

Symposia

THEME A: DEVELOPMENT

Neuronal Cytoskeleton 2.0: A Revised View of an Ancient Edifice CME

Chair: Subhojit Roy, MD, PhD

Co-Chair: Casper Hoogenraad, PhD

Sunday, November 13, 8:30–11 a.m.

San Diego Convention Center: 6F

The neuronal cytoskeleton is essential for trafficking molecules into axons and dendrites and also for maintaining the structural integrity of these elongated appendages. Recent advances in super-resolution, live imaging, and genetics have revealed a remarkable cytoskeletal organization in neurons, essentially revising canonical models. The goal of this symposium will be to inform the audience of these exciting new developments, present ongoing research, and foster cross-talk among participants.

Neuroepigenetics CME

Chair: Li-Huei Tsai, PhD

Tuesday, November 15, 8:30–11 a.m.

San Diego Convention Center: 6A

The aim of this symposium is to discuss the role of epigenetic mechanisms of neuronal diversity, the plasticity of neuronal networks, and their alteration during various neurological disorders. The symposium will focus on the chromatin-based mechanism of neuronal gene expression regulation, as well as on the epigenetic foundations of memory and social behavior, and how pharmacological compounds that target specific epigenetic processes can interfere with diseases.

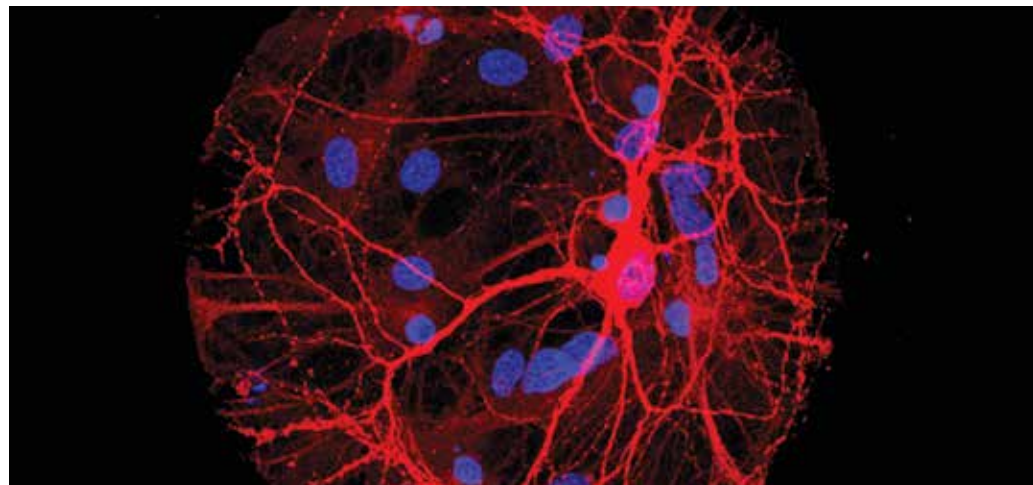
Making Serotonergic Neurons: From Mouse to Human CME

Chair: Jian Feng, PhD

Wednesday, November 16, 1:30–4 p.m.

San Diego Convention Center: 6F

Serotonergic neurons exert diverse actions in the brain. This symposium will highlight how knowledge on the development of mouse serotonergic neurons informs the strategies to generate human serotonergic neurons by directed differentiation of pluripotent stem cells or by transdifferentiation of fibroblasts. The ability to generate patient-specific serotonergic neurons opens up unprecedented opportunities for mechanistic studies and drug discovery in many serotonin-related brain disorders.



THEME B: NEURAL EXCITABILITY, SYNAPSES, AND GLIA

Synaptic Actin Dysregulation: A Convergent Mechanism of Mental Disorders? CME

Chair: Scott H. Soderling, PhD

Co-Chair: Zhen Yan, PhD

Saturday, November 12, 1:30–4 p.m.

San Diego Convention Center: 6B

Synaptic actin polymerization governs activity-dependent modulation of excitatory synapses. Many candidate genes for psychiatric and neurodevelopmental disorders encode regulators of signaling to the actin cytoskeleton, suggesting that its disruption is a commonly affected pathway in brain disorders. This symposium will discuss recent experimental findings that strongly support genetic evidence linking the synaptic cytoskeleton to conditions such as schizophrenia and autism spectrum disorders.

The Ultrastructural Basis of Synaptic Transmission and Plasticity CME

Chair: Kristen M. Harris, PhD

Co-Chair: Nils Brose, PhD

Wednesday, November 16, 1:30–4 p.m.

