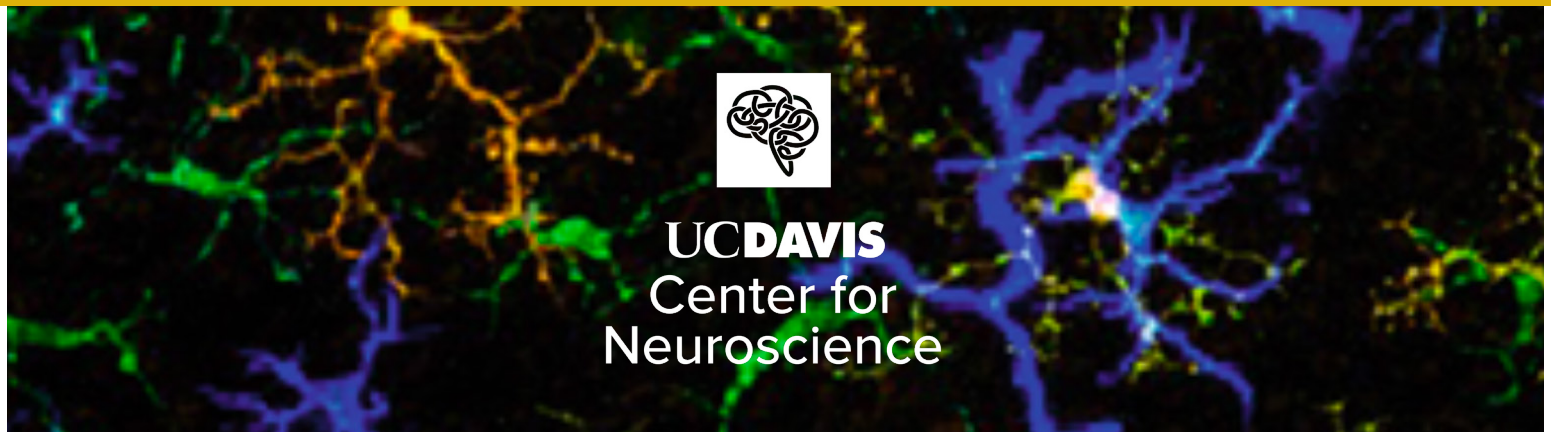
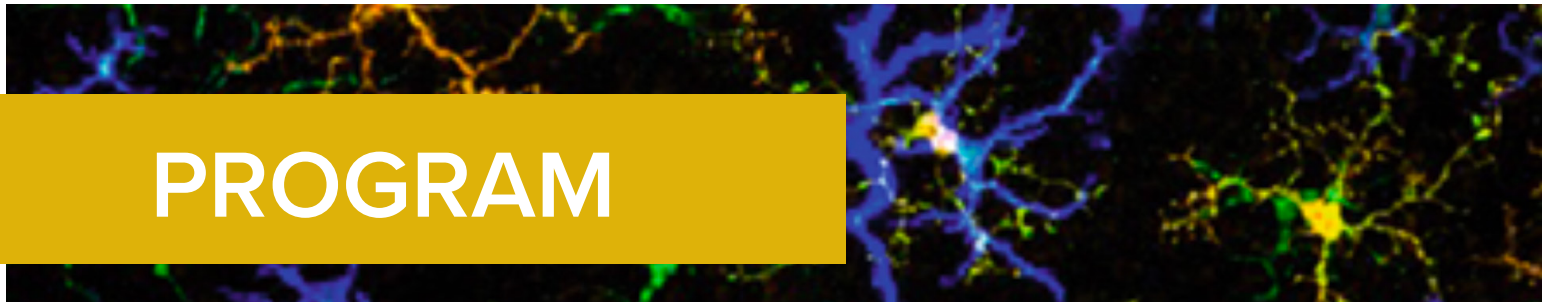
Neuroscience Fast-Pitch Competition and CNS Director's Circle Gratitude Lunch

Saturday, November 1, 2025





PROGRAM

Neuroscience Fast-Pitch Competition and CNS Director's Circle Gratitude Lunch

Director's Welcome and Center for Neuroscience Updates

Marie Burns, Ph.D.

2024 Neuroscience Innovation Grant Update

Savannah Maw/Wiltgen Lab

Neuroscience Fast-Pitch Competition

We are pleased to announce the following five projects,
which will be presented in the fast-pitch competition for your consideration:

Neural Control of Social Attention
Xiaomo Chen, Ph.D.

The Role of Circuit-Specific Dopamine Neuromodulation in Autism-Related Behaviors
Tim Hanks, Ph.D.

Development of Human Cerebellar Organoids as a Platform for Translational Neuroscience Research
Alex Nord, Ph.D.

Real-World Intracranial Recordings of Cognition in the Human Basal Ganglia and Cerebellum
Carina R. Oehrn, M.D., Ph.D.

