

Minisymposia

THEME A: DEVELOPMENT

Building the Cerebral Cortex: Mechanisms That Mediate Migration, Specification, and Axonal Outgrowth CME

Chair: Jill M. Weimer, PhD

Co-Chair: Jason Newbern, PhD

Sunday, November 13, 1:30–4 p.m.

San Diego Convention Center: 29D

Over the past decade, we have learned that the movement and differentiation of newly born neurons in the developing cerebral cortex are orchestrated through a close interplay between cell intrinsic signaling events and nonautonomous cues from the environment. Recent studies have uncovered novel aspects of this cellular interplay in regulating both migration and the initial stages of differentiation. In this minisymposium, the presenters will discuss several emerging key players in this process and how perturbation in these specific signaling hubs can contribute to a number of neural pediatric disorders.

Human Brain Development and Maturation: Animal Brain Mapping, Human Brain Imaging, and Computer Simulation CME

Chair: Koko Ishizuka, MD, PhD

Co-Chair: Tomomi Shimogori, PhD

Monday, November 14, 8:30–11 a.m.

San Diego Convention Center: 28A

The fundamental goal of neuroscience is to understand the human brain. With this goal in mind, comprehensive data collection and analysis have begun in each scientific area and in countries around the world. However, these datasets need to be connected to one another beyond the methodological principles to reach the final goal. This session will discuss a proposal for a symposium in which investigators from representative nation-level projects can meet and discuss how to work together for the future of neuroscience.

Current Perspectives in Autism Spectrum Disorder: From Genes to Therapy CME

Chair: M. Chiara Manzini, PhD

Co-Chair: Maria Chahrour, PhD

Tuesday, November 15, 1:30–4 p.m.

San Diego Convention Center: 6F

Autism spectrum disorder (ASD) is a constellation of neurodevelopmental presentations with genetic and nongenetic causes. Next-generation sequencing has allowed for recent strides in the genetics of ASD, while the molecular mechanisms underlying disease pathogenesis have remained elusive, thus hindering therapy development. This minisymposium will provide an overview of current ASD research, from genetic mutation and molecular pathways to sex differences, ending with strategies for drug development.

Neural Stem Cells to Cerebral Cortex: Emerging Mechanisms Regulating Progenitor Behavior and Productivity CME

Chair: Troy Ghashghaei, PhD

Co-Chair: Noelle Dwyer, PhD

Wednesday, November 16, 8:30–11 a.m.

San Diego Convention Center: 29D

Understanding the temporal and spatial regulation of neural stem cell behaviors that build the cerebral cortex is critical to treating neurodevelopmental disorders such as microcephaly and autism. This minisymposium will address how neural stem cells divide to produce different daughter types in the proper numbers and order. Distinct genetic insults impact cortical size, structure, or function differentially. The presenters will highlight emerging findings and tools that are facilitating identification of the cellular and molecular rules and logics underlying cortical development.

THEME B: NEURAL EXCITABILITY, SYNAPSES, AND GLIA

Astrocytes as Active Participants in Neural Circuits: From Cells to Systems CME

Chair: Kira Poskanzer, PhD

Co-Chair: Anna V. Molofsky, MD, PhD

Sunday, November 13, 1:30–4 p.m.

San Diego Convention Center: 6B

Astrocyte-neuron interactions are essential to neural circuit assembly and function. This minisymposium will present research at the forefront of circuit neurobiology from *in vivo* and *in situ* systems. The session will explore multiple levels at which astrocytes exert highly specific control of neural circuits and discuss their relevance to brain function and disease. The session aims to describe the dynamic interplay of these two cell types and address issues that are critical to all neuroscientists.

Casting a Wide Net: Role of Perineuronal Nets in Neural Plasticity CME

Chair: Barbara A. Sorg, PhD

Monday, November 14, 1:30–4 p.m.

San Diego Convention Center: 29D

Perineuronal nets (PNN) are specialized extracellular matrices surrounding certain central nervous system (CNS) neurons that stabilize synapses during development. Removal of PNNs in adults can restore juvenile-like plasticity. At this minisymposium, speakers will describe details of the assembly and specific components of PNNs, and the role PNNs play in schizophrenia, bipolar disorder, aging, Alzheimer's disease, and in plasticity associated with memory and drugs of abuse.

