*Northwestern University, Chicago, IL, USA*

The detailed experimental approach for medicinal chemistry refinement and optimization in the hit->lead compound->drug candidate maturation process is based on specifics of chemical tractability and pharmacology-based biology considerations. The efficiency and risk reduction goals of the process can be facilitated by integration of pharmacology-driven considerations such as safety, metabolism, pharmacodynamics, pharmacokinetics and disease indication goals with the recursive activities of medicinal chemistry refinement and optimization. For example, a variety of standard in vitro pharmacological screens can be performed at early steps in hit-to-lead refinement and in lead compound optimization to identify metabolic, transport and pharmacogenomic liabilities. Similarly, the major challenge in CNS drug discovery of blood-brain barrier penetrance can be addressed at the design phase through the consideration of multiple property optimization (MPO), especially if curated databases using in vivo outcomes are leveraged, and through the incorporation of in vivo screens at key medicinal chemistry refinement stages. This strategic incorporation of in vitro and in vivo filters or secondary pharmacology screens is sometimes referred to as “smart biology”. It is commonly integrated in the design->synthesis->screen->synthesis->screen cycle to generate “smart chemistry” to facilitate the synthesis of fewer and higher quality compounds. The approach can be especially useful in areas lacking established pharmacological precedents or campaigns seeking to generate potential new chemical entities.

# **SESSION III: Drug Discovery: From Lead to Clinical Candidate**

**Chair: Edward Spack, PhD—MedaRed, Inc.**

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## **Drug Delivery for CNS Disease**

William Banks, MD—VA/University of Washington

## **Improving the Translatability of Animal Models of Neurodegeneration**

Caroline Zeiss, BVSc, PhD—Yale University

## **Integrating Biomarkers into Drug Discovery and Development for Increased Changes of Success**

Kenneth Marek, MD—The Institute for Neurodegenerative Disorders

## **Requirements for an IND**

Edward Spack, PhD—MedaRed, Inc.

## **ADDF Access**

Lauren Friedman, PhD—Alzheimer's Drug Discovery Foundation

## SESSION III: Drug Discovery — From Lead to Clinical Candidate

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### William Banks, MD, VA/University of Washington



William Banks, MD, graduated from the University of Missouri-Columbia in 1979 and subsequently did clinical training in Internal Medicine and Endocrinology at Tulane University and the Veterans Affairs Medical Center in New Orleans.

He is currently the Associate Chief of Staff for Research and Development at the VA in Seattle and a Professor of Medicine in the Division of Gerontology and Geriatric Medicine in the Department of Medicine at the University of Washington, Seattle.

He has investigated physiological, pathological, and drug delivery issues of the blood-brain barrier for over 35 years and has over 500 publications, including one recently published in Nature Reviews

Drug Discovery entitled “From Blood-brain Barrier to Blood-brain Interface: New Opportunities for CNS Drug Delivery”.

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### Drug Delivery for CNS Disease

William Banks

*VA/University of Washington, Seattle, WA, USA*

The blood-brain barrier (BBB) is a major obstacle for drug delivery to the CNS with misunderstandings of its basic features and undiscovered aspects of its nature each contributing to the challenges of drug delivery. The talk will open with a working definition of the BBB and then consider a few of the BBB myths related to drug delivery. The major parameters that determine whether a substance crosses the BBB and the extent to which it does so will be outlined. The talk will conclude with case examples that further illustrate principles of drug delivery across the BBB that, as time permits, include antibody uptake after passive immunization, penetration of antisense molecules, transport of regulatory proteins, and exosomes.

## SESSION III: Drug Discovery — From Lead to Clinical Candidate

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### Caroline Zeiss, BVSc, PhD, Yale University School of Medicine



Caroline Zeiss, PhD, is a double-boarded veterinary pathologist and laboratory animal veterinarian. She directs the Yale Mouse Research Pathology Core, and collaborates on multiple studies with Yale and external investigators in academia and industry. Dr. Zeiss has practiced as a laboratory animal clinician with a focus in non-human primate medicine since 2012, and has published multiple papers on non-human primate medicine and pathology. She has over 20 years' experience in veterinary pathology and consults regularly with industry on efficacy and toxicity studies utilizing ophthalmic and neurologic disease models. Her research focuses on mechanisms of neurodegeneration with a strong focus on translation of basic studies towards clinical relevance. Most recently, she has applied biomedical informatics to reveal patterns of animal research that influence preclinical translatability. Her lab uses biomedical informatics to identify large scale

patterns of animal model use. This approach reveals systemic biases in the utilization of animal models that contribute to the translational gap. In particular, the lab is interested in informatics methods that can correlate interventional outcomes across human and animal species by intervention, drug class and choice of outcome measure. The lab focuses on chronic and complex conditions, in particular neurodegenerative disease. This focus is informed by extensive animal models experience using small and large animal models of retinal and neurodegenerative disease.