Noradrenaline's Role in Alzheimer's Disease: Uncovering New Therapeutic Possibilities
Brian Wiltgen, Ph.D.

The winning proposal will receive a $100,000 research award, of a total $150,000 in research support, made possible by the Haskell Robinson Family Neuroscience Endowment, Ling-Lie Chau Endowment for the Center for Neuroscience, Jeanette Gehl Neuroscience Innovation Fund and CNS Director's Circle members.

CNS Director's Circle Gratitude Lunch and NeuroActivity

INNOVATION

Neural Control of Social Attention

Xiaomo Chen, Ph.D.

Social attention, the ability to focus on and interpret socially meaningful cues, such as faces and expressions, is a cornerstone of human interaction. It supports communication, learning and emotional connection. When this ability is impaired, as in autism spectrum disorder and other conditions, social functioning can be profoundly disrupted. Yet, the brain mechanisms that support social attention remain poorly understood. Most neuroscience studies of attention have relied on simple, artificial images to control experimental conditions. While these studies have provided valuable insights, they fail to capture the richness and importance of social information. As a result, we know little about how the brain prioritizes and encodes socially relevant cues. This project directly addresses that gap. Using advanced recordings from thousands of neurons in non-human primates, we will define the cortical circuits that encode social attention with unprecedented resolution. We will then test whether patterned neural stimulation can enhance attention to socially meaningful stimuli. By combining a rigorously controlled behavioral paradigm with cutting-edge neurophysiology and neuroengineering, this work will provide the first causal evidence for how brain circuits generate and regulate social attention. The expected outcomes are twofold: first, a mechanistic framework for how social information is processed in the brain, and second, proof of concept that targeted stimulation can improve performance. These discoveries will provide the foundation for future large-scale studies and ultimately, new strategies for strengthening social functioning when it is disrupted.

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SCORING (5 being the best):

1. The speaker was clear and effective. _____

2. The project is compelling. _____

3. Fund usage is clearly stated. _____

4. I care deeply about this topic. _____

OVERALL SCORE: _____

Add scores. 20 being the best. Use this to help rank your favorite project!

INNOVATION

The Role of Circuit-Specific Dopamine Neuromodulation in Autism-Related Behaviors

Tim Hanks, Ph.D.

While the behavioral manifestations of autism involve a complex interplay of multiple factors, converging evidence suggests that dopamine abnormalities play a critical role. Abnormalities in dopaminergic systems have been hypothesized to contribute to autism in multiple ways, including through impacts on reward processing, learning and behavioral perseveration. A critical missing element needed to test these hypotheses is direct measurement of dopamine release from distinct dopaminergic pathways during motivated behaviors. This proposed project will leverage next-generation dopamine sensors developed to perform circuit-specific measurements of dopamine, whose adoption by the Hanks Lab was kick-started through a previous Center for Neuroscience Innovation Award. The overall goal of this proposal is to determine how the relationships between dopamine and factors that influence motivated behavior are altered in autism.

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INNOVATION

Development of Human Cerebellar Organoids as a Platform for Translational Neuroscience Research

Alex Nord, Ph.D.

Cerebellar (CB) dysfunction is increasingly recognized as a driving factor across neurological disorders, including medulloblastoma (MB), neurodevelopmental disorders and Autism Spectrum Disorder (NDDs/ASD) and Alzheimer's disease (AD). Mouse models enable approaches that are not possible in humans and have yielded valuable insights regarding CB development, function and role in disease. However, there are human-specific aspects of CB neurobiology that differ from rodents, and there are exciting new technological and methodological advances that are not possible to deploy in animal models like mice. To establish an innovative and flexible platform for studying human CB development and disease, we propose establishing novel human CB organoid culture methods. Organoids are generated by culturing human induced pluripotent stem cells (iPSCs) with sequential treatment with signaling factors that induce formation of 3-D cellular structures that mimic human tissues. Brain organoids recapitulate human brain development and can be directed toward production of specific brain regions. We will refine CB organoid culture methods by incorporating iPSC-derived microglia to enhance physiological and neuroimmune relevance, which will be validated through histology, single-cell multiomics and electrophysiology. We will apply this system to characterize CB organoids carrying representative patient mutations associated with MB (PTCH1), NDDs/ASD (CHD8) and AD (APOE4). This characterization will identify disease-relevant cellular, molecular and circuit perturbations. This project will deliver mechanistic insights into human-specific CB development and pathology and seed a translational research program that bridges animal models and organoid systems.

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INNOVATION

Real-World Intracranial Recordings of Cognition in the Human Basal Ganglia and Cerebellum

Carina R. Oehrn, M.D., Ph.D.