Role of Tau in Neural Network Dysfunction: From Mechanisms to Therapeutics CME

Chair: Lennart Mucke, MD

Co-Chair: Jeffrey L. Noebels, MD, PhD

Tuesday, November 15, 8:30–11 a.m.

San Diego Convention Center: 29D

This minisymposium will focus on the functions of the microtubule-associated protein tau and its role in neurological diseases. Multiple neurodegenerative disorders are associated with an abnormal neuronal accumulation of tau. Recent studies suggest that tau enables network hyperexcitability in disorders as diverse as childhood epilepsy and Alzheimer's disease. The presenters will discuss potential mechanisms underlying pathogenic tau activities and novel therapeutic strategies to block them.

Mechanisms and Consequences of White Matter Plasticity CME

Chair: David Lyons, PhD

Co-Chair: Jonah R. Chan, PhD

Tuesday, November 15, 1:30–4 p.m.

San Diego Convention Center: 29D

White matter, primarily myelinated axons, comprises about half the volume of the human central nervous system. New myelin is made by oligodendrocytes throughout life, and it is now clear that this has important consequences for higher-order nervous system function. This minisymposium will highlight research that investigates how neuronal activity regulates oligodendrocyte proliferation, differentiation, and



Download the meeting mobile app for up-to-date session information

myelination, and how this in turn affects neuronal circuitry and animal behavior.

THEME C: NEURODEGENERATIVE DISORDERS AND INJURY

Second Generation AD Mouse Models for Reproducible Preclinical Studies CME

Chair: Takaomi C. Saido, PhD

Co-Chair: Bart De Strooper, MD, PhD

Sunday, November 13, 8:30–11 a.m.

San Diego Convention Center: 28A

First-generation mouse models of AD overexpress mutant APP or APP and PS, resulting in artificial phenotypes due to overexpression of membrane proteins. This includes non-specific ER stress, perturbed axonal transport, destruction of genetic loci in host animals, and overproduction of non-A β APP fragments such as CTF- β , which is more toxic than A β . This minisymposium will introduce second-generation mouse models of AD exhibiting A β pathology without APP overexpression for more accurate disease studies.

Dysregulation of mRNA Localization and Translation in Genetic Disease CME

Chair: Gary J. Bassell, PhD

Co-Chair: Eric Wang, PhD

Sunday, November 13, 1:30–4 p.m.

San Diego Convention Center: 28A

This minisymposium will highlight recent discoveries on molecular mechanisms of mRNA localization and translation, the dysregulation of mRNA in genetic diseases, and therapeutic strategies. The session integrates diverse topics and mechanisms, including the roles of several mRNA binding proteins in axonal growth, synapse development, synaptic function, learning, and memory. Mechanisms of neurodevelopmental, neuropsychiatric, and neurodegenerative diseases will be discussed. Diverse approaches include use of genome-wide transcriptomics, super-resolution microscopy, animal models, human patient cells, and postmortem tissue.

Association of Alzheimer's Disease and Other Cognitive Impairments With Metabolic Syndrome: Whenceforth Causality? CME

Chair: Steven W. Barger, PhD

Co-Chair: Natalie L. Rasgon, MD, PhD

Wednesday, November 16, 8:30–11 a.m.

San Diego Convention Center: 6F

Epidemiology links Alzheimer's disease, obesity, and type 2 diabetes. Early experiments sought evidence that deposition of amyloid beta peptide (A β) worsened in diabetes, but recent data indicate top-down effects of A β on peripheral metabolism, especially through actions of the peptide in the hypothalamus. Data from several fronts nonetheless evinces cognitive impairment resulting from metabolic syndrome, even in development. Cognitive impacts of a potential CNS-to-periphery-to-CNS loop will be discussed.

THEME D: SENSORY SYSTEMS

New Insight Into Cold Pain: Role of Ion Channels, Modulation, and Clinical Perspectives CME

Chair: Jacques Noel, PhD

Co-Chair: Jerome Busserolles, PhD

Wednesday, November 16, 1:30–4 p.m.