San Diego Convention Center: 6A

Since the invention of the electron microscope, the function of synapses has been illuminated by ultrastructure. Technological advances in stimulation and fixation methods, protein identification, and 3-D reconstruction provide key insights into how subcellular and molecular

components mediate synaptic transmission and plasticity. This symposium will explore the ultrastructural and proteinaceous basis of synapse function and the defined plasticity states involved in learning and memory.

THEME C: NEURODEGENERATIVE DISORDERS AND INJURY

Autophagy-Lysosomal Mechanism in Neurodegeneration CME

Chair: Zhenyu Yue, PhD

Co-Chair: Ana Maria Cuervo, MD, PhD

Saturday, November 12, 1:30–4 p.m.

San Diego Convention Center: 6A

This symposium will present recent advances in autophagy research in neurons and major neurodegenerative diseases. It will provide insight into molecular mechanisms of autophagy control, particularly on subtypes of autophagy that regulate neuronal homeostasis via the clearance of disease protein aggregates and damaged mitochondria. The session will discuss how disease mutants disrupt the autophagy-lysosomal pathway, and strategies of harnessing neuroprotection of autophagy for therapeutic development.

Microtubule and Tau-Based Therapy for Alzheimer's Disease and Other Brain Disorders CME

Chair: Illana Gozes, PhD

Co-Chair: Eckhard Mandelkow, PhD

Monday, November 14, 8:30–11 a.m.

San Diego Convention Center: 6A

The microtubule subunit, tubulin, is a major brain protein. Microtubule associated proteins like tau are key regulatory elements of neuronal and glial health. Microtubule dysfunction leads to the blockade of axonal transport, glial impairment, and synaptic dysfunction/loss, which are hallmarks of brain diseases. This symposium will focus on microtubules in different cell types for a better understanding of brain function in health and disease, and toward improved diagnostics and therapeutics.

Proteoglycans in Neural Development and Disease CME

Chair: Herbert M. Geller, PhD

Co-Chair: Jerry Silver, PhD

Tuesday, November 15, 1:30–4 p.m.

San Diego Convention Center: 6A

Proteoglycans are secreted by every cell, yet their functions in the nervous system are still mostly unexplored. Uniquely, proteoglycans signal through their sugar chains rather than their protein backbones. These chains are heterogeneous in both length and sulfation pattern. This symposium will highlight recent developments in identification of receptors and signal transduction mechanisms used by heparan sulfate and chondroitin sulfate proteoglycans, and how they are involved in

development, plasticity, disease, and the injury response in the nervous system.

THEME D: SENSORY SYSTEMS

Neuroscience of Music: Novel Discoveries and Their Implications in the Understanding of Music and the Brain CME

Chair: Elizabeth Stegemöller, PhD

Co-Chair: Patricia Izbicki

Sunday, November 13, 8:30–11 a.m.

San Diego Convention Center: 6B

Recent developments in understanding the effects of music on the brain have revolutionized music therapy, musical neuroeducation, music perception, and music cognition. This symposium will highlight the neurological mechanisms and significance of music used in the clinical setting, neuroeducation, and daily experiences. Experts in the areas of neuroscience and music will speak on topics including music and neuroplasticity, music and neurochemistry, and the biology of auditory learning.

Current Topics in Chronic Pain: From Molecules to Medicine CME

Chair: Cheryl L. Stucky, PhD

Co-Chair: Xinzhong Dong, PhD

Monday, November 14, 8:30–11 a.m.

San Diego Convention Center: 6B

Chronic pain is a persistent, debilitating condition stemming from a variety of etiologies and diseases. Over 1.5 billion people worldwide suffer from chronic pain that is only partially alleviated by current therapies and treatments. Recent studies have elucidated novel molecular and cellular players that drive chronic pain in animal models and human conditions. This symposium will review these advances and discuss their implications for the diagnosis and treatment of chronic pain patients.

