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# Program at a Glance

GENERAL INFORMATION PROGRAM | [WWW.SFN.ORG/AM2019](http://WWW.SFN.ORG/AM2019)

## Friday, Oct. 18

### SHORT COURSE #2 (p.32)

8 a.m.–6 p.m.  
Quantifying Behavior as a Lens Into the Brain  
Organizers: Robert S. Datta, MD, PhD; Mala Murthy, PhD

### SHORT COURSE #1 (p.32)

8:30 a.m.–6 p.m.  
Neural Prosthetics and Brain Machine Interfaces  
Organizers: Adrienne L. Fairhall, PhD; Charles Liu, MD, PhD

### SHORT COURSE #3 (p.32)

1–5:30 p.m.  
Cultivating Professionalism and Excellence in the Research Landscape  
Organizers: Carlos Aizenman, PhD; Janet Clark, PhD; Marguerite Matthews, PhD; Rosalind A. Segal, MD, PhD; and Keith Trujillo, PhD

## Saturday, Oct. 19

### MEET-THE-EXPERT SERIES (p.32)

8–9:15 a.m.

Session 1

8 a.m.–5 p.m. NeuroJobs Career Center (p.36)

### PROFESSIONAL DEVELOPMENT WORKSHOP (p.38)

9–11 a.m.  
Preparing for Your Career Away From the Bench:  
Essential Skills for Navigating Your Career Transition  
Organizer: Annette Gray, PhD

### PROFESSIONAL DEVELOPMENT WORKSHOP (p.38)

9–11 a.m.  
Reproducibility for Everyone  
Organizer: Aparna Shah, PhD

### MEET-THE-EXPERT SERIES (p.33)

9:30–10:45 a.m.

Session 2

### DIALOGUES BETWEEN NEUROSCIENCE AND SOCIETY (p.14)

11 a.m.–1 p.m.

Speaker: Fei-Fei Li, PhD

### PROFESSIONAL DEVELOPMENT WORKSHOP (p.38)

Noon–2 p.m.  
Imposter Syndrome: Confronting the Career  
Development Monster Hiding Under the Bed  
Organizers: Ericka Boone, PhD; Marguerite Matthews, PhD; Sadye Paez, PhD

### PROFESSIONAL DEVELOPMENT WORKSHOP (p.38)

Noon–2 p.m.  
Integrating Research and Teaching at  
Primarily Undergraduate Institutions  
Organizer: Joyce Fernandes, PhD

1–3 p.m. Graduate School Fair (p.36)

1–5 p.m. Posters/Nanosymposia

1:30–4 p.m. Symposia/Minisymposia **CME** (p.22)

2–3:10 p.m.  
**SPECIAL LECTURE CME (p.18)**  
Neuronal Activity-Dependent Myelination:  
A Mechanism for Learning and Repair?  
Speaker: Ragnhildur T. Karadottir, PhD

### BRAIN AWARENESS CAMPAIGN EVENT (p.36)

2:30–4 p.m.  
Illuminating the Path With Science Outreach  
Organizer: Teodora Stoica

### PROFESSIONAL DEVELOPMENT WORKSHOP (p.38)

3–5 p.m.  
Getting Creative with Course-Based Research Experiences  
to Enhance Scholarship and Generate Publishable Data  
Organizers: Lina Dahlberg, PhD; Jacqueline Rose, PhD

### PROFESSIONAL DEVELOPMENT WORKSHOP (p.38)

3–5 p.m.  
How to Thrive as a Woman in Neuroscience  
Organizer: Melissa Harrington, PhD

### PRESIDENTIAL SPECIAL LECTURE CME (p.14)

5:15–6:30 p.m.  
From Base Pairs to Bedside: Antisense Modulators  
of RNA Splicing to Treat Neurological Diseases  
Speaker: Adrian R. Krainer, PhD

6:30–8:30 p.m. Diversity Poster Session (p.36)

6:30–8:30 p.m. International Fellows Poster Session (p.36)

6:30–8:30 p.m. Trainee Professional Development Awards Poster Session (p.36)

7:30–9:30 p.m. Career Development Topics: A Networking Event (p.36)

## Sunday, Oct. 20

8 a.m.–noon Posters/Nanosymposia

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8:30–11 a.m.	Symposia/Minisymposia <b>CME</b> (p.22)
9–10:10 a.m.	<b>SPECIAL LECTURE CME (p.21)</b> Theoretical Neuroscience: Decision Making and Its Discontents Speaker: Peter Dayan, PhD
9–11 a.m.	<b>PROFESSIONAL DEVELOPMENT WORKSHOP (p.38)</b> Bringing Genetic Diversity to Neuroscientific Research Organizer: Elissa Chesler, PhD
9–11 a.m.	<b>PROFESSIONAL DEVELOPMENT WORKSHOP (p.39) 50</b> Navigating Team Science Organizers: Lique Coolen, PhD; Chiara Manzini, PhD
9:30 a.m.–5 p.m.	Exhibits (p.90)
10:30–11:40 a.m.	<b>SPECIAL LECTURE</b> <b>CLINICAL NEUROSCIENCE LECTURE CME (p.20)</b> From Pecking Order to Ketamine: Neural Mechanisms of Social and Emotional Behaviors Speaker: Hailan Hu, PhD
Noon–1:10 p.m.	<b>SPECIAL LECTURE CME (p.20)</b> The Brain From Inside Out Speaker: Gyorgy Buzsaki, MD, PhD
Noon–2 p.m.	<b>PROFESSIONAL DEVELOPMENT WORKSHOP (p.39)</b> Becoming a Resilient Scientist Organizer: Janet Clark, PhD
Noon–2 p.m.	<b>PROFESSIONAL DEVELOPMENT WORKSHOP (p.39)</b> Science Management Organizer: Tanya Brown, PhD
Noon–2 p.m.	Graduate School Fair (p.36)
1–3 p.m.	<b>SOCIAL ISSUES ROUNDTABLE (p.36)</b> Human Fusions: Ethical and Social Issues Raised by Neural-Digital Interfaces Organizer: Dustin J. Tyler, PhD

1–5 p.m.	Posters/Nanosymposia
1:30–2:40 p.m.	<b>SPECIAL LECTURE CME (p.19)</b> Comparative Neurobiology of Vocal Communication Speaker: Michael A. Long, PhD
1:30–4 p.m.	<b>STORYTELLING SESSION (p.30) 50</b> The Storytelling Brain: How Neuroscience Stories Help Bridge the Gap Between Research and Society Chair: Susana Martinez-Conde, PhD
1:30–4 p.m.	Symposia/Minisymposia <b>CME</b> (p.22)
2:30–5 p.m.	<b>NEUROSCIENCE DEPARTMENT AND PROGRAMS WORKSHOP (p.39) 50</b> Hiring and Promoting Faculty in the Era of Team Science Organizer: Rosalind Segal, MD, PhD
3–4:10 p.m.	<b>PETER AND PATRICIA GRUBER LECTURE (p.14)</b> Molecular Basis of the Circadian Clock in Mammals and Its Fundamental Role in Aging and Longevity Speaker: Joseph S. Takahashi, PhD
3–5 p.m.	<b>PROFESSIONAL DEVELOPMENT WORKSHOP (p.39)</b> Building a Neuroscience Career at a Teaching Focused Institution Organizer: Melissa Harrington, PhD
5:15–6:30 p.m.	<b>PRESIDENTIAL SPECIAL LECTURE CME (p.15)</b> Understanding Cortical Development and Disease: From Embryos to Brain Organoids Speaker: Paola Arlotta, PhD
6:45–8:45 p.m.	SfN-Sponsored Socials (p.41)
<b>Monday, Oct. 21</b>	
8 a.m.–noon	Posters/Nanosymposia
8 a.m.–5 p.m.	NeuroJobs Career Center (p.36)
8:30–11 a.m.	<b>BASIC-TRANSLATIONAL-CLINICAL ROUNDTABLE CME (p.30)</b> Mechanisms of Drug Addiction: A Translational Perspective Organizer: Trevor W. Robbins, PhD

# Program at a Glance

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8:30–11 a.m.	Symposia/Minisymposia <b>CME</b> (p.22)
9–10:10 a.m.	<b>HISTORY OF NEUROSCIENCE LECTURE (p.15)</b> 50 Exocytosis of Synaptic Vesicles: From Quantal Release to Molecular Machines Speaker: Reinhard Jahn, PhD
9–11 a.m.	<b>PROFESSIONAL DEVELOPMENT WORKSHOP (p.39)</b> Advancing Your Career Through Effective Science Writing for the Public and Creating Eye-Catching Research Statements Organizer: Eduardo Rosa-Molinar, PhD
9–11 a.m.	<b>PROFESSIONAL DEVELOPMENT WORKSHOP (p.40)</b> The Art of Building a Career Organizer: Martha Davila-Garcia, PhD
9:30 a.m.–5 p.m.	Exhibits (p.90)
10:30–11:40 a.m.	<b>SPECIAL LECTURE CME (p.19)</b> Neural Mechanisms of Short-Term Memory and Motor Planning Speaker: Karel Svoboda, PhD
Noon–1:10 p.m.	<b>SPECIAL LECTURE CME (p.19)</b> Active Touch, Pain, and Anesthesia Speaker: Fan Wang, PhD
Noon–2 p.m.	Graduate School Fair (p.36)
Noon–2 p.m.	<b>PROFESSIONAL DEVELOPMENT WORKSHOP (p.40)</b> Optimize Your Grant Application: News You Can Use From the NIH Organizer: Bruce Reed, PhD
Noon–2 p.m.	<b>PROFESSIONAL DEVELOPMENT WORKSHOP (p.40)</b> Teaching Computation in Neuroscience Organizers: William Grisham, PhD; Richard Olivo, PhD
1–2 p.m.	<b>DUAL PERSPECTIVES (p.30)</b> 50 Does Adult Neurogenesis Occur in the Human Brain?
1–3 p.m.	<b>ANIMALS IN RESEARCH PANEL (p.37)</b> 50 Treatments for Disorders of the Basal Ganglia and the Development of Deep Brain Stimulation: Translation of Non-Human Primate Research Into Clinical Therapeutics Organizer: Peter Strick, PhD