San Diego Convention Center: 28A

Fifteen years after the cloning of the first cold transducer channel, the molecular mechanisms of cold transduction and cold-triggered pain perception remain elusive. Recent progress has been made in this matter, which will be exposed in this session. New results about the contribution to cold pain from a wide variety of channels such as TRPs, leaky K⁺ and voltage-gated Na⁺ channels, and leak K⁺ channels will be presented. Their modulation and the resulting clinical perspectives will also be discussed.

THEME E: MOTOR SYSTEMS

Neuronal Circuits Driving Behavior: Invertebrates to Vertebrates CME

Chair: Sara M. Wasserman, PhD

Saturday, November 12, 1:30–4 p.m.

San Diego Convention Center: 28A

This minisymposium will focus on how neuronal circuits control complex behaviors from invertebrates to vertebrates. The latest tools being utilized to quantitatively measure behavior and physiology in behaving animals will be discussed. Also, the session will present findings across animal models that may provide molecular, circuit, and neuromodulatory targets for future studies, with the potential to develop therapeutics to benefit those suffering from a wide range of neurological disorders.

Pre-Böttinger Complex 25 Years Later: Diverse Functions of the Breathing Rhythm Generator and Their Cellular and Molecular Origins CME

Chair: Christopher A. Del Negro, PhD

Wednesday, November 16, 8:30–4 p.m.

San Diego Convention Center: 28A

Twenty-five years after its discovery as the breathing rhythm generator, the roles of the pre-Böttinger Complex continue to expand, now including premotor functionality, generation of sighs and gasps, as well as coordination of orofacial behaviors (e.g., whisking and sniffing). These diverse functions can be mapped to distinct specialized cells, transforming the pre-BötC to a premier center to understand the molecular and cellular bases of physiologically-significant behaviors.

THEME F: INTEGRATIVE PHYSIOLOGY AND BEHAVIOR

Visceral Autonomic Nerves as Targets for Precision Bioelectronic Medicines CME

Chair: Warren M. Grill, PhD

Co-Chair: Arun Sridhar, PhD

Saturday, November 12, 1:30–4 p.m.

San Diego Convention Center: 6E

The visceral autonomic nervous system is a largely untapped area to modulate pathophysiology. Many chronic diseases are driven by dysregulation of neural control of end organ function. Bioelectronic medicines are a new treatment modality that correct signals in peripheral nerves to reset feedback control of end organ function in disease. This session will highlight some of the new evidence that links peripheral autonomic nerves to disease and discuss neuromodulation approaches to treat these diseases.

Food for Thought: How Diet Influences Cognitive Function and Emotion CME

Chair: Sarah Spencer, PhD

Co-Chair: Ruth M. Barrientos, PhD

Sunday, November 13, 8:30–11 a.m.

San Diego Convention Center: 6E

Diet influences cognition and emotional behavior, but the neural mechanisms for these effects are not well understood. This minisymposium discusses recent work linking dietary fat intake and omega-3 dietary imbalance with inflammation in the brains of developing, adult, and aged rodents. Recent advances in understanding how microglia detect and integrate peripheral signaling patterns associated with diet and the role of dietary polyphenols in cognitive processes will also be discussed.

Minisymposia

Neurogenetic Insights Into Speech and Language From Birds and Bats CME

Chair: Sonja C. Vernes, PhD

Co-Chair: Michael M. Yartsev, PhD

Monday, November 14, 8:30–11 a.m.

San Diego Convention Center: 6E

Language and speech are core human traits. Comprehension of their neurological and genetic basis is rapidly advancing by studying relevant traits, such as vocal learning and acoustic communication in mammalian and non-mammalian models. This session will highlight these advances, with emphasis on emerging studies in songbirds and bats. The session will consider benefits of integrating findings across species to understand the neurogenetic mechanisms of vocal learning to ultimately shed light on human spoken language.

Actions of Steroids: New Neurotransmitters CME

Chair: Paul E. Micevych, PhD

Co-Chair: Lauren M. Rudolph, PhD

Tuesday, November 15, 1:30–4 p.m.

San Diego Convention Center: 28A

This minisymposium will highlight new findings of rapid steroid signaling in neurobiology and demonstrate how prevalent non-classical hormone action is across the neuraxis. While the focus will be the non-classical role of hormones in reproductive-related functions of the nervous system, steroidal involvement in non-reproductive functions such as communication and stress will be discussed, along with glucocorticoids and the interactions of estrogens and progesterone with other neurotransmitters.