Understanding how the human brain supports thinking, memory and everyday decision-making is one of the greatest challenges in neuroscience. To date, most knowledge has come from controlled laboratory experiments, which may not reflect how the brain works in daily life. This gap is critical because new therapies for conditions like Parkinson's disease adapt brain stimulation in real time to ongoing activity, alleviating symptoms. Yet, our understanding of brain function in natural settings remains limited, especially for processes beyond movement. Our goal is to study brain activity during everyday cognition. Recent advances in medical technology now make it possible to continuously record human brain activity from deep brain structures in real-world settings. Our project will use this opportunity to relate these recordings to real-world experiences. We will focus on two regions central to both movement and higher mental functions: the subthalamic nucleus and the cerebellum. We will study patients already implanted with these sensing-enabled devices.

To move the field forward, we must first establish the technical feasibility of this approach. We will be among the first laboratories worldwide to do so. Our first goal is to show that high-quality brain recordings can be collected reliably at home. Our second is to link these signals to everyday experiences using smartwatch data, smartphone-based tasks and patient self-reports. This high-risk, high-reward project will create the first framework for studying cognition with long-term brain recordings in daily life, paving the way for future therapies that address cognitive and emotional symptoms.

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INNOVATION

Noradrenaline's Role in Alzheimer's Disease: Uncovering New Therapeutic Possibilities

Brian Wiltgen, Ph.D.

Alzheimer's disease (AD) currently affects about 6.7 million people in the United States, with an annual economic burden of approximately $355 billion in healthcare costs and lost productivity. As the population ages, this number is expected to rise dramatically, reaching an estimated 12.7 million cases by 2050. At present, there are no treatments to prevent or slow the progression of AD. While it was once believed that AD begins in the cortex before spreading throughout the brain, recent studies suggest that pathology first appears in subcortical regions, often years or decades before cognitive and behavioral symptoms develop. Early pre-fibrillary tangles are first observed in the locus coeruleus (LC), a brainstem region that regulates arousal, attention, sleep and memory by releasing noradrenaline across the brain. Pathology then progresses to one of the LC's primary targets, the entorhinal cortex, which provides the main cortical input to the hippocampus. Once pathology reaches the hippocampus, significant memory impairments emerge. The goal of this application is to test whether reduced noradrenaline release from the LC contributes to learning and memory deficits, impaired synaptic plasticity in the hippocampus and the expression and spread of amyloid-β (Aβ) and hyperphosphorylated tau.

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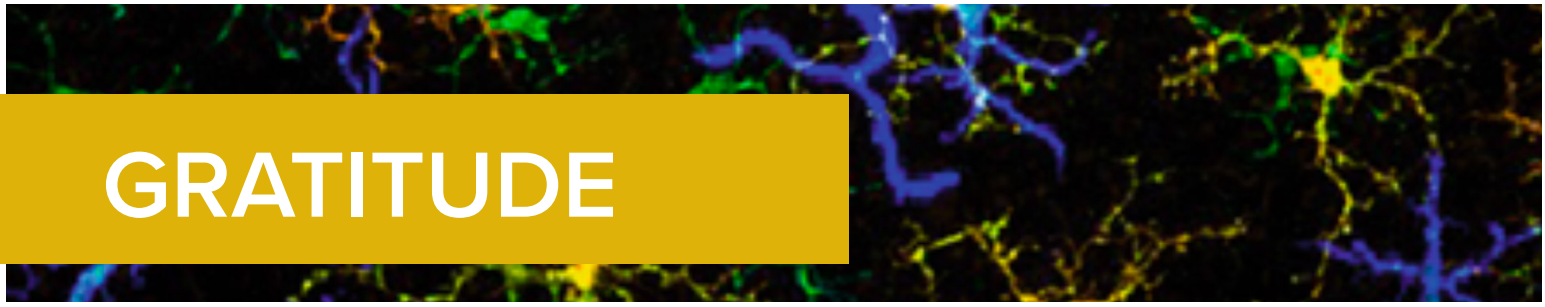

GRATITUDE

The Center for Neuroscience is deeply grateful for the support of our donors and CNS Director's Circle members. Your investment and partnership enable neuroscience research and training excellence at UC Davis. Thank you!

Director's Circle

To join or renew your CNS Director's Circle annual membership, or to learn more about our funding priorities, please contact Jennifer Scott at jescott@ucdavis.edu or (530) 601-3380.

The Center for Neuroscience is the interdisciplinary hub for neuroscience research and training at UC Davis. Our experts conduct cutting-edge research at all levels of the nervous system, from genes to behavior and through all stages of life. We are committed to training the next generation of scientists and engaging the public in neuroscience research.

Our mission is to reveal how the brain works and to leverage these discoveries to promote health, advance treatments and cures for neurological and psychiatric disorders and transform next generation technologies.

Learn more at neuroscience.ucdavis.edu

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