1–5 p.m.	Posters/Nanosymposia
1:30–4 p.m.	Symposia/Minisymposia <b>CME</b> (p.22)
3:15–4:25 p.m.	<b>ALBERT AND ELLEN GRASS LECTURE CME (p.15)</b> Neural Learning Rules in the Cerebellum Speaker: Jennifer L. Raymond, PhD
5:15–6:30 p.m.	<b>PRESIDENTIAL SPECIAL LECTURE CME (p.15)</b> The Cell Biology of the Synapse and Behavior Speaker: Daniel A. Colón-Ramos, PhD
6:45–8:45 p.m.	<b>CHAPTERS WORKSHOP (p.37)</b> Fostering Chapter Engagement Through Your Local Brain Bee Organizer: Jennifer R. Yates, PhD
6:45–8:45 p.m.	SfN-Sponsored Socials (p.41)
<b>Tuesday, Oct. 22</b>	
8 a.m.–noon	Posters/Nanosymposia
8 a.m.–5 p.m.	NeuroJobs Career Center (p.36)
8:30–11 a.m.	<b>BASIC-TRANSLATIONAL-CLINICAL ROUNDTABLE CME (p.30)</b> Exoskeletons and Robotics for Neurorehabilitation Organizer: Ann M. Spungen, EdD
8:30–11 a.m.	Symposia/Minisymposia <b>CME</b> (p.22)
9–10:10 a.m.	<b>SPECIAL LECTURE CME (p.19)</b> Flies and Alcohol: An Interplay of Nature and Nurture Speaker: Ulrike Heberlein, PhD
9:30 a.m.–5 p.m.	Exhibits (p.90)
10:30–11:40 a.m.	<b>SPECIAL LECTURE CME (p.18)</b> Molecular Mechanisms Underlying Activity-Dependent Neural Circuit Development and Plasticity Speaker: Xiang Yu, PhD

Noon–1:10 p.m.	<b>SPECIAL LECTURE CME (p.18)</b> Leveraging Brain Rhythms as a Therapeutic Intervention for Neurodegenerative Diseases Speaker: Li-Huei Tsai, PhD
Noon–2 p.m.	A Celebration of Women in Neuroscience Luncheon (p.37) <b>50</b>
Noon–2 p.m.	Graduate School Fair (p.36)
1–5 p.m.	Posters/Nanosymposia
1:30–2:40 p.m.	<b>SPECIAL LECTURE CME (p.20)</b> Evolution and Dissolution of Memories Over Time Speaker: Eleanor A. Maguire, PhD
1:30–4 p.m.	Symposia/Minisymposia <b>CME (p.22)</b>
2–3:30 p.m.	<b>PUBLIC ADVOCACY FORUM (p.37)</b> The Role of Pharmaceutical Partnerships When Advocating for Basic Research Organizer: Moses V. Chao, PhD
3–4:10 p.m.	<b>DAVID KOPF LECTURE ON NEUROETHICS (p.16)</b> The Neuroethics Frontier Speaker: Nita Farahany, JD, PhD
5:15–6:30 p.m.	<b>PRESIDENTIAL SPECIAL LECTURE CME (p.16)</b> Wavefront Engineering: Illuminating the Neural Landscape Valentina Emiliani, PhD
6:45–7:30 p.m.	SfN Members' Business Meeting (p.37)
6:45–8:45 p.m.	SfN-Sponsored Socials (p.41)
8:30–11:30 p.m.	Graduate Student Reception (p.37)
<b>Wednesday, Oct. 23</b>	
8 a.m.–noon	Posters/Nanosymposia
8 a.m.–3 p.m.	NeuroJobs Career Center (p.36)

8:30–11 a.m.	Symposia/Minisymposia <b>CME (p.22)</b>
8:30–11 a.m.	<b>BASIC-TRANSLATIONAL-CLINICAL ROUNDTABLE CME (p.30)</b> Gene Therapy in Neurological Diseases Organizer: Asa Abeliovich, MD, PhD
9:30 a.m.–5 p.m.	Exhibits (p.90)
10:30–11:40 a.m.	<b>SPECIAL LECTURE CME (p.18)</b> Aberrant Phase Separation in Neurodegenerative Disease Speaker: Anthony A. Hyman, PhD
Noon–1:10 p.m.	<b>SPECIAL LECTURE CME (p.21)</b> Extracting Function From Structure: Lessons From the Fly Connectome Speaker: Gerald M. Rubin, PhD
1–5 p.m.	Posters/Nanosymposia
1:30–2:40 p.m.	<b>SPECIAL LECTURE CME (p.21)</b> Neural Codes for Natural Behaviors in Flying Bats Speaker: Nachum Ulanovsky, PhD
1:30–4 p.m.	Symposia/Minisymposia <b>CME (p.22)</b>
3–4:10 p.m.	<b>SPECIAL LECTURE CME (p.20)</b> The Neurobiology of Long-Term Memory: Key Molecules, Diverse Cell Types, Temporal Dynamics, and Critical Periods Speaker: Cristina M. Alberini, PhD

## Featured Lectures

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### DIALOGUES BETWEEN NEUROSCIENCE AND SOCIETY

Support contributed by: Elsevier

Fei-Fei Li, PhD

Stanford Human-Centered AI Institute  
Saturday, October 19, 11 a.m.–1 p.m.

Fei-Fei Li is a professor of computer science and co-director of the Stanford University Human-Centered AI Institute (HAI). A pioneering expert in AI, inventor of ImageNet, and thought leader, Dr. Li challenges us to be the stewards of technology to serve humanity at its broadest and most diverse extent. Dr. Li has also been recognized as a 2016 Global Thinker by Foreign Policy and formerly served as the vice president of AI and machine learning at Google Cloud. In this session, Dr. Li will discuss the transformative potential that AI and machine learning pose for society from her unique perspective as a scientist and an ethical leader who advocates for future technologies to incorporate an understanding of how to augment, not replace, elements of the human experience.



### PRESIDENTIAL SPECIAL LECTURE

From Base Pairs to Bedside: Antisense Modulators of RNA Splicing to Treat Neurological Diseases **CME**

Adrian R. Krainer, PhD

Cold Spring Harbor Laboratory

Saturday, Oct. 19, 5:15–6:30 p.m.

Nusinersen, the first FDA-approved drug for spinal muscular atrophy (SMA), exemplifies a successful path from basic studies to an effective therapy. It is an antisense oligonucleotide (ASO) that modulates alternative splicing of SMN2, increasing functional SMN protein in motor neurons. After clinical trials in SMA infants and children, nusinersen was approved in 2016. This lecture will describe the development of this drug and its clinical impact. Using a similar approach, an ASO was developed to correct defective RNA splicing of IKBKAP, which causes familial dysautonomia.



### PETER AND PATRICIA GRUBER LECTURE

Support contributed by: The Gruber Foundation

Molecular Basis of the Circadian Clock in Mammals and Its Fundamental Role in Aging and Longevity

Joseph S. Takahashi, PhD

University of Texas Southwestern Medical Center

Howard Hughes Medical Institute

Sunday, Oct. 20, 3–4:10 p.m.

The molecular basis of circadian clocks involves a 24-hour autoregulatory transcriptional network that is cell-autonomous and widely expressed. The suprachiasmatic nucleus acts as master pacemaker, but peripheral oscillators can respond to proximal signals. In addition to behavior and physiology, the clock gene network interacts directly with many other pathways in the cell. With respect to metabolism, the timing of nutrient consumption is critical, and restricting the timing of feeding has many health benefits that impact aging, health span, and longevity.





### PRESIDENTIAL SPECIAL LECTURE

Support contributed by: *Tianqiao and Chrissy Chen Institute*

Understanding Cortical Development and Disease:

From Embryos to Brain Organoids **CME**

Paola Arlotta, PhD

Harvard University

Sunday, Oct. 20, 5:15–6:30 p.m.

Much remains unknown regarding the cellular and molecular mechanisms governing mammalian brain development. Focusing on the cerebral cortex, this lecture will present data on the mechanistic principles that control the developmental generation of cellular diversity *in vivo*, and consider to what extent processes of cortical development can be replicated outside the embryo, within brain organoids. This lecture will also discuss the challenges of modeling human corticogenesis in the dish, and the promise that brain organoids hold to investigate complex human neurodevelopmental disease.



### HISTORY OF NEUROSCIENCE LECTURE

Exocytosis of Synaptic Vesicles: From Quantal Release to Molecular Machines **50**

Reinhard Jahn, PhD

Max Planck Institute for Biophysical Chemistry

Monday, Oct. 21, 9–10:10 a.m.