Oxytocin From Rodents to Humans: How to Translate Research Into Therapeutic Applications in Psychiatry CME

Chair: Valery Grinevich, MD, PhD

Co-Chair: Alexandre Charlet, PhD

Wednesday, November 16, 8:30–11 a.m.

San Diego Convention Center: 6E

The hypothalamic neuropeptide oxytocin attracts the interest of the neuroscience community and the broader public as a prosocial substance in mammals. Recent technological advances enable researchers to decipher the precise circuits underlying these

actions. This minisymposium will focus on the pathways of oxytocin signaling, which underlie its behavioral and possible therapeutic effects. Addressing the mechanisms of oxytocin action in the brain, with special attention to the benefits and pitfalls in the treatment of human patients, will be essential for further progress in research and in the clinic.

Hypocretins and Orexins: What Have We Learned in Nearly 20 Years? CME

Chair: Joshua A. Burk, PhD

Co-Chair: James R. Fadel, PhD

Wednesday, November 16, 1:30–4 p.m.

San Diego Convention Center: 29D

The discovery of hypocretins/orexins in the late 1990s spawned research that primarily focused on the role of these neuropeptides in regulating feeding and sleep. More recently, orexins have been implicated in cognitive processing and a number of neuropsychological disorders. This minisymposium will provide state-of-the-field updates about some of the original and more newly-discovered functions regulated by orexins.

THEME G: MOTIVATION AND EMOTION

Homeostasis Versus Motivation in the Battle to Control Food Intake CME

Chair: Eoin C. O'Connor, PhD

Saturday, November 12, 1:30–4 p.m.

San Diego Convention Center: 29D

Signals that regulate energy homeostasis interact closely with neural circuits of motivation to control food intake. An emerging hypothesis is that transition to maladaptive feeding behavior, as seen in anorexia or obesity, may arise from dysregulation of these interactions. This minisymposium will consider how signals that regulate homeostasis and motivation interact at cellular, synaptic, and circuit levels, and how the outcome of this battle could have relevance for feeding disorders.

Spanning the Central-Peripheral Divide: Bridging the Gap to Find Novel Strategies to Target Depression CME

Chair: Amelia J. Eisch, PhD

Co-Chair: Sanghee Yun, PhD

Sunday, November 13, 8:30–11 a.m.

San Diego Convention Center: 29D

Major depressive disorder (MDD) is among the most common of mental illnesses, yet many people prescribed antidepressants or non-pharmaceutical medications will relapse. MDD is increasingly being recognized as a disorder that spans the central-peripheral divide.

THEME H: COGNITION

Neural Mechanisms of Economic Choice CME

Chair: Benjamin Y. Hayden, PhD

Co-Chair: Erin L. Rich, MD, PhD

Sunday, November 13, 1:30–4 p.m.

San Diego Convention Center: 6F

Despite their central importance in psychology, economics, and ecology, the neural mechanisms of economic choice have long been mysterious. This timely minisymposium will highlight recent empirical and theoretical advances toward understanding the neural execution of economic choice. The speakers will focus on the role of the frontal lobe across species, particularly the orbitofrontal and ventromedial prefrontal cortex, in the mediation of economic-based decision-making processes.

Object Encoding, Semantic Representation, and Memory Formation by Single Neurons in the Human Medial Temporal Lobe CME

Chair: Florian Mormann, MD, PhD

Co-Chair: Peter N. Steinmetz, MD, PhD

Monday, November 14, 1:30–4 p.m.

San Diego Convention Center: 28A

This minisymposium will compare and contrast recent results examining object encoding, semantic representation, and memory formation by single neurons in the human medial temporal lobe. Speakers from different single-unit recording centers across the world will examine the level of sparsity present in the representations, whether they exclusively reflect semantic properties of the stimuli, and the role of these representations in memory encoding, and retrieval.



Download the meeting mobile app for up-to-date session information

The Neural and Computational Construction of Confidence in Decision-Making CME

Chair: Megan A.K. Peters, PhD

Co-Chair: Piercesare Grimaldi, MD, PhD

Tuesday, November 15, 8:30–11 a.m.

