Minisymposia

THEME A: DEVELOPMENT

Genomic Views of Transcriptional Enhancers: Essential Determinants of Cellular Identity and Activity-Dependent Responses in Neurons CME

Chair: Jesse M. Gray, PhD
Co-Chair: Tae-Kyung Kim, PhD
Sunday, Oct. 18, 1:30–4 p.m.
McCormick Place: S103

Animal genomes endow nervous systems with an incredible diversity of cell types. Each cell type is defined by a unique gene expression profile that is specified by regulatory sequences sprinkled throughout the genome. It is now possible to identify thousands of these regulatory sequences, called enhancers, in a single experiment and address their neurobiological functions via genome editing. This session will address the scientific opportunities that enhancers now represent for neuroscience.

Selection and Consolidation of Neuronal Circuits: Lessons From Learning and Development CME

Chair: Kuan Hong Wang, PhD
Tuesday, Oct. 20, 1:30–4 p.m.
McCormick Place: S103

From perception to action, mental functions are mediated by the activities of neuronal circuits. A fundamental challenge in neuroscience is to understand the processes by which neuronal circuits are selected and consolidated for specific information processing tasks. Speakers will present recent studies of these processes in learning and development that afford integrative understanding across multiple levels including population activity and synaptic connection, neuromodulation, and molecular dynamics.

THEME B: NEURAL EXCITABILITY, SYNAPSES, AND GLIA: CELLULAR MECHANISMS

New Insights Into Signal Generation at the Presynaptic Active Zone CME

Chair: Annalisa Scimemi, PhD
Co-Chair: Jeremy S. Dittman, MD, PhD
Monday, Oct. 19, 8:30–11 a.m.
McCormick Place: S105

The presynaptic active zone is the site of Ca^{2+} channels localization, synaptic vesicle docking, and neurotransmitter release. Recent findings shed new light on the topography of the presynaptic active zone and on the molecular mechanisms underlying its function and plasticity in response to neural activity and pathology. This minisymposium will provide a panel of discussion of recent advances in the molecular organization of the presynaptic active zone at central and peripheral synapses.

Emerging Insight Into the Critical Role of Astrocyte Ion Channels in Homeostasis and Neuron-Glia Signaling CME

Chair: Min Zhou, MD, PhD
Co-Chair: Michelle L. Olsen, PhD
Wednesday, Oct. 21, 1:30–4 p.m.
McCormick Place: S105

The critical role of astrocyte potassium channels in central nervous system homeostasis has been reemphasized by recent studies conducted in animal disease models. Emerging evidence also supports the signaling role mediated by astrocyte ion channels, such as BEST1, hemichannels, and two-pore channels; these channels enable astrocytes to interact with neurons and regulate synaptic transmission and plasticity. This minisymposium will highlight the recent development and future perspective of these research areas.

THEME C: DISORDERS OF THE NERVOUS SYSTEM

Epigenetic Landscape of Stress and Addiction: Novel Therapeutic Possibilities CME

Chair: Jean Lud Cadet, MD
Co-Chair: Elisabeth Binder, MD, PhD
Saturday, Oct. 17, 1:30–4 p.m.
McCormick Place: S105

At this minisymposium, speakers will describe the transcriptional and epigenetic mechanisms by which stress and drugs of abuse modify the functionality of reward circuitries. They will also discuss how individual and environmental resilience factors may impact these molecular events. Behavioral and pharmacologic approaches that prevent or alter drug– and/or stress-induced epigenetic changes in the brain may promote long-term abstinence by preventing relapse to drug self-administration.

Axonal Transport Defects in Neurodegenerative Diseases: Mechanisms and Molecular Components Involved CME

Chair: Gerardo Morfini, PhD
Co-Chair: Scott Brady, PhD
Saturday, Oct. 17, 1:30–4 p.m.
McCormick Place: S406B

To date, there is significant consensus on the notion that deficits in axonal transport represent an important pathogenic event common to many neurodegenerative diseases. However, little is known about mechanisms and specific molecular components mediating these deficits. These topics will be the main subject of discussion at this minisymposium.