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### Improving the Translatability of Animal Models of Neurodegeneration

Caroline Zeiss

*Yale University School of Medicine, New Haven, CT, USA*

Translation of promising preclinical results in animal models of neurodegenerative disease is becoming an increasingly vexing issue. This translational divide results in part from animal study design norms that do not favor translation, and whose propagation is amplified by the differing incentives that drive industry and academia. Study designs suitable for development of symptomatic therapies, with emphasis on Parkinson's disease will be outlined. These will be contrasted with key aspects of study design needed to develop disease-altering therapies for neurodegenerative conditions, such as Alzheimer's and Parkinson's diseases. These include utilization of functional outcome measures in animals that are of relevance to patients, as well as meaningful integration of biomarkers that confirm target engagement and confirm dose-response relationships. Use of longitudinal and cross sectional study designs when testing symptomatic and disease-altering interventions will be discussed. Translating results from predominantly reductionist animal models to more complex human diseases confront the challenge that human neurodegenerative conditions exhibit mechanistic and clinical overlap. Fit-for-purpose choice of animal models will be illustrated, with emphasis on appropriate use of toxic and genetic models, as well as utility of model diversity to improve generalizability of animal data to humans. Lastly, areas within the existing biomedical research framework that could provide access points to improve translation of preclinical data are identified.

## SESSION III: Drug Discovery — From Lead to Clinical Candidate

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### Kenneth Marek, MD, The Institute for Neurodegenerative Disorders



Kenneth Marek, MD, is President and senior scientist at the Institute for Neurodegenerative Disorders. Dr. Marek's major research interests include identification of biomarkers for early detection, assessment of disease progression and development of new treatments for Parkinson disease and Alzheimer disease and related neurodegenerative disorders. His specific interest has been in in vivo neuroreceptor imaging biomarkers. He has authored numerous neurology and neuroscience publications on these topics. Dr. Marek has and continues to be the principal investigator of several ongoing multi-center international studies (including the Parkinson Progression Marker Initiative (PPMI) and the Parkinson Associated Risk Syndrome (PARS)) study.

Dr. Marek serves on the scientific advisory board of The Michael J. Fox Foundation. He has served in leadership roles in several organizations focused on neurodegenerative disorders and has been the recipient of numerous grants to support his work in Parkinson disease, Alzheimer Disease and Huntington disease. He was recently awarded the Robert A. Pritzker Prize for Leadership in Parkinson's Research. He also was a co-founder of Molecular Neuroimaging, LLC, and is now an employee and owner at Invicro, a company providing discovery and clinical neuroimaging research services.

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### Integrating Biomarkers into Drug Discovery and Development for Increased Changes of Success

Kenneth Marek

*The Institute for Neurodegenerative Disorders, New Haven, CT, USA*

Biomarkers, objective measures of disease, are essential to accelerate both drug discovery and development for neurodegenerative disorders. In early development biomarkers targeting disease mechanism, drug mechanism and drug distribution are widely used to establish drug target engagement, drug dosing and toxicity. In Phase 2, 3 and 4 clinical trials biomarkers are crucial both to enrich the population and to monitor treatment-induced change in clinical and biomarker outcomes. Biomarkers offer the promise of more rapid and focused drug development with reduced timelines and smaller sample size enabling rational data driven drug development decision-making.

Recent drug discovery and development in Alzheimer disease (AD) and Parkinson disease (PD) has been supported by the Alzheimer's Disease Neuroimaging Initiative (ADNI) and the Parkinson's Progression Marker Initiative (PPMI) both multi-center longitudinal observational studies to develop and validate disease biomarkers. These efforts have identified key biomarkers to establish disease pathology and to elucidate the temporal pattern of biomarker expression demonstrating that multiple biomarkers are likely necessary to track disease progression. Finally, recent studies have further focused on prodromal AD and PD where biomarkers are absolutely essential to identify and track disease even prior to symptom onset with the ultimate goal to prevent disease. This presentation will review the robust potential and some of the limitations of the current neurodegenerative disease biomarker landscape.

## SESSION III: Drug Discovery — From Lead to Clinical Candidate

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### Edward Spack, PhD, MedaRed, Inc.



Edward (Ted) Spack, PhD, is Principal of Vector BioSolutions, a preclinical consulting and grant advising service, as well as an Innovation Partner for SRI International, advising academic and biotech start-ups around the world.

Dr. Spack has extensive translational experience, including preclinical development of drug candidates for multiple sclerosis, nosocomial infection, and botulism poisoning. At SRI International, Dr. Spack directed the PharmaSTART program, a consortium of SRI, Stanford, UC Berkeley, UC San Diego, and UC San Francisco, drafting preclinical development blueprints that led to several major grants and spin out companies. He has consulted with the NIH translational core services committee and several NIH institutes on preclinical development and serves on several study sections, including the NIA Alzheimer's Disease Drug Development review panel, the NIH/CSR Drug Discovery for the Nervous System and Molecular Probes review panels, and the Falk Trust Catalyst and Transformational Award programs. Through the California Life Sciences Institute (CLSI) FAST program and the SRI Innovation program he mentors SF Bay area and international academic and industry teams in biotech company formation and pitch decks.

Dr. Edward Spack received his doctoral degree from The Johns Hopkins University and his postdoctoral fellowship in cellular immunology at Stanford University. He has worked in San Francisco Bay area biotech companies and private research institutes for over 25 years focusing on the transition from discovery to clinical trial.