San Diego Convention Center: 28A

Metacognition, or confidence in our decisions, is not yet well understood. Evidence for a single versus multiple loci of uncertainty representation remains equivocal; whether confidence and decision (perceptual or cognitive) depend on the same or different neuronal information is an ongoing debate. This session will bring together scientists studying confidence and uncertainty from both human and animal perspectives, spanning from computational approaches to neurobiological approaches.

THEME I: TECHNIQUES

Using Miniature Microscopes to Probe the Neural Ensemble Correlates of Innate and Learned Behaviors in Freely Moving Mice CME

Chair: Benjamin F. Grewe, PhD

Co-Chair: Jones G. Parker, PhD

Sunday, November 13, 1:30–4 p.m.

San Diego Convention Center: 6E

Advances in freely moving Ca²⁺ imaging techniques have empowered a detailed understanding of how defined neuronal populations encode diverse animal behaviors. However, the successful implementation of mobile calcium imaging poses challenges for many researchers, ranging from technical to analytical. Focusing on the use of miniaturized microscopes, this minisymposium will present the most recent progress in imaging neural ensembles in widely used behavioral assays and preclinical disease models.

Mesoscale Imaging of Cortical Function and Dysfunction in Mice CME

Chair: Jack Waters, PhD

Monday, November 14, 8:30–11 a.m.

San Diego Convention Center: 29D

The skulls of mice are relatively transparent, permitting relatively non-invasive optical access to the neocortex. This minisymposium presents six recent studies that have leveraged optical access and activity-dependent indicators and opsins to probe the function and dysfunction of the neocortex at the 'mesoscale' recording and modulating the activities of cortical areas in mice performing behavioral tasks.



Mammalian Nervous System Cell Types: CNS Diversity Through the Lens of Single-Cell RNA-Sequencing (RNA-Seq) CME

Chair: Bosiljka Tasic, PhD

Monday, November 14, 1:30–4 p.m.

San Diego Convention Center: 6E

The brain contains a myriad of highly specialized cells, but comprehension of the gene expression programs that produce this cell-type diversity is incomplete at best. This session highlights pioneering work from multiple groups using single-cell RNA-seq approaches to characterize cells from the developing and adult CNS in mice and humans. These studies lay the groundwork for a new taxonomy of nervous system cells and create new opportunities for investigating CNS function and development.

Multiscale Connectomics: Maps, Models, and Mechanisms CME

Chair: Alex Fornito, PhD

Co-Chair: Andrew Zalesky, PhD

Tuesday, November 15, 8:30–11 a.m.

San Diego Convention Center: 6E

Neural networks are organized over resolution scales that span several orders of magnitude. A comprehensive understanding of the brain is thus contingent on integrating information across scales. This session will present the latest findings from studies of brain connectivity at scales ranging from the micro (<1 μ m) to macro (>1 mm). The session will focus on methods for network mapping, models of brain network structure and dynamics, and the molecular mechanisms that drive network organization.

Computational Ethological Approaches for Dissecting the Neural Basis of Behavior in Genetic Model Systems CME

Chair: Megan R. Carey, PhD

Co-Chair: Andre E. Brown, PhD

Tuesday, November 15, 1:30–4 p.m.

San Diego Convention Center: 6E

From simple reflexes to social decision-making, behavior is the brain's ultimate output. Recent advances in computer vision enable automated analysis of a wide range of naturalistic animal behaviors on rapid timescales. This minisymposium presents recent advances in automated behavior tracking across model organisms and systems. Talks will highlight the insights this approach provides into neural function, particularly when combined with modern tools for monitoring and manipulating neural circuits.

Nanoscale Neurocartography: Approaches and Theory for Inference and Analysis of Synaptomes and Connectomes CME

Chair: Narayanan Kasthuri, MD, PhD

Wednesday, November 16, 1:30–4 p.m.

San Diego Convention Center: 6E

Neurocartography at the resolution of individual neurons and their synapses is now possible in state-of-the-art datasets. Although much is known about individual brain cells and low-resolution cortical circuits, research to create and explore biofidelic maps of mesoscale cortical circuitry is still in its infancy. This session will provide theory and tools to help address these challenges and motivate researchers interested in this topic through both methodological and scientific progress.