NEUROSCIENCE 2026

ICONEUS
REVEALING THE BRAIN

SCIENTIFIC PROGRAM

Functional Ultrasound Imaging (fUSI) & Ultrasound Localization Microscopy (ULM)

NOVEMBER 14-18, 2026

WASHINGTON, D.C.

SPECIAL LECTURE

Ultrasound in Neuroscience

Abstract : Ultrasound is fast evolving as an essential imaging and therapeutic modality in neuroscience. The speaker will describe the concepts and applications of ultrasound in neuroscience. He will present functional ultrasound neuroimaging and its impact from preclinical neuroscience to clinical applications. He will show how Ultrasound Localization Microscopy leads to non-invasive, deep and quantitative imaging of hemodynamics up to the micron scale.
Finally, he will describe its combination with sonogenetics and the use of ultrasound deep neuromodulation.



MICKAEL TANTER
INSERM, Paris, France

NOVEMBER 16, 2026

12:00–1:00 PM

WCC HALL D

PRODUCT THEATER

FUNCTIONAL ULTRASOUND (fUS): LATEST ADVANCES IN WHOLE-BRAIN IMAGING WITH ICONEUS ONE



PIA PELAEZ
Scientific Applications Specialist

NOVEMBER 16, 2026

2:30–3:00 PM

GRAND PRODUCT THEATER – AISLE 1400

ICONEUS BOOTH #1815

POSTER SESSIONS

SCHEDULE

SATURDAY, NOVEMBER 14 | SUNDAY, NOVEMBER 15 | MONDAY, NOVEMBER 16 | TUESDAY, NOVEMBER 17 | WEDNESDAY, NOVEMBER 18

2:00 PM – 3:00 PM

NEURODEGENERATIVE DISEASES (AD, PD, MS, STROKE)

PSTR038.10 – Functional ultrasound imaging reveals visually induced somatosensory activation in a mouse model of Cystinosis
Presenter: F. Yin | Board KK52

3:00 PM – 4:00 PM

TRIGEMINAL CIRCUITS: MIGRAINE, HEADACHE, OROFACIAL, AND OCULAR

PSTR015.15 – Characterization of chemically-induced migraine models in mice using behavioral and functional imaging readouts
Presenter: A.-M. Penttinen | Board Y5

Find the full poster abstracts following the Poster Sessions schedule.

POSTER SESSIONS

SCHEDULE

SATURDAY, NOVEMBER 14 | **SUNDAY, NOVEMBER 15** | MONDAY, NOVEMBER 16 | TUESDAY, NOVEMBER 17 | WEDNESDAY, NOVEMBER 18

8:00 AM – 9:00 AM

BMI NEUROPHYSIOLOGY: DECODING, NEUROPHYSIOLOGY, AND PROCESSING I

PSTR063.09 – Functional ultrasound imaging through a human cranial window for mesoscopic mapping of motor effector encoding within the sensorimotor cortex
Presenter: L. J. Lin | Board DD27

9:00 AM – 10:00 AM

BMI NEUROPHYSIOLOGY: DECODING, NEUROPHYSIOLOGY, AND PROCESSING I

PSTR063.18 – Decoding mechanisms of micturition in the human brain during bladder filling and emptying using functional ultrasound imaging
Presenter: K. A. Agyeman | Board EE6

10:00 AM – 11:00 AM

BMI NEUROPHYSIOLOGY: DECODING, NEUROPHYSIOLOGY, AND PROCESSING I

PSTR063.07 – Resolving the functional organization and neural basis of visuomotor planning in posterior parietal cortex with functional ultrasound and electrophysiology
Presenter: T. Callier | Board DD25

POSTER SESSIONS

SCHEDULE

SATURDAY, NOVEMBER 14 | **SUNDAY, NOVEMBER 15** | MONDAY, NOVEMBER 16 | TUESDAY, NOVEMBER 17 | WEDNESDAY, NOVEMBER 18

11:00 AM – 12:00 PM
ALZHEIMER'S DISEASE: BLOOD FLOW AND METABOLISM
PSTR049.04 – Neurovascular changes in DOCA-hypertension model in mice
Presenter: K. Lehtimäki | Board U13

11:00 AM – 12:00 PM
FUNCTIONAL IMAGING AND BRAIN CONNECTIVITY
PSTR067.04 – Restrain stress enhances LC-PVH functional connectivity
Presenter: A. J. Park | Board FF15

4:00 PM – 5:00 PM
LATE-BREAKING POSTER — EMOTION
LBP010.05 – Physical touch activates hypothalamus for stress resilience by orchestrating dopamine-acetylcholine signaling
Presenter: N. Wang | Board B39

Find the full poster abstracts following the Poster Sessions schedule.