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### Requirements for an IND

Edward Spack

*MedaRed, Inc., San Francisco, CA, USA*

When developing a new drug candidate or repurposing a current drug, it is wise to remember the adage: “Begin with the end in mind”. The purpose of this presentation is to provide an overview of the preclinical activities required to prepare a drug candidate for clinical testing. Understanding this path and planning the proper studies at the earliest stages of drug lead optimization increases the probability of success. In the United States, permission to initiate a clinical trial requires submission of an Investigational New Drug (IND) application to the Food & Drug Administration (FDA). A new IND is required for a new indication, change in route of drug administration or dosage, or change in patient population. Each IND includes information on three broad areas: 1.) animal pharmacology and toxicology studies; 2.) chemistry and manufacturing processes; 3.) clinical protocol and investigator information. Previous talks will cover studies of pharmacokinetics (PK), and of drug absorption, distribution, metabolism, and excretion (ADME) that lay the groundwork for IND-enabling studies; this presentation will include a discussion of Good Laboratory Practices (GLP) and the formal components of an IND Animal Pharmacology and Toxicology section. The Chemical, Manufacturing, and Control (CMC) section characterizes the chemical composition, manufacturing methods, potency, purity, stability, and controls used for manufacturing the drug substance and the drug product (active ingredient and excipients) performed according to Good Manufacturing Practices (GMP). Several useful tools and resources will be discussed, including FDA Guidance for Industry publications and other regulatory information. Preparing for an IND is not simply a matter of following a recipe or coloring within the lines- there are strategic considerations that should be part of the earliest planning for a drug candidate. A Target Product Profile (TPP) provides a good guideline for drug optimization and testing, defining optimal and minimal characteristics that will help the development team begin with the end in mind and build toward an acceptable goal. In summary, this talk will provide a basic guide to navigating the sea of three letter acronyms (CMC, COA, TOX, GLP, GMP, TPP, CFR, ICH, etc) required for successful submission of an IND to the FDA.

## ADDF ACCESS

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### Lauren Friedman, PhD, Alzheimer's Drug Discovery Foundation



Lauren Friedman, PhD, is the Acting Director of Scientific Programs at the Alzheimer's Drug Discovery Foundation (ADDF) where she supports the management of the ADDF's drug discovery portfolio by providing scientific and strategic review of preclinical drug discovery proposals and tracking program progress.

Additionally, she manages the ADDF ACCESS program, which provides a virtual network of contract research organizations (CRO) and consultants, and offers educational resources on drug discovery and CRO selection and management. Dr. Friedman completed her postdoctoral training at Columbia University where she studied modulators of autophagy in Alzheimer's disease. She earned a PhD in Neuroscience at the Icahn School of Medicine at Mount Sinai where she studied molecular mechanisms underlying the development and degeneration of brain circuits involved in autism and Parkinson's disease.

Dr. Friedman received a BS in Biopsychology from Tufts University. She has authored numerous peer-reviewed publications and is a member of the Society for Neuroscience, New York Academy of Sciences and the Association for Women in Science.

## DAY 3: Keynote Lecture

### Barbara Slusher, PhD, Johns Hopkins University School of Medicine



Barbara Slusher, PhD, MAS, is Professor of Neurology (primary), Psychiatry, Neuroscience, Medicine and Oncology at Johns Hopkins School of Medicine and the Director of the Johns Hopkins Drug Discovery program (<https://drugdiscovery.jhu.edu/>). She also serves as an adjunct Professor at the Institute of Organic Chemistry and Biochemistry in Prague.

She received her undergraduate degree from Dickinson College where she graduated valedictorian, majoring in Chemistry. She received her PhD in Pharmacology and Molecular Sciences from John Hopkins School of Medicine while simultaneously earning her Master's degree in Administrative Science from the Johns Hopkins Carey School of Business (formerly the Hopkins' School of Continuing Studies). Before joining Johns Hopkins in 2010, Dr. Slusher spent 18 years in the pharmaceutical industry, including several years at the level of Senior Vice President of Research and Translational Development. She has extensive experience in drug discovery through early clinical development and was involved in the successful development, launch and/or post marketing support of several branded medicines including Seroquel<sup>TM</sup>, Aloxi<sup>TM</sup>, Dacogen<sup>TM</sup>, Lucedra<sup>TM</sup>.

At Johns Hopkins, Dr. Slusher leads the largest integrated drug discovery program on campus with a veteran team of medicinal chemists, assay developers, pharmacologists, toxicologists, and pharmacokinetics/drug metabolism experts with an average of 15 years Pharma R&D drug discovery experience. The team is engaged in identifying novel drug targets arising from the faculty's research and translating them into new drug therapies for clinical development. Dr. Slusher has published over 200 scientific articles and is the inventor on over 80 patents and applications. She has been an invited speaker at numerous national and international scientific meetings and has served as a scientific consultant for multiple biotechnology and Pharma companies. She is a co-founder of Cerecor, a CNS-focused biopharma company, and most recently Dracen Pharmaceuticals, focused on immuno-metabolism. She also founded and is leading the first-ever International Consortium of Academic Drug Discovery ([www.addconsortium.org](http://www.addconsortium.org)) with over 140 university-led translational centers and 1500 members in an effort to coordinate and enhance academic drug discovery efforts.