At chemical synapses, depolarization-induced calcium influx triggers neurotransmitter release, a key step in synaptic signaling. In the 1950s, Katz found that transmitter release is quantal, and synaptic vesicles were discovered. In the following decades, recycling routes for synaptic vesicle and for neurotransmitters were worked out, governing the steps in synaptic vesicle cycling becoming known. The history of the field will be briefly reviewed, focusing on exocytosis and membrane fusion.



### ALBERT AND ELLEN GRASS LECTURE

Support contributed by: *The Grass Foundation*

Neural Learning Rules in the Cerebellum **CME**

Jennifer L. Raymond, PhD

Stanford University School of Medicine

Monday, Oct. 21, 3:15–4:25 p.m.

The cerebellum is known for its role in motor learning, and is increasingly implicated in cognitive functions such as navigation, reward prediction, emotion, and social behavior. Its simple, repeated circuit architecture facilitates study of the functional links between events occurring at the molecular, cellular, circuit and behavioral levels as the cerebellum computes. By leveraging this analytical advantage, recent work has yielded new insight in the principles governing how neural circuits tune their performance through experience.



### PRESIDENTIAL SPECIAL LECTURE

The Cell Biology of the Synapse and Behavior **CME**

Daniel A. Colón-Ramos, PhD

Yale University School of Medicine

Monday, Oct. 21, 5:15–6:30 p.m.

When, where, and how synapses form underpin the architecture of the nervous system and behaviors. Synapses are both precisely assembled during development and flexible during learning and memory. How can synapses be both precise and malleable to facilitate both the assembly and function of the brain? This lecture will discuss new findings that link the fundamental cell biological properties of single synapses to how they underpin the emergent property of the nervous system: behavior.

## Featured Lectures

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### DAVID KOPF LECTURE ON NEUROETHICS

Support contributed by: *David Kopf Instruments*

The Neuroethics Frontier

Nita Farahany, JD, PhD

Duke University

Tuesday, Oct. 22, 3–4:10 p.m.

How should we think about our emerging capabilities of accessing and altering human brains, particularly in light of advances in genome-editing technologies? This lecture will focus on the ethical, legal, and social issues arising from accessing and altering human brains. It will discuss consumer neuro-technologies, corporate interests in accessing and changing brains, and government attempts to do the same. It will also consider the current and future potential directions of these neuroethical issues, particularly in light of recent controversies about human genome-editing.



### PRESIDENTIAL SPECIAL LECTURE

Wavefront Engineering: Illuminating the Neural Landscape **CME**

Valentina Emiliani, PhD

Vision Institute (CNRS, INSERM, Sorbonne University)

Tuesday, Oct. 22, 5:15–6:30 p.m.

The revolution of optogenetics has opened perspectives in both fundamental and medical neuroscience unimaginable 10 years ago. Joint progress in the design of microbial opsins and in the shaping of wave fronts to precisely guide light through tissues is now bringing the field into a new phase that we can call circuit optogenetics, where neural circuits distributed across several brain areas can be optically interrogated and controlled with millisecond precision and single-cell resolution.

## New SfN Photo & Recording Policy Gives Choice to Presenters and Exhibitors

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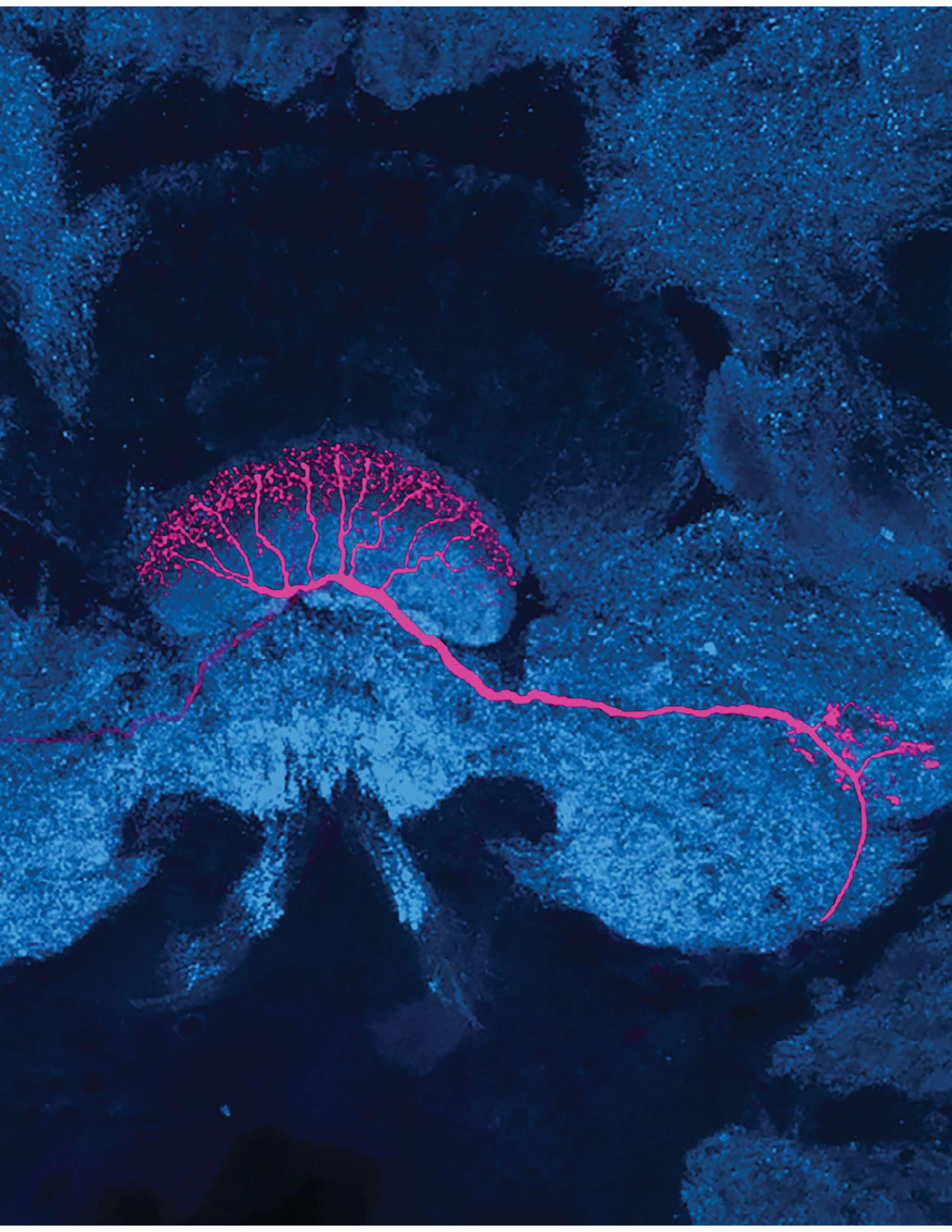
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## Special Lectures

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### THEME A: DEVELOPMENT

Molecular Mechanisms Underlying Activity-Dependent Neural Circuit Development and Plasticity **CME**

Xiang Yu, PhD

Institute of Neuroscience, Chinese Academy of Sciences

Tuesday, Oct. 22, 10:30–11:40 a.m.

The mammalian brain is highly plastic. Experience, both positive and negative, affects how neural circuits are wired, with long lasting effects on the well-being of the individual. This lecture will discuss the molecular mechanisms through which sensory experience and environmental factors affect neural circuit development and plasticity, focusing on plasticity mechanisms that may be unique to early development. The relevance of these mechanisms to developmental neurological disorders, especially autism spectrum disorders, will also be highlighted.



### THEME B: NEURAL EXCITABILITY, SYNAPSES, AND GLIA

Neuronal Activity-Dependent Myelination: A Mechanism for Learning and Repair? **CME**

Ragnhildur T. Karadottir, PhD

University of Cambridge

Saturday, Oct. 19, 2–3:10 p.m.

Myelin is essential for normal brain function, and alterations in myelin are increasingly implicated as a mechanism for learning. The importance of myelin is evident in diseases where damage to myelin leads to physical and cognitive disabilities. Uniquely within the central nervous system, myelin can regenerate; but this often fails, causing sustained clinical deficits. This lecture will cover the progress made in understanding myelination, with a focus on activity-dependent myelination, and explore how the underlying mechanisms of myelin plasticity may underpin myelin regeneration.



### THEME C: NEURODEGENERATIVE DISORDERS AND INJURY

Leveraging Brain Rhythms as a Therapeutic Intervention for Neurodegenerative Diseases **CME**

Li-Huei Tsai, PhD

Massachusetts Institute of Technology

Tuesday, Oct. 22, Noon–1:10 p.m.

Gamma rhythms (30-80 Hz) are modulated during cognition, and impaired gamma rhythms have been associated with Alzheimer's disease (AD). But do they play a causal role? New evidence shows that non-invasive sensory stimulation of 40 Hz rhythm power and synchrony in AD mouse models reduces AD-like pathology and enhances cognitive function. Research is ongoing to understand the mechanisms underlying the beneficial effects of 40 Hz stimulation and to translate this intervention for human patients.



### THEME C: NEURODEGENERATIVE DISORDERS AND INJURY

Aberrant Phase Separation in Neurodegenerative Disease **CME**

Anthony A. Hyman, PhD

Max Planck Institute of Cell Biology & Genetics

Wednesday, Oct. 23, 10:30–11:40 a.m.