Transcriptomic Approaches to Neural Regeneration CME

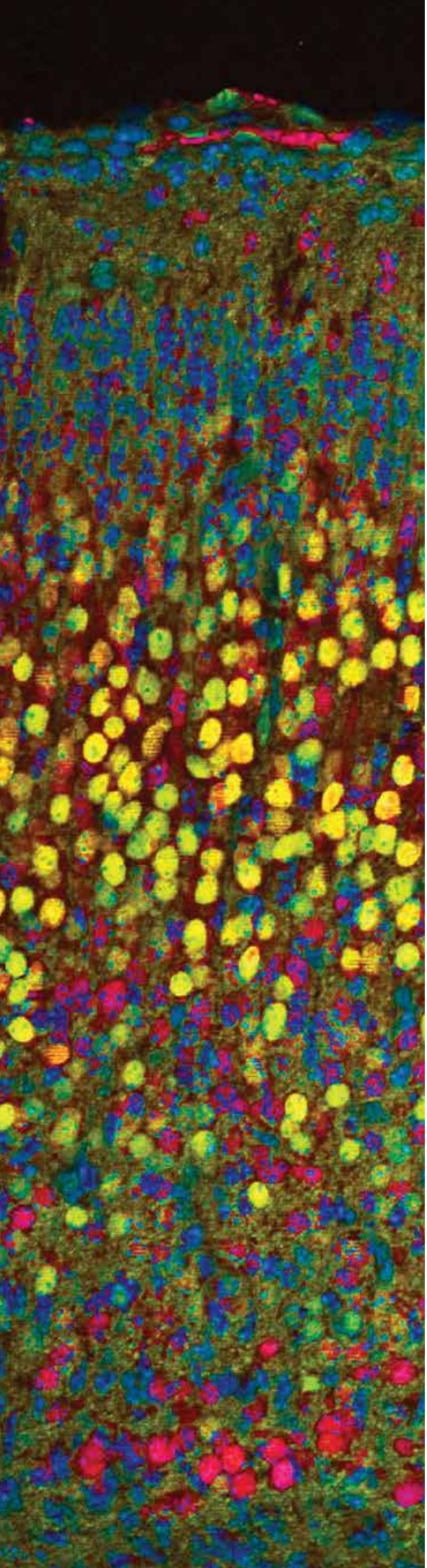
Chair: Mark H. Tuszynski, MD, PhD
Sunday, Oct. 18, 8:30–11 a.m.
McCormick Place: S105

Understanding why injured adult central nervous system axons fail to regenerate remains a central challenge of neuroscience research. Recently, the use of high-throughput genetic screening has greatly illuminated the molecular mechanisms governing neuronal regeneration programs. This minisymposium will highlight how transcriptomics approaches have led to the identification of novel regulatory networks and molecular targets that can be successfully manipulated to promote axon regeneration.

Chaperones in Neurodegeneration CME

Chair: Iris Lindberg, PhD
Monday, Oct. 19, 8:30–11 a.m.
McCormick Place: S406A

This minisymposium will present new work in the area of neuronal proteostasis with a specific focus on the involvement of cellular chaperones in neurodegenerative disease. There will be a brief discussion of protein misfolding in neurodegenerative disease. Each speaker will then present work on a different aspect of chaperone control of neuronal proteostasis with topics including chaperone engineering, blockade of protein oligomerization and cytotoxicity, as well as the rescue of neurodegenerative processes.



New Perspectives for the Rescue of Cognitive Disability in Down Syndrome CME

Chair: Renata Bartesaghi
Co-Chair: Diana Bianchi, MD
Monday, Oct. 19, 1:30–4 p.m.
McCormick Place: S105

Down syndrome is a relatively high-incidence genetic condition caused by the triplication of human chromosome 21. No therapies currently exist for the rescue of cognitive impairment in Down syndrome. This minisymposium will present exciting findings showing that it is possible to restore brain development and cognitive performance in mouse models of Down syndrome with therapies usable in humans. This knowledge provides a breakthrough for the cure and prevention of intellectual disability in Down syndrome.

Modern Approaches Toward More Predictive Mouse Models of Neurodegenerative Diseases CME

Chair: Gareth R. Howell, PhD
Co-Chair: Bruce T. Lamb, PhD
Tuesday, Oct. 20, 8:30–11 a.m.
McCormick Place: S406A

Animal models of neurodegenerative diseases have provided important insights into the pathophysiology of disease and suggested potential avenues for therapies. However, translation of these findings to the clinic has been limited. The latest advances in modeling different neurodegenerative disease processes will be presented, as well as the cutting-edge technologies/methodologies that are revolutionizing the field and should provide more predictive models for neurodegenerative diseases.