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## Changing Ecosystem of Drug Discovery: Rising Role of Academia and Academic-Pharma Partnerships in the Development of New Therapeutics

Barbara Slusher

*Johns Hopkins University School of Medicine, Baltimore, MD, USA*

Historically academic laboratories conducted basic science, discovering new targets of medical interest. The pharmaceutical industry subsequently validated those targets and translated them into new medicines. Today these lines have blurred. Details of the changing drug discovery ecosystem will be reviewed. The Johns Hopkins Drug Discovery team and its innovative public-private collaboration for the development of system xc- inhibitors with Eisai will be discussed. Such shared risk partnership may pave the way for new model of industrial-academia drug discovery collaborations.

# **SESSION IV: Strategies for Challenging CNS Targets— Case Study Examples**

**Chair: Kurt Brunden, PhD—University of Pennsylvania**

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## **Microtubule Stabilizing Compounds for Neurodegenerative Diseases**

Kurt Brunden, PhD—University of Pennsylvania

## **Imaging Inflammation in Patients with Alzheimer’s Disease or Dementia with Lewy Bodies**

William Kreisl, MD—Taub Institute, Columbia University

## **Clinical Development of a Selective PDE4D Inhibitor**

Mark Gurney, PhD—Tetra Discovery Partners

## **Neurophysiological Biomarkers for Neurodegenerative Disease Drug Development**

Daniel Javitt, MD, PhD—Columbia University Medical Center

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## **YOUNG INVESTIGATOR SCHOLARSHIP POSTER SESSION**

**Poster Abstracts #13-22**

## SESSION IV: Strategies for Challenging CNS Targets—Case Study Examples

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### Kurt Brunden, PhD, University of Pennsylvania



Kurt Brunden, PhD, is Director of Drug Discovery and a Research Professor in the Center for Neurodegenerative Disease Research (CNDR) at the University of Pennsylvania, where he oversees drug discovery programs in the areas of Alzheimer's disease (AD), frontotemporal lobar degeneration and Parkinson's disease.

Prior to joining CNDR in 2007, Dr. Brunden was an executive in the biotechnology sector, where he served as VP of Research at Gliatech, Inc. and later as Sr. VP of Drug Discovery at Athersys, Inc. In these positions, he initiated and managed drug discovery programs in AD, cognitive enhancement, schizophrenia, inflammation, metabolic disease and cancer. Prior to his time in industry, Dr. Brunden was an NIH-funded faculty member within the Biochemistry Department at the University of Mississippi Medical Center, with a research focus on the regulation of myelination.

He obtained his B.S. degree (magna cum laude) from Western Michigan University, with dual majors of Biology and Health Chemistry, and his Ph.D. in Biochemistry from Purdue University, with a post-doctoral fellowship at the Mayo Clinic. Dr. Brunden has over 100 scientific publications, and multiple issued and pending U.S. and PCT patents.

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### Microtubule Stabilizing Compounds for Neurodegenerative Diseases

Kurt Brunden

*University of Pennsylvania, Philadelphia, PA, USA*

Alzheimer's disease (AD) and a number of related neurodegenerative disorders, including frontotemporal lobar degeneration, progressive supranuclear palsy, corticobasal syndrome and Pick's disease, are characterized by the accumulation within central nervous system neurons of inclusions comprised of hyperphosphorylated forms of the microtubule-associated protein, tau. Tau normally stabilizes axonal microtubules and helps regulate axonal transport, and the disengagement of hyperphosphorylated tau from microtubules in neurodegenerative tauopathies is believed to affect axonal transport, with consequent impairment of neuronal function. Accordingly, small molecule microtubule-stabilizing agents, such as those used in the treatment of cancer, might have utility in the treatment of neurodegenerative tauopathies. We have previously identified and characterized brain-penetrant natural products that elicit microtubule stabilization in the brain, including epothilone D, which was shown to enhance microtubule density, increase axonal transport, and reduce tau pathology and neuronal death in transgenic mouse models of tauopathy. Epothilone D subsequently advanced to clinical testing in AD patients. We have more recently identified non-natural product triazolopyrimidine (TPD) microtubule-stabilizing compounds that readily enter the brain and enhance microtubule stabilization. A summary of our studies supporting these new TPD examples as potential therapeutics for tauopathies will be presented.

## SESSION IV: Strategies for Challenging CNS Targets—Case Study Examples

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### William Kreisl, MD, Taub Institute, Columbia University



William Kreisl, MD, received his undergraduate degree in Neurobiology and Behavior from Cornell University before attending Virginia Commonwealth University for medical school. Upon completion of neurology residency and Weill Cornell Medicine, Dr. Kreisl spent 7 years working with Bob Innis in the Molecular Imaging Branch at the National Institute of Mental Health Intramural Research Program, first as a clinical research fellow and later as an Assistant Clinical Investigator. In 2014, Dr. Kreisl joined the faculty at the Taub Institute for Research on Alzheimer's disease and the Aging Brain at Columbia University as the Boris and Rose Katz Assistant Professor of Neurology. Dr. Kreisl has spent much of his research career developing radioligands for the translocator protein and working towards validating their use in neurocognitive disorders.

