Special Lectures

All lectures will take place in Ballroom 20 of the San Diego Convention Center. Overflow viewing will be available in Hall A

THEME A: DEVELOPMENT

Lineage Analyses of Developing CNS Tissues CME

Connie Cepko, PhD
Harvard Medical School and Howard Hughes Medical Institute
Saturday, November 12, 2–3:10 p.m.

Lineage analyses describe the progenitor: progeny relationships in developing tissue. Lineage data can rule in, or out, particular models of how a cell achieves its fate, as well as when some of the fate-determining events occur. Lineages can be most definitively tracked using clonal methods, as afforded by retroviral infection. The interpretability of lineage data is further strengthened when mapping is done from identified types of progenitor cells. Recent studies using such methods in the retina and telencephalon will be presented.

Regulation of Neural Stem Cell Fate During Development and in the Adult CME

Yukiko Gotoh, PhD
University of Tokyo
Wednesday, November 16, 8:30–9:40 a.m.

This lecture will discuss how neocortical neural stem/progenitor cell (NPC) fate is regulated in a developmental stage-dependent manner. This lecture will also focus on the mechanisms underlying long-term maintenance of adult neural stem cells (NSCs), the differences between embryonic NPCs and adult NSCs, and the embryonic origin of adult NSCs.

THEME B: NEURAL EXCITABILITY, SYNAPSES, AND GLIA

Quantal Release and Its Requirements CME

Robert Edwards, MD
University of California, San Francisco
Monday, November 14, 8:30–9:40 a.m.

Quantal release by exocytosis requires the transport of classical neurotransmitters into secretory vesicles. Vesicular transport activity thus defines the membranes as well as the cells capable of transmitter release. However, the three families of vesicular transporters differ in ionic coupling. This lecture will discuss the biophysical properties of the transporters, the properties of secretory vesicles that influence their function, and the implications for synaptic transmission, including quantal size, non-vesicular efflux, synaptic vesicle pools and transmitter co-release.

Cortical Circuits of Vision CME

Massimo Scanziani, PhD
University of California, San Francisco
Tuesday, November 15, 1–2:10 p.m.

The diversity of neuron types and synaptic connectivity patterns in the cerebral cortex is astonishing. How this cellular and synaptic diversity contributes to cortical function is just beginning to emerge. Using the mouse visual system as an experimental model, this lecture will discuss the mechanisms by which excitatory and inhibitory interactions among distinct neuron types contribute to the most basic operations in visual cortex. This lecture will highlight how a functional and structural analysis of cortical circuits allows us to bridge the gap between system and cellular neuroscience.

THEME C: NEURODEGENERATIVE DISORDERS AND INJURY

Capturing Immune Responses to Understand and Treat Neurodegenerative Disease CME

Eliezer Masliah, MD
University of California, San Diego
Wednesday, November 16, 1–2:10 p.m.

Neurodegenerative disorders are characterized by progressive accumulation of proteins leading to cognitive impairment and movement disorders. A dysequilibrium in the rate of aggregation, clearance, and synthesis appears to play a key role. Moreover, recent studies have shown that prion-like propagation of proteins may contribute to neurodegeneration. Therefore, developing strategies to increase clearance and diminish prion-like propagation might be key to treating these disorders. Harnessing the power of the immune system by utilizing cellular and humoral immunization has been under development for the past several years. This lecture will provide a perspective on the recent progress and challenges of utilizing immunotherapy for neurodegenerative disorders.

THEME D: SENSORY SYSTEMS

Genetic Dissection of Sensorimotor Circuits in the Spinal Cord CME

Martyn D. Goulding, PhD
Salk Institute for Biological Studies
Tuesday, November 15, 8:30–9:40 a.m.

Sensorimotor circuits in the spinal cord play essential roles in somatosensation and motor control. Studies defining the genetic programs controlling spinal cord development have opened up new avenues for exploring the cellular and functional organization of these circuits. This lecture will outline our current understanding of the spinal CPG circuits that control locomotion and the dorsal horn pathways that process and transmit cutaneous somatosensory modalities, highlighting the cutting-edge genetic and behavioral approaches that are being employed to map these circuits.

Postdiction and Perceptual Awareness CME

Shinsuke Shimojo, PhD
California Institute of Technology
Wednesday, November 16, 10–11:10 a.m.

There are a few postdictive perceptual phenomena known where a stimulus presented later causally affects the percept of target presented earlier. While backward masking and apparent motion provide classical examples, the flash lag effect and its variations have stimulated theorists. The TMS-triggered scotoma and its "backward filling-in" offer a unique neurophysiological case. Findings suggest that various visual attributes are postdictively reorganized; its neural correlates (such as reentry) and implications to understand visual awareness and sense of agency will be discussed.

THEME E: MOTOR SYSTEMS

Circuits for Movement CME

Silvia Arber, PhD
Biozentrum, University of Basel and Friedrich Miescher Institute
Sunday, November 13, 1–2:10 p.m.