Cells organize many of their biochemical reactions by formation and dissolution of non-membrane-bound compartments. Recent experiments show that a common mechanism for such biochemical organization is phase separation of unstructured proteins to form liquid-like compartments. These liquid-like compartments can be described by principles elucidated from condensed-matter physics and are therefore termed biomolecular condensates. This lecture will cover the relationship between the formation of liquid-like compartments, quality control mechanisms that preserve the liquid-like state, and the onset of aggregated-protein pathology that is commonly observed in neurodegenerative diseases.





#### **THEME D: SENSORY SYSTEMS**

Active Touch, Pain, and Anesthesia **CME**

Fan Wang, PhD

Duke University Medical Center

Monday, Oct. 21, Noon–1:10 p.m.

This lecture will discuss studies aimed at understanding the neural basis of somatosensory perception. Specifically, three areas of research will be presented including: peripheral and brainstem sensory and motor circuits underlying exploratory touch behaviors; neural circuits processing the sensory-discriminative and the affective aspects of orofacial pain; and neural circuits mediating the analgesic (pain-suppression) functions of general anesthesia, especially the identification of an anesthesia-activated circuit in the amygdala that potently suppresses pain.



#### **THEME E: MOTOR SYSTEMS**

Comparative Neurobiology of Vocal Communication **CME**

Michael A. Long, PhD

New York University School of Medicine

Sunday, Oct. 20, 1:30–2:40 p.m.

Vocal communication is central to our everyday lives, facilitating social exchange. Despite significant recent discoveries, the neural mechanisms underlying coordinated vocal exchanges remain poorly understood. This lecture will examine the brain processes involved in interactive vocal behaviors, focusing on forebrain circuitry in the songbird and the rodent, and will relate these to emerging human studies that employ a range of methods to manipulate and monitor cortical areas relevant for speech.



#### **THEME E: MOTOR SYSTEMS**

Neural Mechanisms of Short-Term Memory and Motor Planning **CME**

Karel Svoboda, PhD

Howard Hughes Medical Institute, Janelia Research Campus

Monday, Oct. 21, 10:30–11:40 a.m.

Motor planning plays key roles in motor control. Movements that are preceded by periods of motor planning are faster and more accurate than in the absence of planning. Motor planning is also a prospective form of short-term memory that links past events and future movements. During motor planning, neurons in the motor cortex show persistent activity related to specific movements, long before movement onset, in the absence of sensory input. This lecture will discuss how multi-regional neural circuits maintain this selective persistent activity and how this activity relates to behavior.



#### **THEME F: INTEGRATIVE PHYSIOLOGY AND BEHAVIOR**

Flies and Alcohol: An Interplay of Nature and Nurture **CME**

Ulrike Heberlein, PhD

Howard Hughes Medical Institute, Janelia Research Campus

Tuesday, Oct. 22, 9–10:10 a.m.

Alcoholism is a major problem in medicine and society, yet few effective therapies are available for its treatment. This lecture will discuss the development and use of the fruit fly *Drosophila melanogaster* as a model system to identify genes, molecular pathways, and neural circuits that mediate the highly conserved behavioral responses to alcohol.

## Special Lectures

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### THEME G: MOTIVATION AND EMOTION

#### CLINICAL NEUROSCIENCE LECTURE

From Pecking Order to Ketamine: Neural Mechanisms of Social and Emotional Behaviors **CME**

Hailan Hu, PhD

Zhejiang University School of Medicine

Sunday, Oct. 20, 10:30–11:40 a.m.

Emotions and social interactions color our lives and shape our behaviors. Using animal models and engineered manipulations, Dr. Hu's lab aim to understand how social and emotional behaviors are encoded, focusing on the neural circuits underlying dominance hierarchy and depression. This lecture will highlight recent discoveries on the interplay between winning history and prefrontal circuit activities; the impact of social status loss on depression; and how ketamine tames depression by blocking bursts in the brain's anti-reward center, involving a surprising role of glia.



### THEME G: MOTIVATION AND EMOTION

The Neurobiology of Long-Term Memory:

Key Molecules, Diverse Cell Types, Temporal Dynamics, and Critical Periods **CME**

Cristina M. Alberini, PhD

New York University

Wednesday, Oct. 23, 3–4:10 p.m.

Long-term memory formation and storage are complex and dynamic processes. What types of molecular and cellular mechanisms underlie this complexity? This lecture will describe key biological mechanisms regulated in response to learning, their expression in diverse cell types, their temporal dynamics, and their roles in long-term memory formation, storage, as well as changes induced by memory recall. It will also discuss how the biological mechanisms engaged in long-term memory formation and storage change over development.



### THEME H: COGNITION

The Brain From Inside Out **CME**

Gyorgy Buzsaki, MD, PhD

New York University

Sunday, Oct. 20, Noon–1:10 p.m.

Is there a right way to study the brain? The current outside-in approach examines neural reactions to external stimuli. It has fueled a generation of extraordinary brain research but now it must confront its limits and hidden assumptions. The brain is a foretelling device that interacts with its environment through action and the examination of action's consequence. It is not an information-absorbing coding device but a venture-seeking explorer constantly controlling the body to test its hypotheses. Our brain does not process information: it creates it.



### THEME H: COGNITION

Evolution and Dissolution of Memories Over Time **CME**

Eleanor A. Maguire, PhD

University College London

Tuesday, Oct. 22, 1:30–2:40 p.m.

Autobiographical memories are the ghosts of our past. Through them we visit places long departed, see faces once familiar, and hear voices now silent. These often decades-old personal experiences can be recalled on a whim or come unbidden into our everyday consciousness. This lecture will focus on examining not only how autobiographical memories evolve in the brain over time, but also how our understanding of this process has developed through the 50 years of the Society for Neuroscience.



**THEME H: COGNITION**

Neural Codes for Natural Behaviors in Flying Bats **CME**

Nachum Ulanovsky, PhD

Weizmann Institute of Science

Wednesday, Oct. 23, 1:30–2:40 p.m.

Natural Neuroscience aims to decipher the neural mechanisms of natural behaviors in freely-moving animals. This lecture will focus on studies of neural codes for space, time, and social behaviors in flying bats using wireless neurophysiology methods. It will highlight new neuronal representations discovered in animals navigating through complex, 3D, or large-scale environments, or engaged in social interactions. The lecture will posit that neuroscience experiments in bats, rodents, or humans should be conducted under evermore naturalistic settings.



**THEME I: TECHNIQUES**

Theoretical Neuroscience: Decision Making and Its Discontents **CME**

Peter Dayan, PhD

Max Planck Institute for Biological Cybernetics

Sunday, Oct. 20, 9–10:10 a.m.

Theoretical neuroscience comes in three intertwined strands: data analysis, which is of ever greater importance in the present age of burgeoning big neural data; mathematical neuroscience, offering quantitative accounts spanning levels of description; and computational neuroscience, predicated on the fact that brains solve complex information processing problems. This lecture will review elements of each of these, focusing on the ever richer understanding of normal and dysfunctional affectively-charged decision-making.



**THEME I: TECHNIQUES**

Extracting Function From Structure:

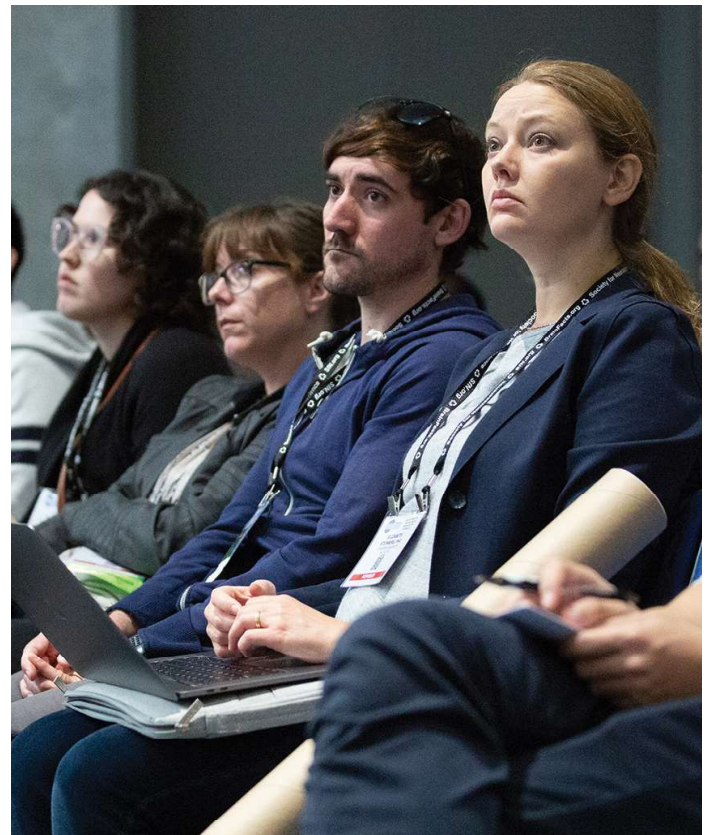
Lessons From the Fly Connectome **CME**

Gerald M. Rubin, PhD

Howard Hughes Medical Institute, Janelia Research Campus

Wednesday Oct. 23, Noon–1:10 p.m.

A connectome of the *Drosophila* central nervous system will soon be available, providing the first glimpse of synaptic-level connectivity of the brain of an animal with sophisticated behavior. The challenge now is to use this information—together with genetically targeted physiology and perturbation during behavior—to understand the neural basis of perception, sleep, associative learning, navigation, and more.