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### Imaging Inflammation in Patients with Alzheimer's Disease or Dementia with Lewy Bodies

William Kreisl

*Taub Institute, Columbia University, New York, NY, USA*

Neuroimmune activation is a proposed contributor to neurodegeneration in Alzheimer's disease and dementia with Lewy bodies. Neuroimmune changes may be quantified using PET radioligands that bind to the 18 kDa translocator protein, which is overexpressed by activated microglia. While there exist limitations to TSPO PET, at present TSPO is the only biomarker for microglial activation available for PET imaging with validated radioligands. In Alzheimer's disease, most TSPO PET studies have shown increased binding in temporal and parietal regions. However, the relationship between TSPO and disease progression remains controversial. Multimodal PET studies suggest that TSPO may have differing relationships between amyloid and tau deposition. In dementia with Lewy bodies, increased TSPO has been demonstrated in cortical and subcortical brain regions. However, co-morbidity with Alzheimer's disease and lack of a radioligand for  $\alpha$ -synuclein limit our understanding of the role of TSPO in dementia with Lewy bodies. TSPO may be useful to monitor response to immune-targeted therapies in Alzheimer's disease and dementia with Lewy bodies. However, developing additional biomarkers for neuroimmune activation in general, and for dementia with Lewy bodies in particular, is warranted.

## SESSION IV: Strategies for Challenging CNS Targets—Case Study Examples

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### Mark Gurney, PhD, Tetra Discovery Partners



Mark Gurney, PhD, is the Chairman & CEO of Tetra Discovery Partners, Inc. a clinical stage biotechnology company headquartered in Grand Rapids, MI. Tetra is developing BPN14770, a negative allosteric modulator of phosphodiesterase-4D, for the treatment of Alzheimer's disease and other dementias, psychiatric disease, and neurodevelopmental disorders including Fragile-X. BPN14770 uniquely targets the biology of the synapse to improve learning and memory with the potential to slow Alzheimer's disease progression.

Dr. Gurney has held positions in academia and within the pharmaceutical industry. Dr. Gurney's resume with biotech companies includes work in drug discovery and development as Senior Vice President at deCODE genetics, Inc.; Director Genomics, Pharmacia Corporation; Associate Professor, Northwestern University Feinberg School of Medicine; and Assistant Professor, University of Chicago Medical School. In addition to his work on Alzheimer's disease, Dr. Gurney developed the SOD1-G93A transgenic mouse model of ALS.

Dr. Gurney has authored 117 peer reviewed scientific articles that have been cited over 21,000 times and holds 36 issued patents. He earned a PhD in neuroscience from the California Institute of Technology and an MBA from the Kellogg Graduate School of Management at Northwestern University.

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### Clinical Development of a Selective PDE4D Inhibitor

Mark Gurney

*Tetra Discovery Partners, Grand Rapids, MI, USA*

Early and late stages of memory formation are dependent upon cAMP signaling. In humans, genetic studies show that brain cAMP levels relevant to cognition are regulated by phosphodiesterase-4D (PDE4D). We have humanized the PDE4D gene in mice to study the effect of a PDE4D negative allosteric modulator, BPN14770, on early and late stages of memory. The humanized PDE4D mice provided a unique and powerful model in which BPN14770 engagement of the PDE4D target could be linked directly to improvement in early and late stages of memory as well as to biomarkers associated with activation of the cAMP-PKA-CREB pathway. In parallel, we developed a PET tracer to study the distribution of the PDE4D target in brain and to assess BPN14770 engagement of the PDE4D target. The distribution of PDE4D in primate brain was highest in those regions known to be important for cognition, the hippocampus and the prefrontal cortex, which also are targets of Alzheimer's pathology. BPN14770 has completed three Phase I human clinical trials enrolling 147 subjects. The compound was found to have excellent oral bioavailability, safety and tolerability. Assessment of BPN14770 cognitive benefit in elderly subjects was consistent with the proposed mechanism of action of the drug.

## SESSION IV: Strategies for Challenging CNS Targets—Case Study Examples

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### Daniel Javitt, MD, PhD, Columbia University Medical Center



Daniel Javitt, PhD, is Professor of Psychiatry and Neuroscience at Columbia University College of Physicians and Surgeons where he directs the Division of Experimental Therapeutics, and serves as Director of Schizophrenia Research at Nathan Kline Institute for Psychiatric Research.

Dr. Javitt received his BA, magna cum laude from Princeton University in 1979 and his MD from Albert Einstein College of Medicine in 1983. He completed his residency in Psychiatry in 1987, and earned a PhD in Neuroscience from Einstein in 1990. He has published over 300 articles on issues related to neurophysiological investigations of normal and abnormal sensory processing across neuropsychiatric disorders, non-invasive brain stimulation and new treatment development in depression, schizophrenia and aging. His work has received over 33,000 citations to date, and has

been featured in *Scientific American* and other popular science venues. Dr. Javitt's work is funded by the NIMH, Stanley Research Foundation, and ADDF.

He has received numerous research awards, including the Penwalt Resident Research Award from the American Psychiatric Association in 1987; The Kempf Fund Award for Research Development from the American Psychiatric Association in 1992 the A.E. Bennett Basic Science Award from the Society for Biological Psychiatry in 1998; the Joel Elkes Research Award from the American College of Neuropsychopharmacology in 2002; a MERIT award from the National Institutes of Mental Health in 2003; the Alexander Gralnick Award from the Child Welfare League of America in 2007; the Stanley Dean Award for Schizophrenia Research from the American College of Psychiatrists in 2012, and the Distinguished Research Award from the American Psychiatric Association in 2013.