Movement is the behavioral output of the nervous system. Animals carry out an enormous repertoire

of distinct actions, spanning from seemingly simple repetitive tasks like walking, to more complex movements such as forelimb manipulation tasks. This lecture will focus on recent work elucidating the organization and function of neuronal circuits at the core of regulating distinct motor behaviors. It will show that dedicated circuit modules within different brainstem nuclei and their interactions in the motor system play key roles in action diversification.

Understanding Mammalian Microcircuits: Let Inspiration Guide the Way CME

Jack L. Feldman, PhD
University of California, Los Angeles
Monday, November 14,
11:30 a.m.–12:40 p.m.

More than 25 years since our discovery of the pre-Bötzinger Complex, the core of the circuit for breathing, the underlying mechanisms governing its dynamics remain elusive and are much more complex than we first thought. This lecture will address how novel emergent mechanisms, but not pacemakers, inhibition, or bursting, are likely to be critical and describe the roles the pre-BötC plays in regulation of body function, other movements, and emotion. The neural circuit controlling breathing is inimitably tractable and may inspire general strategies for elucidating other neural microcircuits.

THEME F: INTEGRATIVE PHYSIOLOGY AND BEHAVIOR

Bitten: Understanding and Modulating Mosquito Attraction to Humans CME

Leslie B. Vosshall, PhD
Rockefeller University
Sunday, November 13, 8:30–9:40 a.m.

By the act of feeding on our blood, female mosquitoes spread dangerous infectious diseases such as malaria, dengue, zika, and yellow fever to humans. We attract mosquitoes via multiple sensory cues including emitted body odor, body heat, and carbon dioxide in the breath. The mosquito perceives differences in these cues, both between and within species, to determine which animal or human to target for blood-feeding. This lecture focuses on the genes and circuits that drive this dangerous behavior and how it is modulated by the internal physiological state of the mosquito.

From Song to Synapse: Vocal Communication in Sparrows, Finches, and Mice CME

Richard D. Mooney, PhD
Duke University School of Medicine
Tuesday, November 15, 10–11:10 a.m.

The interplay between hearing and vocalization is critical to vocal communication and vocal learning. Recent research using both songbirds and mice has provided keen insights into the neural circuits and mechanisms that mediate this sensorimotor interplay. This lecture will cover recent progress in understanding how auditory experience engages and shapes motor systems to enable vocal learning, how motor systems modulate hearing during vocalization and other movements, and the neural circuitry that produces vocalizations used for social communication.

THEME G: MOTIVATION AND EMOTION

Translational Neuroepigenetic Insights of Addiction Vulnerability CME

Yasmin L. Hurd, PhD
Icahn School of Medicine at Mount Sinai
Sunday, November 13,
11:30 a.m.–12:40 p.m.

Drug addiction involves complex interaction of dynamic processes that contribute to individual vulnerability from early stages of development and during different phases of life by linking genetic factors with environmental experiences. This lecture will focus on the neurobiological insights recently gained about the molecular underpinnings of substance abuse, particularly cannabis and opiates using multidisciplinary translational approaches in humans and animal models. The work presented will illuminate epigenetic mechanisms associated with addiction risk that extend even across generations.

THEME H: COGNITION
CLINICAL NEUROSCIENCE LECTURE

Deciphering the Dynamics of the Unconscious Brain Under General Anesthesia CME

Emery N. Brown, MD, PhD
Massachusetts Institute of Technology
Tuesday, November 15,
11:30 a.m.–12:40 p.m.

General anesthesia is a drug-induced reversible coma. A primary mechanism by which anesthetics induce altered states of arousal is by producing large, structured oscillations that impair communication among brain regions. This lecture will discuss the neurophysiology of these oscillations and how they change with drug and patient age. It will show new ways to control the anesthetic state and induce rapid emergence from anesthesia. Studying mechanisms of anesthesia is a largely untapped way of studying the brain.

The Social Brain in Human Adolescence CME

Sarah-Jayne Blakemore, PhD
University College London
Wednesday, November 16,
11:30 a.m.–12:40 p.m.

Social cognitive processes involved in navigating an increasingly complex social world continue to develop throughout human adolescence. In the past 20 years, neuroscience research has shown that the human brain develops both structurally and functionally during adolescence. Areas of the social brain undergo significant reorganization during the second decade of life, which might reflect a sensitive period for adapting to the social environment.

THEME I: TECHNIQUES

Dendritic Spines Shaping Memory and Behaviors CME

Haruo Kasai, MD, PhD
Graduate School of Medicine,
University of Tokyo
Sunday, November 13, 10–11:10 a.m.

Spiny protrusions of dendrite, called dendritic spines, are the major postsynaptic sites for excitatory synaptic transmission in the brain. New studies indicate that spines act as memory elements, and do so by their structural plasticity. Such cell motility regulates functional connectivity and enables Hebbian and reinforcement learning in the cortex and basal ganglia. Motility can be spontaneous, and such fluctuations may determine memory persistence and stabilize recurrently connected networks. Spine motility connects cell biology to mental functions and disorders.