# Symposia & Minisymposia

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## THEME A — DEVELOPMENT

### Minisymposium

#### **New Insights in Understanding Fragile X Syndrome (FXS): Focus on Neural Development in Human Models and Non-Neuron Glial Cells CME**

Chair: Yongjie Yang, PhD  
Co-Chair: Gary J. Bassell, PhD  
Saturday, Oct. 19, 1:30–4 p.m.  
McCormick Place: S100BC

Recent development to establish stem cell or iPSC-derived human models of FXS has begun to provide new insight about the molecular and synaptic alterations in human neurons. This minisymposium will describe recent progress on utilizing human cell models to not only understand the roles of FMRP in human neuron development, but also test reactivation of the FMRI gene as a potential therapeutic strategy. In addition, new knowledge about how non-neuronal glial cells are involved in the pathogenic process of FXS will be presented.

### Minisymposium

#### **Functional Maturation of Cerebello-Cerebral Interactions CME**

Chair: Freek E. Hoebeek, PhD  
Co-Chair: Roy V. Sillitoe, PhD  
Sunday, Oct. 20, 8:30–11 a.m.  
McCormick Place: S406A

The developmental processes that connect the cerebellum to the cerebrum constitute critical morphogenetic events that span embryogenesis through postnatal life. It is argued that disrupting these mechanisms results in neurodevelopmental disorders such as autism, movement diseases such as cerebral palsy, and language defects such as dyslexia. This minisymposium brings together recent experimental and clinical advances to better define the cerebellum's role in cerebral maturation.

### Symposium

#### **Circuit Variability and Plasticity in the Central Nervous System of *Drosophila* CME**

Chair: Gaia Tavosanis, PhD  
Co-Chair: Bassem A. Hassan, PhD  
Monday, Oct. 21, 8:30–11 a.m.  
McCormick Place: S100A

Which level of variability in the connections within a circuit can support behavioral variation among individuals or trigger the modified response of an animal that has learned a given task? Unprecedented views into neuronal morphology and circuit organization allow for asking such questions in flies with great precision. This symposium will explore how variability emerges during nervous system development and its behavioral correlates and discuss the signals that promote plasticity in the adult nervous system.

### Symposium

#### **From Single-Cell Profiling to Human Brain Organoids: Capturing Neural Development and Disease CME**

Chair: Sergiu P. Pasca, MD  
Co-Chair: Hongjun Song, PhD  
Monday, Oct. 21, 1:30–4 p.m.  
McCormick Place: S100A

A critical challenge in understanding human brain development and disease has been the lack of direct access to functioning human neural tissue for detailed molecular investigation. This symposium will introduce recent advances in generating stem cell-derived neurons and glial cells in preparations known as brain organoids and assembloids. Moreover, it will illustrate how single-cell genomic and transcriptomic methods as well as studies of RNA and DNA modifications are advancing our understanding of neural development and disease.

### Minisymposium

#### **Novel Mechanisms of Neuronal Alternative Splicing and Strategies to Correct Aberrant Splicing CME**

Chair: Eduardo J. Lopez Soto, PhD  
Tuesday, Oct. 22, 8:30–11 a.m.  
McCormick Place: S102

Dynamic changes in alternative splicing support virtually every neuronal process, ranging from development and plasticity to complex behaviors and cognition, and is implicated in disease pathology. This minisymposium will focus on novel cell-specific mechanisms that regulate alternative splicing in neurons and how these findings inform promising new therapies to correct and control splicing defects.

### Minisymposium

#### **Adult Hippocampal Neurogenesis in Humans and Rodents: New Evidence and New Perspectives CME**

Chair: Juan Song, PhD  
Co-Chair: Shaoyu Ge, PhD  
Tuesday, Oct. 22, 1:30–4 p.m.  
McCormick Place: S100BC

Adult neurogenesis in mammals including humans affords remarkable structural and functional plasticity and regenerative capacity to mature circuits. This minisymposium will cover the most recent topics in adult hippocampal neurogenesis, including new evidence for human adult hippocampal neurogenesis, visualization of neural stem cells in living mice, regulation of adult neurogenesis by niche cells and neural circuits, and adult neurogenesis in the contexts of behavior and diseases.

### Minisymposium

#### **Mechanisms of Basal Ganglia Maturation: Insights Into Health and Disease CME**

Chair: Rui Peixoto, PhD  
Co-Chair: Ori Lieberman  
Wednesday, Oct. 23, 1:30–4 p.m.  
McCormick Place: S100BC

The basal ganglia are critical for action selection and motivated behaviors, and growing evidence points to striatal



dysfunction in numerous neurodevelopmental disorders. This minisymposium will highlight recent advances in our understanding of the molecular and activity dependent mechanisms regulating the maturation of basal ganglia circuits, how these contribute to unique behaviors in adolescence, and how they might be implicated in the pathophysiology of human neurodevelopmental disorders.

**THEME B — NEURAL EXCITABILITY, SYNAPSES, AND GLIA**

**Minisymposium**

**Novel Mechanistic Roles for Sodium Channels in Neurodevelopmental Disorders CME**

Chair: Kevin J. Bender, PhD  
Co-Chair: Ethan M. Goldberg, MD, PhD  
Sunday, Oct. 20, 8:30–11 a.m.  
McCormick Place: S105

Disease-related alterations in ion channel function, termed channelopathies, contribute to a range of neurodevelopmental disorders. This minisymposium will highlight advances in our understanding of how pathogenic variation in sodium channels contributes to a range of neurodevelopmental disorders, including new insight into well-established sodium channelopathies leading to epilepsy and new associations between sodium channels and other developmental disorders, including autism and schizophrenia.

**Minisymposium**

**The Gut-Brain Axis in Health and Brain Disease CME**

Chair: Arthur Liesz, MD  
Co-Chair: Jane A. Foster, PhD  
Sunday, Oct. 20, 1:30–4 p.m.  
McCormick Place: S406A

The gut microbiome is a critical player in neurodevelopment and aging as well as in brain diseases including stroke, Alzheimer’s disease, and Parkinson’s disease. Intestinal bacteria act along the gut-brain axis in part by modifying the immune response. Bacteria also produce neuroactive mediators and can modulate neuronal function, plasticity and behavior. This minisymposium will highlight recent insights on the bi-directional

communication along the brain-gut-microbiome-immune axis.

**Symposium**

**Dissecting Cerebellar Function: A Prototypical Circuit Critical for Motor Learning and Cognition CME**

Chair: Michisuke Yuzaki, MD, PhD  
Monday, Oct. 21, 8:30–11 a.m.  
McCormick Place: S100BC

At the end of 2018, the world lost Masao Ito. Few have shaped our understanding of the cerebellum more — from the identification of inhibitory actions of Purkinje cells, to the postulate and discovery of synaptic long-term depression and a role beyond motor control. This tribute to his visionary work and how it continues to influence research around the world features state-of-the-art studies of cerebellar development, plasticity, and consequences for cognition and its disorders.

**Minisymposium**

**The Synaptic Vesicle Cycle Revisited: New Insights Into the Modes and Mechanisms CME**

Chair: Jennifer R. Morgan, PhD  
Co-Chair: Shigeki Watanabe, PhD  
Tuesday, Oct. 22, 1:30–4 p.m.  
McCormick Place: S105

Neurotransmission relies critically upon the ability of nerve terminals to locally recycle synaptic vesicles with precise efficiency. Recently, the field has witnessed many exciting discoveries on synaptic vesicle recycling. Novel pathways have

been identified; multiple modes of vesicle exo-/endocytosis have been reported, distinguished by speed; and new points of molecular regulation are now known. This minisymposium will present these findings and discuss how they impact the classical view of the vesicle cycle.

**Minisymposium**

**Pleiotropic Mitochondria: The Influence of Mitochondria on Neuronal Development and Disease CME**

Chair: Julien Courchet, PhD  
Co-Chair: Seok-Kyu Kwon, PhD  
Wednesday, Oct. 23, 8:30–11 a.m.  
McCormick Place: S102

Mitochondria are a central organelle in the regulation of neuronal metabolism and synaptic transmission. This minisymposium aims to present exciting novel developments regarding mitochondria biology and its role in neuronal development in a physiological and pathological context.

**Minisymposium**

**Cell-Type Specificity, Strength, and Dynamics of Long-Range Synaptic Input CME**

Chair: Gabe J. Murphy, PhD  
Co-Chair: Leopoldo T. Petreanu, PhD  
Wednesday, Oct. 23, 1:30–4 p.m.  
McCormick Place: S406A

The specificity and functional properties of long-range synaptic input is less understood than that of local input. New optogenetic, viral tracing, and imaging techniques enable a deeper understanding of the interactions



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between cell types in discrete brain areas. New data from these approaches indicate that the specificity of local and long-range input can be comparable and raise the possibility that long-range input specificity may play a larger role than previously appreciated.

## THEME C — NEURODEGENERATIVE DISORDERS AND INJURY

### Minisymposium

#### Myelin Degeneration and Remyelination in Health and Disease **CME**

Chair: Carlos E. Pedraza, PhD  
Co-Chair: Tarek Samad, PhD  
Sunday, Oct. 20, 8:30–11 a.m.  
McCormick Place: S100A

Myelin speeds the transmission of the nerve impulse and insulates and protects the neuron. Defects in myelin formation and demyelination result in developmental disabilities and neurological deficits. A better understanding of myelin dynamics is the key to developing effective therapies for demyelinating diseases. Current studies on myelinating cell biology (specifically oligodendrocyte and Schwann cells) during development and pathology will provide the basis for innovative drug discovery.