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### Neurophysiological Biomarkers for Neurodegenerative Disease Drug Development

Daniel Javitt

*Columbia University Medical Center, New York, NY, USA*

Amyloid deposition during aging is a major predictor of liability to neurodegeneration, and a potential target for early intervention. At present, definitive detection of amyloid is based upon PET amyloid imaging. However, PET scans are expensive, invasive and poorly suited to widespread screening of the healthy aged population. This presentation focuses on use of non-invasive neurophysiological measures for early detection of brain amyloid as a prelude to early intervention. Studies took advantage of optimized sensory stimulation and neurophysiological analyses procedures developed in the course of schizophrenia research. Event-related potentials/neuro-oscillations were recorded from a sample of healthy elders ( $n=64$ , 15 amyloid+) in response to an optimized paradigm with interleaved stimulus-onset, motion, and steady-state responses that reflect both cortical and subcortical activation. Responses to stimulus onset were reflected in a P1 potential that reflected primarily activation of brain theta (4-7 Hz) activity, while motion-onset was reflected in an N2 component that reflected primarily reset of slower (1-4 Hz) delta activity. Amyloid+ healthy elders showed no neurocognitive impairments but nevertheless had highly significant impairments in both theta ( $t=3.82$ ,  $p<.0001$ ) and delta ( $t=4.31$ ,  $p<.0001$ ). Moreover, a composite measure of these values correlated highly with amyloid load and detected 100% of amyloid-positive subjects, while excluding 27 of 39 (69%) of amyloid-negative subjects. Similar deficits were observed in a smaller sample ( $n=9$ ) of individuals with amnesic mild cognitive impairments (aMCI). Deficits in visual processing correlated with impaired social cognition, as measured using the The Awareness of Social Inference Test (TASIT), which in turn has been linked to increased isolation during aging. Overall, these findings suggest first that visual neurophysiological measures can be used to substantially reduce the number of healthy elders referred for amyloid PET scanning, and second, that dysfunction of early visual pathways may contribute to social isolation in both aging and MCI and may therefore constitute a novel target for cognitive remediation and non-invasive brain stimulation.

# **SESSION V: Commercialization Strategies: Developing Science into Products**

**Chair: Frank Longo, MD, PhD— Stanford School of Medicine**

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## **Intellectual Property Strategies: What and When to File for Patent Protection**

Leslie Meyer-Leon, JD—IP Legal Strategies Group PC

## **Lessons Learned in Drug Development from an Academic and Small Biotech Perspective**

Frank Longo, MD, PhD— Stanford School of Medicine

## **Finding and Working with Investors/Industrial Partners**

Rana Quraishi, PhD— UM Ventures, University of Maryland Baltimore

## SESSION V: Commercialization Strategies: Developing Science into Products

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### Leslie Meyer-Leon, JD, IP Legal Strategies Group PC



Leslie Meyer-Leon, PhD, JD, an intellectual property attorney, registered patent attorney and founder of IP Legal Strategies Group P.C., represents clients in the biotechnology and pharmaceutical sectors with complex intellectual property matters, and provides consulting services to investors who seek interpretive assistance with biotech patent litigation and portfolio analysis. She has over two decades of practical expertise in intellectual property-related opinions and operational planning, licensing, transactions and due diligence, in dispute negotiation, and in strategic plans for corporate intellectual property assets.

In addition to client practice, Dr. Meyer-Leon is widely recognized in the Boston intellectual property community for her service as President of the Boston Patent Law Association and her 10 years as a member and officer of the BPLA Board of Governors. She has also chaired the BPLA's biotechnology committee, patent law committee, and case law discussion committee. Dr. Meyer-Leon has also since 2001 served as a Patent Highlights Advisor for Nature Reviews Drug Discovery journal, providing on-going counsel and updates for NRDD's editorial staff on the interpretation of US patent law. Prior to founding IP Legal Strategies in 2000, Leslie was a patent attorney at the Boston law firms of Goodwin Procter, Mintz Levin, and Fish & Richardson.

She holds a PhD in Molecular and Cellular Biology from the University of Wisconsin-Madison, and a JD from Boston College Law School.

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## Intellectual Property Strategies: What and When to File for Patent Protection

Leslie Meyer-Leon

*IP Legal Strategies Group PC, Cambridge, MA, USA*

To make a patent portfolio attractive to investors so they will fund your commercialization efforts, you must know what and when to file for patent. We will first discuss what to patent by answering four questions: What is eligible for patent protection under the law? Is your commercially valuable product eligible for patent protection? How can patent exclusivity be used to enhance FDA exclusivity? And which patents are most worthy of pursuing given limited patent dollars? We will then explore when to patent by discussing the timelines set in motion by dates of discovery, publication, and patent filings. Understanding those timelines is important to avoid filing too early with insufficient data, and to avoid filing too late having lost rights to a third party with a competing patent filing or publication. Further practicalities will be pursued as time permits, such as designating inventorship, and how to access and work with patent professionals.