Mood and Reward Networks in Chronic Pain Conditions CME

Chair: Venetia Zachariou, PhD
Co-Chair: Ipek Yalcin, PhD
Tuesday, Oct. 20, 8:30–11 a.m.
McCormick Place: S103

This session presents new perspectives on mechanisms modulating sensory and affective components of chronic pain. The panel will emphasize studies on networks involved in mood, reward, and motivation. Speakers will cover areas of investigation related to adaptations in cortical and striatal networks under chronic pain conditions, the impact of pain in cortical plasticity and stress/anxiety disorders, the mechanisms by which the brain reward center modulates motivation under chronic pain states, and the intracellular targets of antidepressants in the brain reward center.

Redox Signaling in Neurological Dysfunction CME

Chair: Rodrigo Franco, PhD
Co-Chair: Lourdes Massieu, PhD
Tuesday, Oct. 20, 1:30–4 p.m.
McCormick Place: S406B

Oxidative stress, the imbalance between reactive oxygen species formation and detoxification, participates in the etiology of neurological disorders. Recent findings demonstrate that reductive/oxidative (redox) signaling regulates gene expression, enzyme activity, neuronal fate, and metabolism. This session will examine recent findings regarding the role of oxidative damage, redox signaling, antioxidant response, metabolism, and mitochondrial dysfunction in neurodegeneration, epilepsy, and brain hypoglycemia.

Corticospinal Motor Neurons in Health and Disease CME

Chair: Hande Ozdinler, PhD
Wednesday, Oct. 21, 1:30–4 p.m.
McCormick Place: S100B

The corticospinal motor neurons (CSMN) act as the "spokesperson" of the cerebral cortex for the initiation and modulation of voluntary movement. Their health is critical for the proper function of motor neuron circuitry and their degeneration is key in numerous motor neuron diseases in which voluntary movement is impaired. Recent developments suggest a key role for CSMN in disease progression and pathology. These neuron populations deserve better attention and understanding.

THEME D: SENSORY AND MOTOR SYSTEMS

Dorsal Striatum: From Microcircuits and Modulation to *In Vivo* Function CME

Chair: Jens Hjerling-Leffler, PhD
Co-Chair: David Robbe, PhD
Saturday, Oct. 17, 1:30–4 p.m.
McCormick Place: S103

Dorsal striatum receives sensorimotor and higher-order information through a wide range of synaptic inputs, including those from the cortex and the thalamus. The integration of this information is fine-tuned by neuromodulators affecting cortical and subcortical motor systems. This minisymposium will present data from connected areas of research that aim at

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For details, see page 70 and visit SfN.org/cme.

understanding the cellular diversity, connectivity, modulation, and *in vivo* function of the dorsal striatal network and how malfunction might lead to disease.

Behavior Diversity in Individuals: Genetic and Circuit Mechanisms CME

Chair: Brian Grone, PhD
Co-Chair: Carlos J. Pantoja, MD, PhD
Sunday, Oct. 18, 1:30–4 p.m.
McCormick Place: S406A

Consistent differences in sensorimotor behavior are found among individuals. These differences likely contribute to fitness in varied environmental conditions. However, the proximal causes that generate and control behavior variability have only recently begun to be unraveled. This minisymposium will examine mechanisms of behavior variability in vertebrates and invertebrates. Presentations will include the latest findings from genetic, molecular, and circuit-based studies.

Brainy and Handy: What Robotics and Prosthetics Can Learn From Touch Receptors in the Hand CME

Chair: Esther P. Gardner, PhD
Tuesday, Oct. 20, 8:30–11 a.m.
McCormick Place: S105

To honor Vernon Mountcastle, experts from somatosensory neurophysiology, psychophysics, and bioengineering will present studies of how the sense of touch might be translated for use in prosthetic or robotic hands. Speakers will define the components of intelligent manipulative sensors based on biological models in the hand. Touch receptors detect object shape, edges and texture, and monitor grip force. Multisensor networks enhance touch information enabling translational application to adaptive mechanical hands.

Different Brains, Common Circuits? Visual Decision Making in Rodents and Primates CME

Chair: David J. Freedman, PhD
Tuesday, Oct. 20, 8:30–11 a.m.
McCormick Place: S406B

Decision-making is a process by which sensory stimuli are evaluated and used to guide behavior. While much is known about activity within individual cortical areas during visual decision-making, recent advances are giving insight into the circuit mechanisms by which multiple brain areas interact to form decisions. This minisymposium will assemble a diverse group of researchers studying circuit mechanisms of decision-making with the goal of integrating recent findings from primate and rodent work.