### Symposium

#### The Molecular and Spatial Complexity of Tau: What Forms and Loci to Target? **CME**

Chair: Dominic M. Walsh, PhD  
Sunday, Oct. 20, 1:30–4 p.m.  
McCormick Place: S100A

Aggregation of tau is a common feature of a range of neurodegenerative disorders referred to as tauopathies. However, the forms of tau which mediate toxicity remain ill-defined, making it difficult to design optimal anti-tau therapeutics. This symposium will address the molecular and structural heterogeneity of tau, the effects of tau on excitatory neurons, and factors which contribute to the specific spatiotemporal patterns of neurodegeneration which characterize particular tauopathies.

### Minisymposium

#### Phenotype Suppression in Neurodegeneration **CME**

Chair: Kristi Wharton, PhD  
Monday, Oct. 21, 8:30–11 a.m.  
McCormick Place: S105

The underlying causes of neurodegeneration remain elusive in many diseases, including ALS and FTD. This minisymposium will focus on the hallmark phenotypes of these diseases and the molecular and cellular pathways that suppress them. Rather than uniting around a specific genetic mutation or model organism, this minisymposium will highlight models with clinically relevant symptoms that enable mechanistic studies based on genetic or pharmacological suppressors.

### Minisymposium

#### Necroptosis and Other Non-Apoptotic Processes in Microglial Pathophysiology and Neurologic Diseases **CME**

Chair: Dmitry Ofengeim, PhD  
Monday, Oct. 21, 1:30–4 p.m.  
McCormick Place: S105

An emerging view is that inflammation and altered innate immunity drive the pathophysiology of neurodegenerative diseases. The identification of a RIPK1-mediated necroptotic pathway that sits at the intersection of cell death and inflammation presents a new opportunity to explore the role of inflammation in degenerative diseases. This minisymposium will explore the immune response in the context of cellular stress in neurodegenerative diseases.

### Symposium

#### Comparing Dopamine Metabolism in Mouse and Human Neurons: Relevance for Parkinson's Disease **CME**

Chair: Dimitri Krainc, MD, PhD  
Tuesday, Oct. 22, 1:30–4 p.m.  
McCormick Place: S406A

Parkinson's disease involves the degeneration of dopaminergic neurons in the substantia nigra. However, unlike human patients, most Parkinson's disease mouse models do not exhibit dopaminergic degeneration,

suggesting fundamental species differences. This symposium will highlight recent work demonstrating that dopamine metabolism is differentially regulated across mouse and human midbrain neurons, contributing to differences in neuromelanin production and their susceptibility to degeneration.

### Symposium

#### CNS Scarring, Inflammation, and Repair **CME**

Chair: Christian Goeritz, PhD  
Co-Chair: Michael V. Sofroniew, MD, PhD  
Wednesday, Oct. 23, 1:30–4 p.m.  
McCormick Place: S100A

This symposium will focus on the cellular components mediating scarring and repair following lesions to the central nervous system (CNS). Recent advances in understanding the function of glial, stromal, and immune cell components emphasizing heterogeneity within individual cell populations regarding injury induced changes, axonal regeneration and functional recovery after CNS injury will be presented. Based on these advances, this symposium will discuss potential therapeutic repair strategies of the injured nervous system.

## THEME D — SENSORY SYSTEMS

### Minisymposium

#### Parabrachial Complex: A Hub for Pain and Aversion **CME**

Chair: Mary M. Heinricher, PhD  
Sunday, Oct. 20, 8:30–11 a.m.  
McCormick Place: S406B

The parabrachial nucleus complex (PBN) has long been recognized as a sensory relay for taste, nociception, and interoception, but how this information is integrated and used to inform different behavioral outputs is only now being elucidated. This minisymposium will provide a context for interrogation of PBN circuits involved in aversion and avoidance and consider how information is integrated within PBN and transmitted to distinct targets to signal alarm and engage appropriate behavioral responses.

**Minisymposium**

**What Do Neurons Want? CME**

Chair: Gabriel Kreiman, PhD  
Co-Chair: Carlos R. Ponce, MD, PhD  
Monday, Oct. 21, 1:30–4 p.m.  
McCormick Place: S102

Sixty years after Hubel and Wiesel, there remain important questions about the shapes that visually responsive neurons learn to abstract from the natural world. Recent advances in computational neuroscience have paved the way to rethinking neural coding for visual shapes. This minisymposium will discuss recent findings and theories about neuronal representations in the visual cortex, as revealed through experiments, simulations and the novel use of machine learning tools including generative neural networks.

**Minisymposium**

**Sensory Circuits for Vision and Smell: Integrating Molecular, Anatomical, and Functional Maps CME**

Chair: Alexander Fleischmann, PhD  
Co-Chair: Andreas T. Schaefer, PhD  
Tuesday, Oct. 22, 8:30–11 a.m.  
McCormick Place: S105

The past decade has witnessed major advances in the development of molecular, anatomical, and functional techniques for large scale brain mapping. However, integrating these complementary techniques has remained challenging. This minisymposium will demonstrate how novel approaches can be combined to bridge these gaps and systematically generate insight into the molecular and functional topology of sensory neural circuits.

**Minisymposium**

**Expecting the Unexpected: Cortical Circuits for Novelty Detection CME**

Chair: Jordan P. Hamm, PhD  
Tuesday, Oct. 22, 1:30–4 p.m.  
McCormick Place: S406B

Efficient sensory processing involves building predictions based on context and detecting when events betray these predictions. Recent findings indicate that whether a stimulus is

context-typical vs context-deviant/novel may be encoded by separate circuit mechanisms or even neural subpopulations (e.g. deviance detecting cells) distributed across sensory, associative, and prefrontal cortices. This minisymposium will highlight this discovery with converging results and insights from mice, ferrets, and humans.

**Symposium**

**New Approaches to Vision Restoration CME**

Chair: Joshua R. Sanes, PhD  
Co-Chair: Paul A. Sieving, MD, PhD  
Wednesday, Oct. 23, 8:30–11 a.m.  
McCormick Place: S100A

A variety of translational strategies are being developed to restore vision to those who have blinding diseases. This symposium features premier investigators who will highlight four different approaches by discussing cutting-edge research in gene therapy, cell therapy, retinal prostheses, and optogenetic therapy. It will inform the community about the current state of the science using these approaches and highlight their potential to treat debilitating diseases of the visual system.

**Minisymposium**

**Progress in Pain and Itch Research CME**

Chair: Qin Liu, PhD  
Co-Chair: Hongzhen Hu, MD, PhD  
Wednesday, Oct. 23, 1:30–4 p.m.  
McCormick Place: S102

Although acute pain and itch are two of the most fundamental protective somatosensory processes, chronic pathological pain and itch inflict significant clinical challenges and economic burdens. The coding and processing of pain and itch in the peripheral and central nervous systems are highly complicated processes. This minisymposium will highlight the recent research advances in the cross-system regulations of pain and itch, and maladaptive processes that lead to chronic pain and itch.

**THEME E — MOTOR SYSTEMS**

**Minisymposium**

**Gain Control in the Sensorimotor System: From Neural Circuit Organization to Behavioral Function CME**

Chair: Kazuhiko Seki, PhD  
Co-Chair: Eiman Azim, PhD  
Saturday, Oct. 19, 1:30–4 p.m.  
McCormick Place: S406B

Coordinated movement depends on communication between neural circuits that produce motor output and those that report sensory consequences. Fundamental to this interaction are mechanisms for controlling the influence that feedback signals have on motor pathways — for example, reducing feedback gains when disruptive and increasing gains when advantageous. This minisymposium will discuss the organization and function of diverse forms of sensory gain control across species at multiple levels of the nervous system.

**Minisymposium**

**The Neural Basis of Manual Dexterity CME**

Chair: Sliman J. Bensmaia, PhD  
Sunday, Oct. 20, 8:30–11 a.m.  
McCormick Place: S102

Human hands are remarkably versatile and constitute the principal means by which we physically interact with the environment. This minisymposium will investigate the neural mechanisms that mediate manual dexterity by examining both motor control of the hands and the sensory input necessary for manual precision. Manual dexterity from evolutionary and comparative perspectives and recent efforts to confer anthropomorphic dexterity to brain-controlled bionic hands will also be considered.

# Symposia & Minisymposia

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## Minisymposium

### Beta Oscillations in Sensorimotor Function, Executive Action Control, and Working Memory **CME**

Chair: Robert Schmidt, PhD  
Co-Chair: Adam R. Aron, PhD  
Tuesday, Oct. 22, 8:30–11 a.m.  
McCormick Place: S406A

Beta oscillations in cortical and basal ganglia networks remain mysterious, yet they are closely linked to network function and dysfunction. While beta is classically seen as representing an akinetic state, this minisymposium will highlight new insight into beta in the sensorimotor system and in cognitive control. Results across three species as well as from computational modelling, deep brain stimulation and electrophysiology that explain the mechanisms and function of beta and closed-loop methods in patients will be presented.

## Minisymposium

### Adaptive Control of Movements and Emotional States by the Cerebellum **CME**

Chair: Reza Shadmehr, PhD  
Wednesday, Oct. 23, 1:30–4 p.m.  
McCormick Place: S406B

An unexpected sensory event can be emotionally charged or neutral and can occur during movements or stillness. In every case, the cerebellum learns to eliminate the sensory prediction error. When this learning fails, results are motor as well as anxiety disorders. This minisymposium will present recent discoveries regarding the neural basis of this learning process, demonstrating the role of prediction errors in sculpting activity of Purkinje cells and leading to better control of brain structures outside of the cerebellum.