## SESSION V: Commercialization Strategies: Developing Science into Products

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### Rana Quraishi, PhD, UM Ventures, University of Maryland Baltimore



Rana Quraishi, PhD, Rana Quraishi heads the University of Maryland Baltimore (UMB) New Ventures Initiative (NVI) which brings together a team with management expertise, business formation strategy expertise, a physical space, and early-stage capital all of which are critical for new startup success. As a result of this several new startups have been launched over the last three years and received seed funding. One of the startups Living Pharma, Inc., an immunotherapy company, was recently acquired by Lentigen Technology Inc. Prior to joining UMB, Dr. Quraishi spent much of her career working in life science directed finance, investment and consulting organizations. At the TCG Group, a premiere private equity firm she focused on business development opportunities for its life science companies. Prior to this she was a Principal at Conning Capital Partners/SwissRe an early stage private equity fund. At Conning/SwissRe, she served on Boards of several portfolio companies. She was also CFO/senior advisor for Helicon Therapeutics, a start-up with assets contributed by Cold Spring Harbor and OSI Pharmaceuticals. She has held senior positions at major corporations including American Express and GE Capital. Dr. Quraishi has a PhD in Molecular Biology and Biochemistry from Columbia University where she was also an undergraduate and an MS degree from Harvard University.

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### Finding and Working with Investors/Industrial Partners

Rana Quraishi

*UM Ventures, University of Maryland Baltimore, MD, USA*

In order to create interest among investors or industrial partners, it's important to view the opportunity from their point of view. What are the key things they look for and how does one move toward creating a package that will include these items. This presentation will discuss how one can begin to create an appropriate package and the resources needed to do so. The presentation will also review examples of strategies some academic institutions have taken to help with commercialization and attracting investors and partners. One approach within an academic institution is to bring together a deeply integrated team of PhD's with a strong track record of management and business formation expertise and small amounts of early-stage capital. A "business team" of this type can identify promising compounds/biologics and "embed" with the science from a business perspective. This is an approach we started at UMB with our team which has all the components and intensity of a start-up. The team creates a plan and strategy to develop a product as it were a company without necessarily forming a company. The team has also developed deep relationships with non-clinical and clinical CRO's and FDA advisors across diseases, small molecule, and biologics. This has led to improved value added licensing opportunities, and formation of new startups for which the team provides management support. One of the startups has already exited through an early acquisition. The presentation will discuss this model and some other approaches suitable for different academic institutional cultures.

## SESSION V: Commercialization Strategies: Developing Science into Products

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### Frank Longo, MD, PhD, Stanford School of Medicine



Frank Longo, MD, PhD, is Professor and Chairman, Department of Neurology and Neurological Sciences at Stanford University. He received his MD in 1981 and PhD in Neurosciences in 1983 from UC San Diego. He completed his neurology and fellowship training in the Department of Neurology at UC San Francisco where he was then recruited as an assistant professor and promoted to professor and vice chair. Since 2006 has served as chair of the Department of Neurology and Neurological Sciences at Stanford. With support from the Alzheimer's Drug Discovery Foundation (ADDF), Alzheimer's Association, and the NIH, he and his team have pioneered small molecule treatment strategies for Alzheimer's and other neurodegenerative diseases. In 2005 he founded Pharmatrophix, a company focused on the commercial development of these therapies. A lead candidate compound for Alzheimer's disease has completed phase I safety trials and is currently in an NIH-funded phase 2a trial in Alzheimer's patients. In 2015, Dr. Longo was the recipient of the inaugural Melvin R. Goodes Prize for Excellence in Alzheimer's Drug Discovery from the ADDF in recognition of his work creating Alzheimer's disease therapies.

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### Lessons Learned in Drug Development from an Academic and Small Biotech Perspective