POSTER SESSIONS

SCHEDULE

SATURDAY, NOVEMBER 14 | SUNDAY, NOVEMBER 15 | **MONDAY, NOVEMBER 16** | TUESDAY, NOVEMBER 17 | WEDNESDAY, NOVEMBER 18

10:00 AM – 11:00 AM

STUDY OF THE SCI LESION ENVIRONMENT, STEM CELL, AND SCAFFOLD INTERVENTIONS

PSTR133.03 – Recapitulating developmental tip-cell-guided sprouting promotes functional vascular regeneration after spinal cord injury

Presenter: S. Yu | Board X1

2:00 PM – 3:00 PM

VISUAL MOTION

PSTR184.06 – Measuring Hemodynamic Modulation to Optic Flow in Macaque Extrastriate Visual Cortex using functional Ultrasound Imaging (fUSI)

Presenter: Q. Luo | Board AA7

3:00 PM – 4:00 PM

COMPUTATIONAL METHODS FOR EXPERIMENTAL NEUROSCIENCE

PSTR207.19 – A Bayesian framework for efficient low-intensity focused ultrasound parameter mapping

Presenter: A. Boscutti | Board MM5

4:00 PM – 5:00 PM

VISUAL MOTION

PSTR184.08 – Reliability and electrophysiological correspondence of functional ultrasound imaging in macaque MT/MST

Presenter: E. Rudolph | Board AA9

ICONEUS BOOTH #1815

POSTER SESSIONS

SCHEDULE

SATURDAY, NOVEMBER 14 | SUNDAY, NOVEMBER 15 | MONDAY, NOVEMBER 16 | **TUESDAY, NOVEMBER 17** | WEDNESDAY, NOVEMBER 18

9:00 AM – 10:00 AM

PAIN: SPINAL CIRCUITS

PSTR226.26 – Neuromodulatory effects of invasive and non-invasive stimulation on spinal cord hemodynamics in failed back surgery syndrome using functional ultrasound imaging
Presenter: H. Zareian | Board AA8

10:00 AM – 11:00 AM

LATE-BREAKING POSTER — NETWORK INTERACTIONS

LBP048.06 – A high-order thalamocortical circuit couples affective and motor dysfunction through frequency-specific synchrony
Presenter: C. Ji | Board C9

1:00 PM – 2:00 PM

ULTRASOUND NEUROMODULATION

PSTR295.01 – Bayesian-enhanced closed-loop optimization of ultrasound protocols for targeted and precise neuromodulation
Presenter: A. Boscutti | Board MM29

Find the full poster abstracts following the Poster Sessions schedule.

POSTER SESSIONS

SCHEDULE

SATURDAY, NOVEMBER 14 | SUNDAY, NOVEMBER 15 | MONDAY, NOVEMBER 16 | **TUESDAY, NOVEMBER 17** | WEDNESDAY, NOVEMBER 18

2:00 PM – 3:00 PM

AUTISM: SYNAPTIC AND CELLULAR MECHANISMS

PSTR253.18 – Socially evoked prefrontal hyperexcitation in Shank3B mutant mice reveals ASD-relevant state-dependent circuit dysfunction
Presenter: X. Jin | Board F7

2:00 PM – 3:00 PM

ULTRASOUND NEUROMODULATION

PSTR295.02 – Functional ultrasound imaging-guided low-intensity focused ultrasound neuromodulation in a model of focal epilepsy
Presenter: V. Grasso | Board MM30

4:00 PM – 5:00 PM

ULTRASOUND NEUROMODULATION

PSTR295.04 – Contrast-Enhanced Ultrasound Neuromodulation: A Histological Safety Assessment in the Mouse Brain
Presenter: M. Gerlach | Board MM32

4:00 PM – 5:00 PM

LATE-BREAKING POSTER : VOLUNTARY MOVEMENTS

LBP065.06 – Functional ultrasound imaging and analysis of an awake infant's brain activity during goal-directed reaching
Presenter: I. Sahin | Board B62

ICONEUS BOOTH #1815

POSTER SESSIONS

SCHEDULE

SATURDAY, NOVEMBER 14 | SUNDAY, NOVEMBER 15 | MONDAY, NOVEMBER 16 | TUESDAY, NOVEMBER 17 | **WEDNESDAY, NOVEMBER 18**

10:00 AM – 11:00 AM

ANIMAL MODELS OF AUTISM

PSTR297.03 – Resting-state functional ultrasound reveals spatially localized prefrontal network alterations in a maternal immune activation mouse model