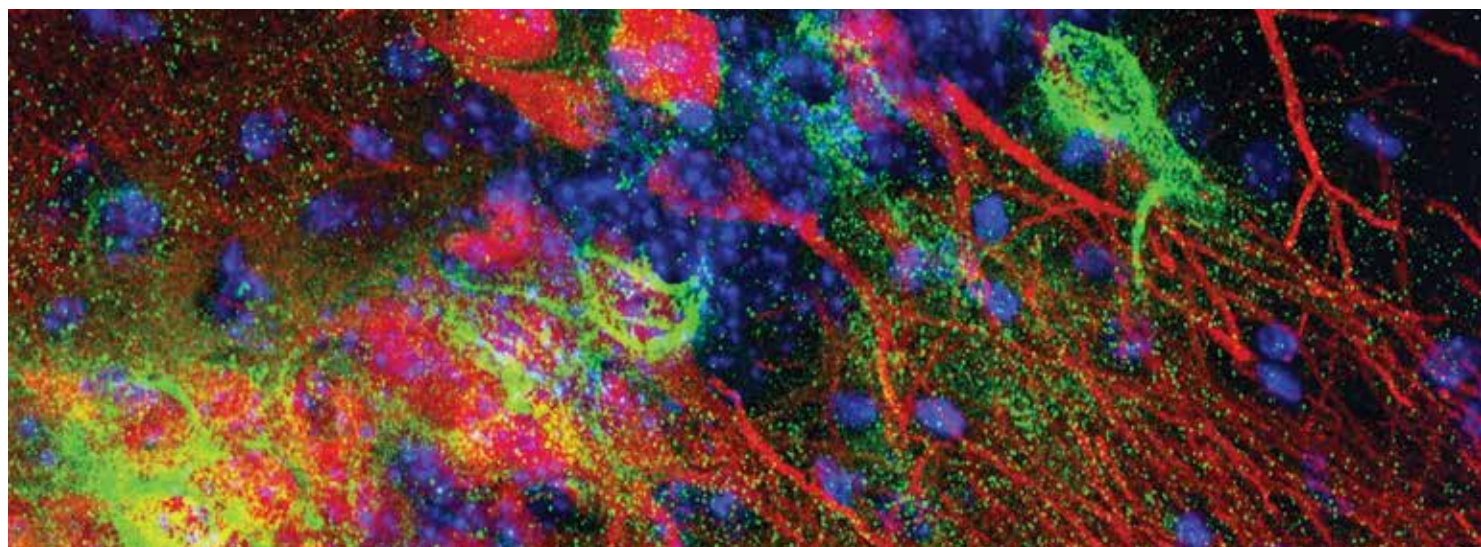
Mechanisms of Object Organization in the Visual Cortex CME

Chair: Rüdiger von der Heydt, PhD

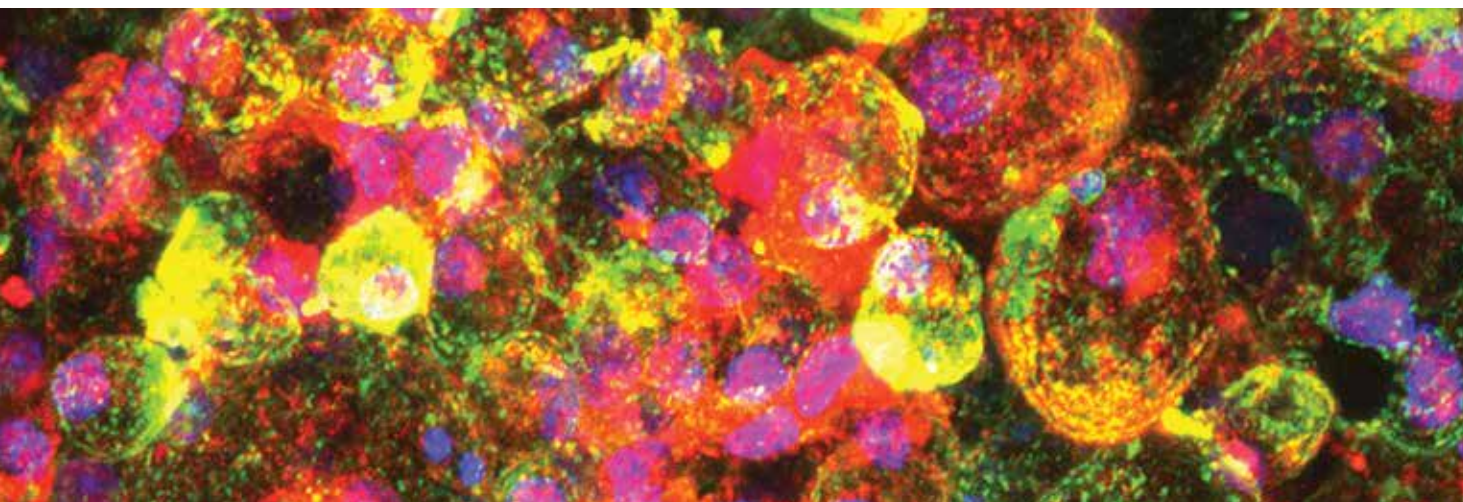
Monday, November 14, 1:30–4 p.m.