Peripheral Optogenetic Neuromodulation: Progress and Challenges CME

Chair: Scott L. Delp, PhD
Tuesday, Oct. 20, 1:30–4 p.m.
McCormick Place: S105

At the border between the external and internal worlds, the peripheral nervous system is fundamental to understanding the behavior of any living being. Optogenetic control of the peripheral nervous system is a powerful tool for exploration and understanding; however, it brings with it a unique set of challenges. This minisymposium will highlight innovations in peripheral optogenetic neuromodulation and illustrate recent discoveries in pain, sensation, motor systems, and stem cell biology.

Reward-Driven Learning in Primary Sensory Cortices CME

Chair: Alfredo Kirkwood, PhD
Wednesday, Oct. 21, 8:30–11 a.m.
McCormick Place: S406B

Maximizing reward and avoiding punishment is an important behavioral drive, and animals routinely learn what stimuli and actions predict favorable and aversive outcomes. This panel will discuss the emerging idea that learning to recognize reward-predicting stimuli involves remodeling at early stages of perception in the primary sensory cortices. Covered topics will include perceptual learning in the human primary visual cortex, how cortical cells "learn" to predict attributes of the reward, and the underlying synaptic mechanisms.

Pain and Poppies: The Good, the Bad, and the Ugly of Opioid Analgesics CME

Chair: Tuan Trang, PhD
Co-Chair: Catherine Cahill, PhD
Wednesday, Oct. 21, 1:30–4 p.m.
McCormick Place: S406A

Opioid analgesics are the cornerstone of modern pain therapy. However, their use is plagued with major side effects, such as a loss of pain relieving effects (analgesic tolerance), paradoxical pain (hyperalgesia), and addiction. This session will highlight recent breakthroughs in understanding the key causes of these adverse effects and explore the cellular control of opioid systems in reward and aversion. The findings will challenge traditional views of the good, the bad, and the ugly of opioids.

THEME E: INTEGRATIVE SYSTEMS: NEUROENDOCRINOLOGY, NEUROIMMUNOLOGY, AND HOMEOSTATIC CHALLENGE

Sex-Specific Mechanisms of Stress Susceptibility CME

Chair: Debra Bangasser, PhD
Co-Chair: Mollee R. Farrell, PhD
Sunday, Oct. 18, 8:30–11 a.m.
McCormick Place: S103

Stress-related mental illnesses are twice as prevalent in women as in men. Because many factors that contribute to pathology are likely sex-dependent, the development of improved treatments for both men and women relies on preclinical studies that include both male and female animals. This minisymposium will highlight recent advances in rodent models that dissect the genes, hormones, and circuits that underpin sex differences in the brain's response to stress.

Corticotropin Releasing Factor: Novel Molecular, Cellular, and System Roles CME

Chair: Danny G. Winder, PhD
Co-Chair: Nicholas W. Gilpin, PhD
Sunday, Oct. 18, 1:30–4 p.m.
McCormick Place: S406B

Corticotropin releasing factor (CRF) is a neuropeptide that has classically been studied in the context of neuroendocrine regulation of the stress response. This minisymposium will capitalize on recent data generated by using transgenic, live imaging, electrophysiology, optogenetic, molecular, and behavioral approaches. It will highlight newly appreciated roles of CRF in modulating functions of specific neuronal populations and circuits, influencing memory, anxiety, alcohol intake, and pain.

Disrupted Sleep: From Molecules to Cognition CME

Chair: Eus J. Van Someren, PhD
Co-Chair: Chiara Cirelli, MD, PhD
Monday, Oct. 19, 1:30–4 p.m.
McCormick Place: S103

Whereas it remains enigmatic whether neuroscience can ultimately define a single key function of sleep for all organisms, it is becoming clear that disruption of sleep interferes profoundly with their normal functioning. This minisymposium will present an integrated

overview of compelling new evidence showing that sleep disruption leads to significant negative consequences for brain function across many different levels, ranging from molecules to cognition, with broad health implications.

THEME F: COGNITION AND BEHAVIOR

Learning to Generalize: Neural, Behavioral, and Computational Basis of Categorization CME

Chair: Matthew V. Chafee, PhD
Co-Chair: Hugo Merchant, PhD
Sunday, Oct. 18, 8:30–11 a.m.
McCormick Place: S406B

The ability to group objects and events into flexible categories depending on their behavioral utility is fundamental to many forms of intelligent behavior shared between human and nonhuman primates. This minisymposium will synthesize alternative views of how the brain implements categorization based on studies of statistical learning in humans, lesions in monkeys, the activity of single neurons and dynamics of cortical networks in monkeys, as well as the properties of computational models.