Presenter: K. Hikishima | Board D14

11:00 AM – 12:00 PM

SCHIZOPHRENIA GENETICS, PATHOPHYSIOLOGY, AND MECHANISMS

PSTR298.08 – Tracking the evolving Brain-Wide Functional Connectome in psychiatric risk mouse models

Presenter: N. Wang | Board H5

1:00 PM – 2:00 PM

LATE-BREAKING POSTER — SOCIAL COGNITION

LBP084.09 – Reading the social brain with volumetric functional ultrasound imaging in behaving marmosets

Presenter: C. Zhang | Board B67

Find the full poster abstracts following the Poster Sessions schedule.

POSTER SESSIONS

SCHEDULE

SATURDAY, NOVEMBER 14	SUNDAY, NOVEMBER 15	MONDAY, NOVEMBER 16	TUESDAY, NOVEMBER 17	WEDNESDAY, NOVEMBER 18

3:00 PM – 4:00 PM

PRE- AND PERINATAL IMPACTS ON NEURODEVELOPMENT

PSTR342.07 – In Utero Functional Ultrasound Imaging Reveals Brain Activity in Embryonic Mice and Fetal Non-Human Primates

Presenter: J. Zhu | Board F5

3:00 PM – 4:00 PM

SEIZURE NETWORKS, CIRCUIT DYNAMICS, DETECTION, AND POST-SEIZURE STATES

PSTR345.19 – Low-mortality chronic epilepsy model using fractionated kainic acid dosing and seizure imaging with functional ultrasound

Presenter: T. Huhtala | Board O3

ICONEUS BOOTH #1815

NEUROSCIENCE 2026

(https://www.abstractsonline.com/pp8/#!/21503)

Session PSTR038 - Neurodegenerative Diseases (AD, PD, MS, Stroke)

Add to Itinerary

PSTR038.10 / KK52 - Functional ultrasound imaging reveals visually induced somatosensory activation in a mouse model of Cystinosis

November 14, 2026, 1:00 PM - 5:00 PM | WCC Halls A-C

Presenter at Poster
Sat., Nov. 14, 2026 2 - 3 p.m.

Session Types
Poster

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NIH Grant AR069655

Citation
*F. YIN[1], Y. DING[6], H. CHANG[2], J. FENG[7], V. PRIFTI[2], E. G. FREEDMAN[3], J. J. FOXE[4], M. DOYLEY[5], K. WANG[8];
[1]Electrical and Computer Engin., [2]Neurosci., [3]Del Monte Inst. for Neurosci., Univ. of Rochester, Rochester, NY; [4]Neurosci., Univ. of Rochester, Bronx, NY; [5]Univ. of Rochester, Rochester, NY; [6]Neurosci., [8]Dept. of Neurosci., [7]Univ. of Rochester Med. Ctr., Rochester, NY. Functional ultrasound imaging reveals visually induced somatosensory activation in a mouse model of Cystinosis. Program No. PSTR038.10. 2026 Neuroscience Meeting Planner. Washington, D.C. : Society for Neuroscience, 2026. Online.

Authors
*F. YIN[1], Y. DING[6], H. CHANG[2], J. FENG[7], V. PRIFTI[2], E. G. FREEDMAN[3], J. J. FOXE[4], M. DOYLEY[5], K. WANG[8];
[1]Electrical and Computer Engin., [2]Neurosci., [3]Del Monte Inst. for Neurosci., Univ. of Rochester, Rochester, NY; [4]Neurosci., Univ. of Rochester, Bronx, NY; [5]Univ. of Rochester, Rochester, NY; [6]Neurosci., [8]Dept. of Neurosci., [7]Univ. of Rochester Med. Ctr., Rochester, NY

Disclosures
F. Yin: None. Y. Ding: None. H. Chang: None. J. Feng: None. V. Prifti: None. E.G. Freedman: None. J.J. Foxe: None. M. Doyley: None. K. Wang: None.