San Diego Convention Center: 6F

How does the visual cortex organize elementary features to objects? This symposium will provide a comprehensive picture of recent findings on object-based coding at low and intermediate cortical levels (V1-V2-V4), its possible mechanisms, and its hypothetical role in vision. The session will also question where the organizing influence comes from, how its time course is relative to other stages of visual processing, and how the organizing influence relates to object individuation, awareness, recognition, and selective attention.



Symposia



THEME E: MOTOR SYSTEMS

New Developments in Understanding the Complexity of Human Speaking CME

Chair: Kristina Simonyan, MD, PhD

Sunday, November 13, 8:30–11 a.m.

San Diego Convention Center: 6A

Speech is one of the most unique features of human existence and communication. Our ability to articulate our thoughts depends critically on the integrity of the motor cortex. Long thought to be a low-order brain region, exciting work in past years is overturning this notion. In this symposium, speakers will highlight major experimental advances in speech motor control research and discuss emerging findings about the complexity of speech motor cortex organization and its large-scale networks.

Facilitation of Recovery of Motor Function After Paralysis With Non-Invasive Spinal Cord Stimulation CME

Chair: V. Reggie Edgerton, PhD

Monday, November 14, 1:30–4 p.m.

San Diego Convention Center: 6A

This symposium describes changes of the physiological state of spinal networks using noninvasive spinal cord stimulation combined with step training in an exoskeleton. The speakers will demonstrate recovery of voluntary

movement, posture, and locomotor function in individuals that have been paralyzed for over one year, a time which historically has been considered beyond the critical period for motor recovery. A subject that has received these interventions will share his experiences.

Spike Timing Codes for Motor Control CME

Chair: Samuel J. Sober, PhD

Tuesday, November 15, 8:30–11 a.m.

San Diego Convention Center: 6F

Neurons emit spike trains that vary in both the rate and precise timing patterns of spikes. Whereas there is substantial evidence that sensory systems can use millisecond-scale spike timing patterns to encode information, studies of motor control have focused almost exclusively on spike rates. This session will present emerging work from a wide range of species (insects, songbirds, and mice) showing that brains can control behavior by precisely regulating spike timing patterns.

The Neural Basis of Adaptive Motor Control in the Cerebellum CME

Chair: Reza Shadmehr, PhD

Wednesday, November 16, 1:30–4 p.m.

San Diego Convention Center: 6B

The cerebellum is critical for learning to make accurate movements, yet the neural mechanisms of how it learns this adaptive

control remain poorly understood. This symposium will consider this puzzle by attempting to answer three questions regarding what Purkinje cells and cells at deep cerebellar nuclei encode, what inferior olive neurons that project onto these cells encode, and how Purkinje cells learn to alter their encoding in response to error information from the inferior olive.

THEME F: INTEGRATIVE PHYSIOLOGY AND BEHAVIOR

Physical Activity Impacting Neuroplasticity in Aging and Disease CME

Chair: Giselle Petzinger, MD

Co-Chair: Sarah McEwen, PhD

Sunday, November 13, 1:30–4 p.m.

San Diego Convention Center: 6A

This symposium will present translational research investigating physical activity-induced structural and functional alterations in brain circuits and synaptic function, and potential mechanisms underlying activity-dependent plasticity in aging and disease. Effects of exercise on structure and functional connectivity of the brain and alterations in gene and protein expression important for neuroplasticity will be discussed in the context of aging, neurodegenerative disorders, and schizophrenia.

Getting Down to Business: Identifying Epigenetic Mechanisms of Behaviors Within Discrete Cell Populations CME

Chair: Tracy L. Bale, PhD

Co-Chair: Paul J. Kenny, PhD

Wednesday, November 16, 8:30–11 a.m.

San Diego Convention Center: 6B

Identifying the epigenetic modifications and their impact within discrete neuronal populations is critical in understanding brain health and disease risk, including behaviors important to stress coping, addiction, and learning and memory. Expert speakers will describe their latest studies on novel epigenetic mechanisms, including miRNAs, nucleosome remodeling, and unique histone modifications, and demonstrate their role in specific behavioral outcomes.

THEME G: MOTIVATION AND EMOTION

Advances in Noninvasive Brain Stimulation Along the Space-Time Continuum CME

Chair: C. Alex Goddard, PhD

Co-Chair: Sarah H. Lisanby, MD

Monday, November 14, 1:30–4 p.m.