Can We Merge the Divergent Views of Hippocampal Function? CME

Chair: Daniela Schiller, PhD
Co-Chair: Howard B. Eichenbaum, PhD
Monday, Oct. 19, 8:30–11 a.m.
McCormick Place: S103

Two views diverge in hippocampal research. Some argue that the hippocampus calculates paths through space, whereas others claim that the hippocampus mediates declarative memory. These views emerged largely through independent fields of research. How can researchers reconcile the spatial and memory views of hippocampal function? The goal of this minisymposium is to discuss novel findings that might provide a bridging framework, paving the way for a unified understanding of hippocampal function.

Internally and Memory-Guided Behaviors: The Role of Frontal Cortical Ensembles CME

Chair: Nandakumar Narayanan, MD, PhD
Co-Chair: Alex C. Kwan, PhD
Monday, Oct. 19, 8:30–11 a.m.
McCormick Place: S406B

Organized behavior is influenced by internal representations of the external world. How mental models constructed from memory, rules, and timing influence cortical dynamics remains unclear. In this minisymposium, presenters will highlight recent studies of the frontal cortex that have leveraged large-scale recording methods and novel tasks for rodents. These studies are revealing critical roles for cortical oscillations and ensemble activity in mediating internally guided behaviors that could have relevance in understanding brain disease.

The Medial Prefrontal Cortex: Emotional Regulation Across Species CME

Chair: Hannah F. Clarke, PhD
Monday, Oct. 19, 1:30–4 p.m.
McCormick Place: S406B

The medial prefrontal cortex (mPFC) consists of multiple subregions that contribute differentially to emotional regulation and exhibit selective dysfunction in psychiatric disorders. However, uncertainty over functional homology across species hinders the translation of animal studies to those of humans. The presenters will highlight new insights into how mPFC subregions regulate emotion across three species: rodents, monkeys, and humans, and their relevance for our understanding of disease.

Optogenetic Dissection of the Basal Forebrain Neuromodulatory Control of Cortical Activation, Plasticity, and Cognition CME

Chair: Shih-Chieh Lin, MD, PhD
Co-Chair: Adam Kepecs, PhD
Wednesday, Oct. 21, 8:30–11 a.m.
McCormick Place: S100B

The basal forebrain (BF) is a major ascending arousal center and has long been implicated in cognitive functions such as attention and learning. Recent studies using optogenetics to target specific BF cell-types have led to a renaissance in this field and are beginning to yield new insights about circuit mechanisms during behavior. This minisymposium will discuss recent advances in the roles of BF cholinergic and non-cholinergic neurons in cognition via their dynamic modulation of cortical activity.

Understanding Goal-Directed Decision Making in Humans: Computations and Circuits CME

Chair: Amitai Shenhav, PhD
Co-Chair: Richard W. Morris, PhD
Wednesday, Oct. 21, 1:30–4 p.m.
McCormick Place: S406B

Goal-directed action selection is critical for adaptive behavior. But fundamental questions remain about its neural realization in humans. What circuits are functionally involved? What computations do these circuits perform? How do these systems interact with other processes that contribute to action selection, and how are these interactions impaired in clinical disorders? The work presented in this minisymposium will offer a fresh view of the computational and neural mechanisms for human goal-directed choice.

THEME G: NOVEL METHODS AND TECHNOLOGY DEVELOPMENT

Clearing and Labeling Methods for High Resolution Imaging of Intact Biological Specimens CME

Chair: Ali Erturk, PhD
Co-Chair: Viviana Gradinaru, PhD
Tuesday, Oct. 20, 1:30–4 p.m.
McCormick Place: S406A

Recent advances in tissue clearing methods paved the way for scientists to image the tissue of interest as a whole, without sectioning. These approaches are particularly powerful for tracing long neuronal connections in the healthy and diseased central nervous system. During this SfN minisymposium, experts in the field will discuss recent advances in tissue clearing methods and their applications.

3-D Retinal Organoids From Human Pluripotent Stem Cells: Promise to Alleviate Blindness or Better Disease Model? CME

Chair: Magdalene Seiler, PhD
Wednesday, Oct. 21, 8:30–11 a.m.
McCormick Place: S406A

This minisymposium will bring together translational and basic science researchers who use pluripotent stem cells and adult tissue as tools to repair vision. The promise of 3-D retinal organoids derived from stem cells is high. What is not clear is whether this presents only a better model for human retinal diseases or carries a real promise for retinal replacement as well. Speakers will discuss the potential of 3-D retinal organoid approach to generate immature human retinal sheets for vision repair.