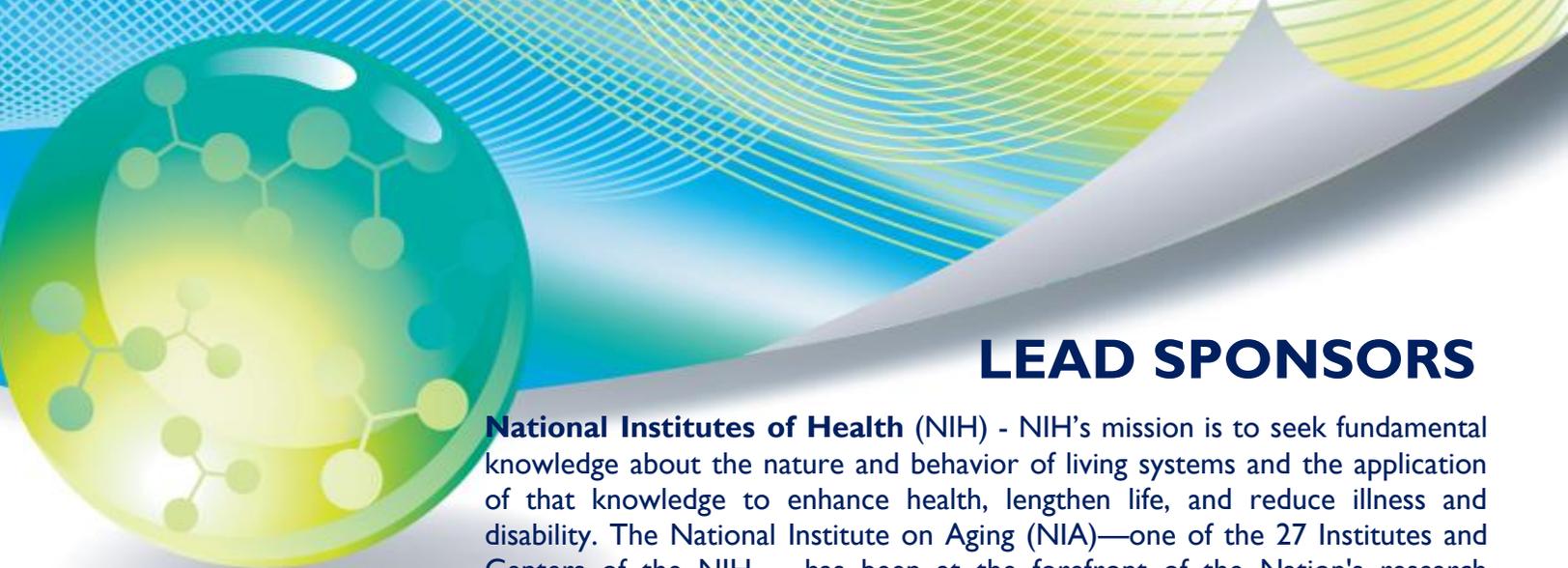
Frank Longo

*Stanford School of Medicine, Menlo Park, CA, USA*

Important drug candidates with significant novel clinical potential continue to emerge from translational programs in universities as well as the continuous emergence of small biotech companies. In both settings, there are key important lessons to learn in terms of reaching value inflection points, avoiding common pitfalls and obtaining funding. We will review the rationale, challenges and alternatives for academic-based faculty spinning a biotechnology company out of an academic program. Key areas of focus will include the following: approaches for creating technology elements that pharma partners seek (including quality and execution of intellectual property, target rationale/validation/engagement, quality and translational value of preclinical work, availability of relevant biomarkers, clinical trial plans and/or data); the basics of starting or partnering with a company; following university and conflict-of-interest policies; options for funding; elements of the virtual company model; working with CROs; large pharma partnership models and goals; and exit strategy options.

# NOTES





## LEAD SPONSORS

**National Institutes of Health (NIH)** - NIH's mission is to seek fundamental knowledge about the nature and behavior of living systems and the application of that knowledge to enhance health, lengthen life, and reduce illness and disability. The National Institute on Aging (NIA)—one of the 27 Institutes and Centers of the NIH -- has been at the forefront of the Nation's research activities dedicated to understanding the nature of aging, supporting the health and well being of older adults, and extending healthy, active years of life for more people.

**Merck & Co.** - From developing new therapies that treat and prevent disease to helping people in need, we're committed to improving health and well-being around the world. Our vision is to make a difference in the lives of people globally through our innovative medicines, vaccines, biologic therapies, consumer care and animal health products. We aspire to be the best healthcare company in the world and are dedicated to providing leading innovations and solutions for tomorrow.

**The Centers for Therapeutic Innovation (CTI)** is a pioneering research and development network initiated by pharma that uses an open innovation model to bring great ideas to fruition. Part of Pfizer, we are an entrepreneurial group that partners with leading academic medical centers and disease foundations with the aim of translating promising science into clinical candidates. Our work is based on authentic collaboration, reflected in shared decision making and aligned incentives. We are committed to bringing together cutting-edge academic and industry resources to develop medicines faster and more efficiently.

## PARTNERS

**The Harrington Discovery Institute** at University Hospitals in Cleveland, Ohio—part of The Harrington Project for Discovery & Development—aims to advance medicine and society by enabling our nation's most inventive physician-scientists to turn their discoveries into medicines that improve human health. The ADDF-Harrington Scholar Program was established in partnership to leverage the combined expertise and resources of both organizations to advance highly promising Alzheimer's disease discovery projects conducted in academic medical institutions nationwide. ADDF-Harrington Scholars get funding from ADDF and strategic advising and mentoring from experts in pharmaceutical development through the Harrington Discovery Institute's Innovation Support Center to chart a path from the bench to the clinic. For more information about Harrington Discovery Institute visit: [www.HarringtonDiscovery.org](http://www.HarringtonDiscovery.org)

**The National Multiple Sclerosis Society** exists because there are people with MS. Our vision is a world free of MS. Everything we do is focused so that people affected by MS can live their best lives as we stop MS in its tracks, restore what has been lost and end MS forever. The Society is a gathering place for people with MS, their family and loved ones, healthcare providers, volunteers, donors, fundraisers, advocates, community leaders and all those that seek a world free of MS.

**The Taub Institute for Research on Alzheimer's Disease and the Aging Brain** at Columbia University Medical Center and New York-Presbyterian Hospital brings together researchers and clinicians across disciplines to uncover the causes of Alzheimer's, Parkinson's, and other age-related brain diseases, and to discover ways to treat, prevent, and ultimately cure these diseases. In collaboration with the Departments of Pathology & Cell Biology and Neurology, research in the Taub Institute integrates genetic analysis, molecular and cellular studies, and clinical investigation to better understand complex neurodegenerative disorders. Funding for the Taub Institute's Alzheimer's Disease Research Center is provided by the NIH National Institute on Aging. In 2016, the Taub Institute was designated as a Center of Excellence for Alzheimer's Disease by the New York State Department of Health. For more information, visit the Taub Institute for Research on Alzheimer's Disease and the Aging Brain at <http://www.cumc.columbia.edu/dept/taub/>