San Diego Convention Center: 6B

Noninvasive brain stimulation (NBS) is a key tool for probing neural circuit function and is being tested to ameliorate a host of neurological and psychiatric conditions. Recent studies suggest that specific spatial and temporal NBS parameters are critical for achieving effective modulation of intact neural circuitry. This symposium will highlight several studies that explore the importance and physiological relevance of specific spatial or temporal patterns using different forms of NBS.

The Lateral Habenula Circuitry: Reward Processing and Cognitive Control CME

Chair: Aleksandra Vicentic, PhD

Co-Chair: Bo Li, PhD

Tuesday, November 15, 8:30–11 a.m.

San Diego Convention Center: 6B

This symposium will present novel concepts from animal studies of the lateral habenula that have been recently tested with causal methods, with a goal to dissect the role of specific inputs and outputs of the LHb in

processing of reward and aversion. Because dysfunctions in reward processing have been implicated in psychiatric illnesses and drug abuse, the symposium will increase our mechanistic understanding of how aberrant activity in the LHb circuits may contribute to these disorders.

Moving From Pavlovian 'Fear' Conditioning to Active Avoidance CME

Chair: Christopher K. Cain, PhD

Co-Chair: Gregory J. Quirk, PhD

Tuesday, November 15, 1:30–4 p.m.

San Diego Convention Center: 6B

In the active avoidance paradigm (AA), subjects learn to emit actions that escape threats and prevent harm. AA research stalled in the 1970s, partly because psychologists disagreed intensely over the reinforcement mechanisms and nature of avoidance responding (operant vs. respondent). However, recent work has shed new light on the distinction between AA and fear conditioning brain circuits. This session will detail this progress and discuss the role of AA in human anxiety disorders such as obsessive-compulsive disorder.

Neural Basis of Social Rewards and Group Decisions: From Scanners to the Real World CME

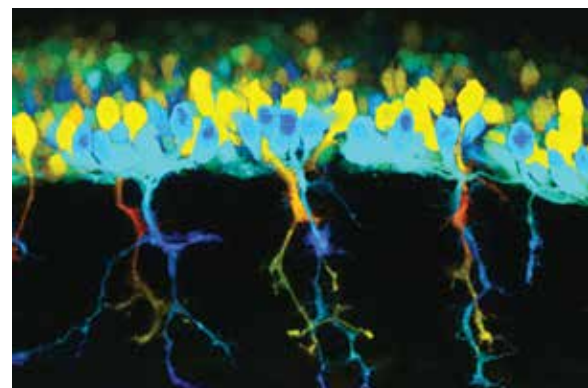
Chair: Brian Knutson, PhD

Co-Chair: Jorge Moll, MD, PhD

Wednesday, November 16, 8:30–11 a.m.

San Diego Convention Center: 6A

Neuroimaging has dramatically improved our understanding of the neurobehavioral systems that support social cognition and choice. This symposium will highlight new advances, focusing on the role of reward and motivation in social perception, interpersonal communication, intergroup relations, and mass prosocial behavior. Speakers will also describe novel techniques and trends poised to extend the frontiers of neuroscience and account for social preferences and behaviors in naturalistic settings.



THEME H: COGNITION

Is the Prefrontal Cortex Special? Working Memory Across the Cortical Mantle: From Single Units to Neural Ensembles CME

Chair: Julio C. Martinez-Trujillo, MD, PhD

Co-Chair: Christos Constantinidis, PhD

Saturday, November 12, 1:30–4 p.m.

San Diego Convention Center: 6F

Working memory (WM) is one of the pillars of cognition. This symposium will offer an updated view of WM coding in primates, with emphasis in the prefrontal cortex. Experts will discuss WM coding in different brain areas of macaques, how the macaque prefrontal cortex encodes WM across the life span, how the prefrontal cortex integrates WMs from different modalities, and how to bridge WM studies in macaques and humans.

Fronto-Subthalamic Circuits for Control of Action and Cognition CME

Chair: Adam R. Aron, PhD

Monday, November 14, 8:30–11 a.m.

San Diego Convention Center: 6F

This session will report new findings about the cognitive functions and computational properties of the circuit linking frontal cortex and subthalamic nucleus (STN) of the basal ganglia. Diverse and novel technical approaches in humans are taken to record cortical and STN electrophysiology at the same time, to record single-unit human STN activity, to use 7T fMRI, and to stimulate STN optogenetically in mice. The role of the circuit is highlighted for stopping and pausing behavior and cognition.