## THEME F — INTEGRATIVE PHYSIOLOGY AND BEHAVIOR

### Minisymposium

#### Sex Differences in Drug Craving and Addiction-Like Behaviors in Rodent Models **CME**

Chair: Mathieu E. Wimmer, PhD  
Co-Chair: Jessica A. Loweth, PhD  
Saturday, Oct. 19, 1:30–4 p.m.  
McCormick Place: S102

Women tend to have greater vulnerability than men to developing symptoms that define Substance Use Disorder, including escalation of drug taking and withdrawal symptoms. Moreover, the limited treatment options for addiction are less effective in women compared to men. This minisymposium highlights recent advances in rodent models of addiction that dissect the molecular, hormonal, and neuronal circuits underlying sex differences in addiction-like behaviors and craving and relapse vulnerability.

### Minisymposium

#### Insights Into Neural Coding and Behavior From Large-Scale Population Recordings Across Cortical Areas **CME**

Chair: Jerry L. Chen, PhD  
Monday, Oct. 21, 8:30–11 a.m.  
McCormick Place: S406B

Cognitive functions involve information processing within and across the neocortical areas. This minisymposium aims to unravel how local and global cortical dynamics contribute to sensory processing, attention, working memory, and decision making. Novel optical and electrophysiological methods for simultaneous recordings across multiple areas, their application across mammalian species, and computational approaches for analyzing large-scale population activity will be discussed.

### Symposium

#### Cortical Disinhibitory Circuits: Cell Types, Connectivity, and Function **CME**

Chair: Chair: Lisa Topolnik, PhD  
Co-Chair: Klas Kullander, PhD  
Monday, Oct. 21, 1:30–4 p.m.  
McCormick Place: S100BC

The concept of cortical disinhibition has recently arisen as an important mechanism for information flow during complex behavioral tasks. Identifying the neuron types involved in cortical disinhibition, their connectivity patterns, and their functional role is therefore critical to understanding the structure and function of disinhibitory circuits. This symposium brings together leading scientists from around the world to present the latest discoveries on the dynamic organization of cortical microcircuits with focus on disinhibition and its role in cognition and behavior.

### Symposium

#### Neural Circuit and Plasticity Mechanisms of Cognitive Control of Feeding Behavior **CME**

Chair: Gorica D. Petrovich, PhD  
Tuesday, Oct. 22, 1:30–4 p.m.  
McCormick Place: S100A

Persistent food cravings drive overeating and binge-eating disorder. Palatable food cues stimulate excessive food seeking and consumption through cognitive and hedonic processes. This symposium will highlight new neural circuitry and plasticity mechanisms underlying cognitive control of feeding, including learning and memory processes that integrate sensory and reward components of food and related cues. Sex differences and translational implications of these findings will be also discussed.

### Minisymposium

#### Redefining Neuromodulation of Behavior: Impact of a Modular Locus Coeruleus Architecture **CME**

Chair: Nelson K. B. Totah, PhD  
Tuesday, Oct. 22, 1:30–4 p.m.  
McCormick Place: S102

The locus coeruleus (LC) is a brainstem nucleus critical for survival (wakefulness, autonomic responses, and analgesia) as well as cognition. LC neurons project throughout the central nervous system and could transmit a homogenous noradrenergic signal that uniformly regulates these diverse functions. This minisymposium will present work reconceptualizing LC as a differentiated



system for targeted neuromodulation on the basis of developmental, molecular, anatomical, and neurophysiological diversity.

### Minisymposium

#### Regulation and Dysregulation of Activity Homeostasis in Central Neural Circuits **CME**

Chair: Inna Slutsky, PhD  
Co-Chair: Samuel Barnes, PhD  
Wednesday, Oct. 23, 8:30–11 a.m.  
McCormick Place: S406B

A fundamental challenge in the field of neuroscience is to understand how neurons and neural networks maintain stable firing rates in the face of continuous synaptic, metabolic and molecular turnover. This minisymposium will explore how neural homeostasis is implemented at different spatial scales and across diverse brain regions. Importantly, how current findings can be reconciled with other plasticity mechanisms and the disease implications of homeostasis failures will also be discussed.

## THEME G — MOTIVATION AND EMOTION

### Symposium

#### Epigenetic Mechanisms: Shared Pathology Across Brain Disorders **CME**

Chair: Eric J. Nestler, MD, PhD  
Co-Chair: Zhen Yan, PhD  
Saturday, Oct. 19, 1:30–4 p.m.  
McCormick Place: S100A

The pathogenesis of many brain disorders converges on epigenetic changes, leading to lasting transcriptional dysregulation and synaptic dysfunction. This symposium will discuss recent findings on the key role of epigenetic mechanisms in stress-induced depression, autism-like social deficits, drug addiction, and age-related memory loss. It will also discuss the therapeutic potential of targeting epigenetic enzymes, such as chromatin remodelers and histone modifiers, for complex brain disorders.

### Minisymposium

#### Cannabis and the Developing Brain: Insights Into Its Long-Lasting Effects **CME**

Chair: Yasmin Hurd, PhD  
Co-Chair: Miriam Melis, PhD  
Sunday, Oct. 20, 1:30–4 p.m.  
McCormick Place: S100BC

Increasing evidence suggests that cannabis exposure during neurodevelopment (perinatal and adolescent stages) results in persistent alterations in brain circuits underlying neuropsychiatric disorders and leads to an increased risk for certain psychiatric conditions later in life. This minisymposium will explore gene x environment interactions that appear to play a significant role in such sensitivity and will provide translational insights about molecular, epigenetic, neurophysiological, and *in vivo* neuroimaging disturbances in the human brain and animal models.

### Minisymposium

#### Ventral Tegmental Area (VTA) Cell Heterogeneity in Health and Disease **CME**

Chair: Nicholas W. Gilpin, PhD  
Co-Chair: Elyssa B. Margolis, PhD  
Monday, Oct. 21, 8:30–11 a.m.  
McCormick Place: S102

Historically, most research on the ventral tegmental area (VTA) has tested dopamine function as it relates to reward processing. Recent progress indicates 1) non-dopamine VTA neurons significantly impact behavior, 2) VTA inputs and outputs have multiple, sometimes opposing, behavioral effects, and 3) the VTA subserves various functions impacted by mental health disorders. This minisymposium will describe newly elucidated roles of specific VTA cell populations in addiction, reward, aversion, fear and sleep.

### Symposium

#### The Paraventricular Thalamus (PVT): Salience and Timing Orchestrator for Learning and Deciding **CME**

Chair: Seema Bhatnagar, PhD  
Co-Chair: Tallie Z. Baram, MD, PhD  
Tuesday, Oct. 22, 8:30–11 a.m.  
McCormick Place: S100BC

The goal of this symposium is to present novel perspectives on the established and emerging roles of the PVT in complex behaviors. There has been an explosion of interest in the PVT due to its recently described roles in orchestrating decisions and behaviors involving emotional salience. Evidence suggests that the PVT shapes behaviors by integrating information about the memory and salience of negative and positive experiences, functions highly germane to addiction and psychopathology.

### Minisymposium

#### Brain Circuits for the Selection and Scaling of Defensive Behavior **CME**

Chair: Stephen Maren, PhD  
Wednesday, Oct. 23, 8:30–11 a.m.  
McCormick Place: S105

Threatening stimuli evoke a range of behavioral responses that are selected and scaled according to the proximity of the danger. This minisymposium will examine the neural circuits that underlie defensive behaviors under threat. Sex, context, threat proximity, and safety signals regulating defensive responses in both rodents and humans will be considered.

## THEME H — COGNITION

### Minisymposium

#### Brain Mechanisms of Concept Learning **CME**

Chair: Dagmar Zeithamova, PhD  
Co-Chair: Michael L. Mack, PhD  
Saturday, Oct. 19, 1:30–4 p.m.  
McCormick Place: S105

Concept learning, the ability to extract commonalities and highlight distinctions across related experiences to build organized knowledge, is uniquely supported by interacting neural systems related to memory, attention, and executive control. This minisymposium will highlight research that directly assesses the multiple neural mechanisms of concept learning with innovative approaches that bridge computational modeling and neural measures.

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## Symposium

### Opening the Black Box of the Hippocampus: Visualizing Memories in Distinct Cell Types, Microcircuits, and Cellular Compartments **CME**

Chair: Mazen Kheirbek, PhD  
Sunday, Oct. 20, 8:30–11 a.m.  
McCormick Place: S100BC

The hippocampus is comprised of many cell types and circuits that differentially contribute to aspects of memory encoding. Recent technological advances have led to a reassessment of the hippocampus, its information processing capacity, and how it controls behavior. This symposium will describe how electrophysiology, imaging, and computational tools can be combined to decode the function of hippocampal cell types, microcircuits, and subcellular compartments in the control of behavior.

## Minisymposium

### Cognitive Cerebellum: Role in Motivation, Emotion, Executive, Social, and Sensory Processing **CME**

Chair: Iaroslav A. Savtchouk, PhD  
Co-Chair: June Liu, MD, PhD  
Sunday, Oct. 20, 1:30–4 p.m.  
McCormick Place: S102

The cerebellum has been predominantly studied as a sensory-motor integrator, but anatomic studies reveal its extensive reciprocal connections with non-motor cortical regions. It is now increasingly implicated in higher-order cognition, such as complex planning as well as emotional, social, linguistic, and reward processing. This minisymposium will review how these recent advances in beyond-motor cerebellar research will reshape our view of brain function and dysfunction, including autism and cognitive affective syndrome.

