



## PRELIMINARY PROGRAM

**Thursday, June 12, 2025**

7:00 AM Breakfast

8:00 AM Welcome to Neural Interfaces 2025

8:30 AM Voices of Experience: Patients in Neural Interface Trials

Meet the pioneers of neural interface and neuromodulation research—patients who have experienced the therapy or volunteered in clinical trials. This panel offers a rare opportunity to hear their personal stories, motivations, and experiences firsthand, including the challenges and life-changing impacts of these therapies. Gain invaluable insights into the real-world effects of neurotechnology.

9:00 AM Building Bridges with Stakeholder Communities to Drive NeuroTech Development

This interactive session explores strategies for collaboration across the neural interfaces and brain health ecosystem. Learn how to engage in the regulatory process, build effective interdisciplinary teams, and foster meaningful patient engagement. Discover best practices for coalition building to drive innovation and improve outcomes in neurotechnology development.

*Invited moderators: Jennifer French, MBA, and Nick Langhals, PhD*

10:45 AM Bench to Bedside Adventures and Misadventures: The Entrepreneur's Journey

What does it take to bring a neurotechnology therapy from concept to clinical use? In this session, four NeuroTech leaders/entrepreneurs will share their experiences—the breakthroughs, setbacks, and lessons learned. A dynamic, interactive discussion will follow, offering attendees a chance to engage directly with innovators shaping the future of neurotechnology.

*Invited moderator: Parag Patil, MD, PhD*

12:00 PM Lunch Break

1:30 PM Biohybrid Neural Interfaces: Merging Biology and Technology

This session explores cutting-edge biohybrid neural interfaces, integrating biological tissues with electronics to enhance neuroprosthetics and neurorestoration. Topics include improving signal processing, reducing immune rejection, and advancing functionality in central and peripheral systems. Learn about engineering challenges, translational efforts, and clinical applications shaping the future of neural interface technology.

*Invited moderators: Damiano Barone, MD, PhD, and Jin Hyung Lee, PhD, MS*

1:30 PM Light-Based Neuromodulation: Emerging Therapies and Mechanisms

This session explores photobiomodulation (PBM) for neural health, including an FDA-cleared therapy for macular degeneration, PBM in Parkinson disease models, and transient selective neural inhibition (tSNIP). Learn about mechanisms, recent breakthroughs, and opportunities for integrating light-based neuromodulation into neurotechnology and clinical practice.

*Invited moderators: Juanita Anders, PhD and Mike Moffitt, PhD*

3:15 PM High Channel-Count Neural Interfaces: Applications and Challenges

This session explores the development and use of high channel count neural interfaces, focusing on their potential for cortical neuroprosthetics. Discussions will cover the physiological need for high-channel-count systems, challenges in data acquisition, signal processing and data transfer, as well as innovative solutions emerging from leading laboratories to address these complexities.

*Invited moderators: Duygu Kuzum, PhD, and Ahmed Raslan, MD*

3:15 PM Open-Source Neuromodulation: Driving Innovation & Accessibility

This session explores how open-source neuromodulation systems accelerate innovation and accessibility in bioelectronic medicine and functional restoration. Teams from OpenNerve and COSMIIC will showcase their work in spinal cord injury therapies, highlighting how collaboration fosters breakthroughs, adaptability, and real-world impact for researchers, clinicians, and patients.

*Invited moderators: Kevin Kilgore, PhD, and Ellis Meng, PhD, MS*

4:30 PM Poster Presentations: Basic-Translational Abstracts

## Friday, June 13, 2025

7:00 AM Breakfast

8:00 AM Visual Prosthetics

8:30 AM TBD

9:00 AM Known Neurophysiological Mechanisms and Phenomena: Foundations for Next-Generation DBS Therapies

Despite the success of DBS and SCS, their mechanisms remain unclear. This session explores known neurophysiological principles—excitability reduction, connectivity modulation, and plasticity—as a foundation for next-gen DBS therapies. By integrating mechanistic understanding with empirical insights,

we aim to refine and advance neuromodulation strategies for improved clinical outcomes.

*Invited moderator: Cameron McIntyre, PhD*

#### 10:45 AM Advancing Closed-Loop Bioelectronic Medicine

This review explores the evolution of bioelectronic medicine, emphasizing the potential of closed-loop neuromodulation for brain, spinal cord, and autonomic regulation. Innovations like focused ultrasound and autonomic neurography offer new therapeutic possibilities for conditions like sepsis and chronic inflammation. Overcoming signal noise, drift, and external influences will drive precision medicine forward.