## Minisymposium

### Awakening the Engram: The Etiological Role of Engram Cells for Memory Formation, Storage, and Retrieval in Health and Disease **CME**

Chair: Johannes Gräff, PhD  
Co-Chair: Tomas J. Ryan, PhD  
Monday, Oct. 21, 1:30–4 p.m.  
McCormick Place: S406A

Converging evidence over the past several years suggests that memories are stored at least in part as specific populations of engram cells. In this symposium, leading experts in engram biology share their continuously refined insights on how engram cells contribute to information encoding and storage, across diverse brain regions and behavioral modalities. Particular emphasis is placed on their emerging translational value for memory dysfunctions in age and stress-related disorders.

## Minisymposium

### Naturalistic Paradigms in Awake Monkeys: Bridging fMRI and Extra-Cellular Activities **CME**

Chair: Sze Chai C. Kwok, PhD  
Co-Chair: Brian E. Russ, PhD  
Tuesday, Oct. 22, 8:30–11 a.m.  
McCormick Place: S406B

Naturalistic viewing paradigms have become increasingly popular, as they translate to the real world conditions that shaped brain evolution. Recent advances in non-human primate research allow for the monitoring of large numbers of neurons, and the collection of richer behavioral and neural data than ever before. This minisymposium will present evidence that naturalistic paradigms reveal neural specializations and interaction patterns in the brain that would be dormant otherwise.

## Minisymposium

### Grid-Like Hexadirectional Modulation of Neural Activity in Humans **CME**

Chair: Nanthia Suthana, PhD  
Wednesday, Oct. 23, 8:30–11 a.m.  
McCormick Place: S100BC

Neurons have been shown to increase in firing rate with a hexagonal grid pattern as an animal navigates an environment.

Recently, studies show that population signals of neural activity (i.e., LFP and fMRI) exhibit similar hexadirectional modulation in humans. These findings from human grid-like oscillatory and fMRI signals will be discussed as well as how they relate to each other and rodent studies. This minisymposium will also focus on how findings relate to spatial navigation and memory in humans.

## THEME I — TECHNIQUES

### Minisymposium

#### BRAIN Initiative: Cutting-Edge Tools and Resources for the Community **CME**

Chair: Walter J. Koroshetz, MD  
Saturday, Oct. 19, 1:30–4 p.m.  
McCormick Place: S406A

A core principle of the BRAIN Initiative is to develop and share novel technologies, tools, methods, and resources to advance understanding of healthy and disease brain states. This minisymposium features BRAIN-funded investigators who are driving forward toward this goal; it will inform and educate the community about opportunities and applications of their advances and encourage broader understanding of the methodological and technological advances developed as a part of the BRAIN Initiative.

### Minisymposium

#### Optical Recording of Neural Transmission: From Tool Development to Applications **CME**

Chair: Haining Zhong, PhD  
Co-Chair: Loren L. Looger, PhD  
Sunday, Oct. 20, 1:30–4 p.m.  
McCormick Place: S105

Imaging of genetically encoded calcium indicators have revolutionized systems neuroscience. However, crucial complementary information, such as when and where neurotransmission takes place, are required for revealing the full picture of brain function. This minisymposium aims to highlight the most recent development of the fluorescent indicators for imaging key neurotransmitters and their downstream events, and the exciting applications of these indicators for dissecting neuronal function.





**Minisymposium**  
**Artificial Intelligence and Neuroscience: From Neural Dynamics to Artificial Agents CME**  
Chair: Maneesha Sahani, PhD  
Monday, Oct. 21, 8:30–11 a.m.  
McCormick Place: S406A

Machine learning research is advancing at a fast pace, with substantial impacts on neuroscience. Data-analytic approaches have helped to uncover and characterize dynamical structure in neural population activity, while artificial networks have provided insights into representations and computations in the brain. This minisymposium will explore topics at the intersection of machine learning and neuroscience, demonstrating recent advances and how both fields can benefit from a close interaction.

**Symposium**  
**Brain Somatic Mosaicism: Implications for Development and Disorders CME**  
Chair: Flora M. Vaccarino, MD  
Co-Chair: Alexander E. Urban, PhD  
Tuesday, Oct. 22, 8:30–11 a.m.  
McCormick Place: S100A

Cells of the human brain can contain differences in their individual genome sequences, manifesting as single-nucleotide variants (SNVs), mobile element insertions (MEIs), and large copy number variants (CNVs). This symposium will discuss the analysis of somatic mosaicism using advanced genome sequencing approaches, as well as how mosaic variants arise and spread across the brain and their frequencies, mechanisms, and relevance for development and disease.

**Minisymposium**  
**Timing is Everything: Temporally Irregular Stimulation Patterns for Brain Mapping and Clinical Therapeutics CME**  
Chair: Alik S. Widge, MD, PhD  
Wednesday, Oct. 23, 8:30–11 a.m.  
McCormick Place: S406A

Brain stimulation therapies have revolutionized movement disorder treatment, hold promise in mental disorders, and are

powerful tools for studying the brain. Clinical stimulation is delivered without consideration of how it interacts with ongoing brain activity. This minisymposium explores the growing evidence that when we stimulate is as important as where. New, precisely timed stimulation sequences, each of which has useful physiologic effects, will be described.

**Minisymposium**  
**Advanced Circuit and Cellular Imaging Methods in Non-Human Primates CME**  
Chair: Stephen L. Macknik, PhD  
Wednesday, Oct. 23, 1:30–4 p.m.  
McCormick Place: S105

Optogenetic and microscopic imaging techniques have proven successful in manipulating neuronal populations with high spatial and temporal fidelity in species ranging from insects to rodents. However, significant obstacles remain in their application to non-human primates (NHPs). Robust optogenetics-activated behavior and long-term monitoring of target neurons have been especially challenging in NHPs. This minisymposium will present recent advances that overcome many such obstacles.

## Featured Panel Sessions

GENERAL INFORMATION PROGRAM | [WWW.SFN.ORG/PANELS](http://WWW.SFN.ORG/PANELS)

### STORYTELLING SESSION 50

#### The Storytelling Brain: How Neuroscience Stories Help Bridge the Gap Between Research and Society

Chair: Susana Martinez-Conde, PhD  
Sunday, Oct. 20, 1:30–4 p.m.  
McCormick Place: S406B

This storytelling session brings together neuroscientific discovery, science reporting, and personal storytelling in a synergetic and memorable way. Broad-appeal lectures will interweave with personal stories to showcase the effective ways in which neuroscience researchers and journalists can collaborate, how storytelling provides a common ground between science and art, and the power of narrative to hold captive our storytelling brains.

### DUAL PERSPECTIVES 50

#### Does Adult Neurogenesis Occur in the Human Brain?

Monday, October 21, 1–2 p.m.  
McCormick Place: Room S406B

Whether neurogenesis continues in the adult human brain has been contested for decades. Adult neurogenesis is a fascinating phenomenon involving the birth, migration and functional integration of a new neuron into established neural networks. This Dual Perspectives session will present recent evidence both supporting (Dr. Llorens-Martín) and questioning (Dr. Alvarez-Buylla) the presence of new neurons in the adult human hippocampus.



### BASIC-TRANSLATIONAL-CLINICAL ROUNDTABLES

#### Mechanisms of Drug Addiction:

##### A Translational Perspective CME

Organizer: Trevor W. Robbins, PhD  
Monday, October 21, 8:30–11 a.m.  
McCormick Place: Room N230B

This roundtable will focus on translatability of basic research in animals to human research in addiction in order not only to understand neurobehavioral mechanisms of addiction, but also to define new strategies for discovery of clinical treatments, especially regarding the current opioid crisis. Topics to be discussed include the neural systems underlying addiction, neuronal adaptations occurring within those systems, how different drugs of abuse produce addiction, and the role of aberrant learning and vulnerabilities in the drive to addiction.

#### Exoskeletons and Robotics for Neurorehabilitation CME

Organizer: Ann M. Spungen, EdD  
Tuesday, October 22, 8:30–11 a.m.  
McCormick Place: Room N230B

This session will include a state-of-the-art overview of the use of robotics and exoskeletons in populations with neurological impairments. Specific presentations will include upper body robotic interventions for functional and neurological gains, robotic interventions for children with neurological

impairments, and lower extremity exoskeletons for over ground ambulation. The lower extremity exoskeletal-assisted walking data will be presented from a randomized, controlled clinical trial.

#### Gene Therapy in Neurological Diseases CME

Organizer: Asa Abeliovich, MD, PhD  
Wednesday, October 23, 8:30–11 a.m.  
McCormick Place: Room N230B

Gene therapy has advanced rapidly in the past five years, with technological advances and encouraging early clinical studies. This roundtable will focus on the opportunities and challenges as the field progresses, with a focus on the development of disease-modifying therapies that address urgent unmet needs of patients with neurological disorders. Discussion topics will include: technologies that are driving the field, with a focus on AAV platforms; leveraging advances in neurogenetics to identify validated therapeutic targets and patient subpopulations; rare monogenic disorders and clinical therapeutic strategies; the pursuit of gene therapy approaches for genetically complex disorders; and CNS region- and cell-selective approaches.