*Invited moderators: Imanuel Lerman, MD, MS, and Luis Lujan, PhD, MS*

#### 12:00 PM Lunch Break

#### 1:30 PM Advancing Neural Interfaces Beyond the Lab for Real-World Rehabilitation

Neural interfaces hold transformative potential for restoring sensory and motor function, yet many remain limited to animal models or small trials. This session examines barriers to clinical adoption, including long-term reliability and user engagement, and explores strategies to accelerate real-world advances in rehabilitation through collaboration across academia, industry, and patient advocacy.

*Invited moderators: Hamid Charkhkar, PhD, and Helen Huang, PhD, MS*

#### 1:30 PM Intracortical Microstimulation (ICMS) as a Translational Tool for Neural Circuit Research and Sensory Restoration

This session explores computational models, multi-species data, and neurocomputational approaches to optimize intracortical microstimulation (ICMS) for therapy. By integrating insights from preclinical and clinical studies, speakers will address key challenges in enhancing ICMS precision, stability, and safety to improve neural circuit modulation for restoring sensory and motor function.

*Invited moderators: TK Kozai, PhD, and Florian Solzbacher, PhD*

#### 3:15 PM Clinical Trial Design in Neuromodulation

This session explores key aspects of clinical trial design in neuromodulation, including sham controls, multi-arm crossovers, and placebos. Drawing from personal experience, speakers and attendees will discuss benefits, challenges, and best practices to ensure rigorous, effective studies that advance the field and improve patient outcomes.

*Invited moderators: Megan Frankowski, PhD, and Sijetlana Miocinovic, MD, PhD*

### 3:15 PM Expanding the Frontier: Opportunities and Challenges in Cranial and Peripheral Nerve Interfaces

Cranial and peripheral nerve interface devices offer exciting opportunities to restore function and to treat pain and other neurological disorders, but significant challenges remain in clinical translation, device design, and long-term efficacy. This session brings together four experts to explore both the technological advancements and clinical applications shaping the future of nerve interfaces.

*Invited moderators: Kevin Otto, PhD, and Stavros Zanos, MD, PhD*

### 4:30 PM Poster Presentations: Clinical-Translational Abstracts

### 6:30 PM Cultivating the Next Generation: Pathways for Future Leaders in Neural Engineering

This roundtable panel discussion explores strategies to engage students in neural engineering research and prepare them for careers in academia and industry. Discussions will cover pursuing meaningful research experiences, balancing autonomy and supervision, securing funding, and overcoming challenges. Academic and industry speakers will also share insights on how opportunities shape career trajectories and offer guidance on transitioning either to academic roles or industry positions in neurotechnology and neuromodulation.

*Invited moderators: Matt Johnson, PhD, and Karlo Malaga, PhD*

## Saturday, June 14, 2025

7:00 AM Breakfast

8:00 AM Neurotech Commercialization

8:30 AM TBD

9:00 AM Biomarkers in Action: Advancing Adaptive Brain Stimulation

This session explores novel biomarkers for OCD, chronic pain, essential tremor, and Parkinson disease, identified through neural recordings in ambulatory settings. Speakers will highlight how these biomarkers are driving adaptive brain stimulation algorithms, enabling on-demand therapy to improve efficacy, reduce side effects, and prevent habituation—paving the way for precision neuromodulation.

*Invited moderators: Coralie de Hemptinne, PhD, MS and Rob Gaunt, PhD*

10:45 AM New Frontiers in SCS: Expanding Therapeutic Applications

This session explores emerging applications of spinal cord stimulation (SCS) beyond conventional uses. Experts will present cutting-edge research and clinical advancements in SCS for respiratory control, sensory restoration, cardiovascular regulation, and bladder control—rapidly evolving areas that hold significant therapeutic potential but remain underexplored in the traditional neuromodulation space.

*Invited moderators: Lee Fisher, PhD, MS, and Siamak Salavatian, PhD, MS*

12:00 PM Lunch Break

1:30 PM Funding the Future of Neurotechnology

From bench to bedside, neurotech development relies on strategic funding. This session explores key funding opportunities, from academic grants to venture financing, and examines how funding decisions are made. Experts will provide insights into current investment trends, funding challenges, and strategies for securing support to advance neurotechnology innovation.

*Invited moderator: Emily Caporello, PhD*

1:30 PM Leveraging Publishing Wisdom: An Insider's Guide to Academic Success

Join us for a lively workshop where you'll harness the publishing wisdom of seasoned experts to advance your Neural Interfaces research. Learn essential tips on manuscript preparation, mastering the peer review process, navigating publication ethics in the age of AI, and leveraging open data. This session is a must-attend for anyone eager to build a robust publication record and accelerate their academic career.

*Invited moderators: Magda Anitescu, MD, PhD, and Jessica Wheeler, BS*