Abstract
Cystinosis is a rare lysosomal storage disorder (LSD) caused by mutations in the *CTNS* gene and marked by systemic cystine accumulation. Individuals with Cystinosis show growth impairment, kidney issue, and visual complications like photophobia and blepharospasm. However, the neural mechanisms underlying altered visual response in cystinosis remain poorly understood. In this study, functional ultrasound (fUS) imaging was used to investigate central visual processing in a Cystinosis knockout (*CTNS−/−*) mouse model and identify potential neural correlates of visual deficits. Visual stimulation in control mice of both sexes elicited robust activation throughout the canonical visual pathway, including the superior colliculus (SC), lateral geniculate nucleus (LGN), lateral posterior nucleus (LP), and primary and secondary visual cortices (V1/V2). In contrast, *CTNS−/−* mice exhibited altered visually evoked activation, with abnormal recruitment of somatosensory regions, including the ventral posteromedial nucleus (VPM), posterior nucleus (PO), primary somatosensory cortex (S1) and posterior parietal cortex (PPC), in addition to visual regions. These effects were particularly pronounced in males, suggesting sex-dependent neural circuit dysfunction. The aberrant engagement of somatosensory networks may reflect enhanced processing of aversive sensory signals and provide a neurobiological basis for photophobia. Collectively, these findings reveal significant alterations in sensory network organization in Cystinosis and suggest that visual discomfort may arise from maladaptive central sensory processing.

NEUROSCIENCE 2026

(https://www.abstractsonline.com/pp8/#!/21503)

Session PSTR015 - Trigeminal Circuits: Migraine, Headache, Orofacial, and Ocular

Add to Itinerary

PSTR015.15 / Y5 - Characterization of chemically-induced migraine models in mice using behavioral and functional imaging readouts

November 14, 2026, 1:00 PM - 5:00 PM | WCC Halls A-C

Presenter at Poster
Sat., Nov. 14, 2026 3 - 4 p.m.

Session Types
Poster

Citation
A. SUHONEN, R. IMMONEN, T. MIETTINEN, *A.-M. PENTTINEN, J. RYTKÖNEN, T. HUHTALA;
IQVIA Labs. Finland Oy, Kuopio, Finland.
Characterization of chemically-induced migraine models in mice using behavioral and functional imaging readouts. Program No. PSTR015.15. 2026 Neuroscience Meeting Planner. Washington, D.C. : Society for Neuroscience, 2026. Online.

Authors
A. SUHONEN, R. IMMONEN, T. MIETTINEN, *A.-M. PENTTINEN, J. RYTKÖNEN, T. HUHTALA;
IQVIA Labs. Finland Oy, Kuopio, Finland

Disclosures
A. Suhonen: A. Employment/Salary (full or part-time):; IQVIA Laboratories Finland Oy. R. Immonen: A. Employment/Salary (full or part-time):; IQVIA Laboratories Finland Oy. T. Miettinen: A. Employment/Salary (full or part-time):; IQVIA Laboratories Finland Oy. A. Penttinen: A. Employment/Salary (full or part-time):; IQVIA Laboratories Finland Oy. J. Rytkönen: A. Employment/Salary (full or part-time):; IQVIA Laboratories Finland Oy. T. Huhtala: A. Employment/Salary (full or part-time):; IQVIA Laboratories Finland Oy.

Abstract
Global migraine prevalence is 14-15% and it causes significant burden to economy as sick leaves and reduced productivity, not to mention the reduced quality of life for the individuals affected. It is a complex neurological disorder in which multiple neuropeptides modulate nociceptive and sensory pathways. Some of the most studied neuropeptides, calcitonin gene-related peptide (CGRP), vasoactive intestinal peptide (VIP) and pituitary adenylate cyclase-activating peptide (PACAP) promote vasodilation and neurogenic inflammation but act through different pathways. Preclinical animal models can shed light on migraine pathophysiology and can be used to test novel treatments for migraine. In this study we characterized chemically induced migraine rodent model with behavioral readouts and vascular imaging of the brain using functional ultrasound (fUS).

Male CD1 mice were dosed either with vehicle or a mixt of PACAP+CGRP (0,6 mg/kg + 0,6 mg/kg, 5 ml/kg, i.p.) and light aversion test using open field chamber with dark box insert (Med Associates Inc, St Albans, VT). Habituation to the chambers and dosing was done one day before the actual test. A separate cohort of mice was scanned with fUS. The imaging consisted of structural scan and vasodilation challenge. During the scanning the heart rate was monitored. The vasodilation was reported as a change to the baseline as relative cerebral blood volume (rCBV%).

The light aversive behavior was prominent in PACAP and CGRP dosed animals. The total time spent in light was lower compared to vehicle group as well as other explorative behavior (number of entries, total distance travelled in light). In fUS, rCVB% increases were seen in several brain surface vessels (Dorsal surface vessel, Lateral surface vessel, Sagittal sinus and Extracerebral vessel) compared to baseline. As a conclusion, functional and behavioral readouts are complementary in testing novel therapies for migraine.

NEUROSCIENCE 2026

(https://www.abstractsonline.com/pp8/#!/21503)

Session PSTR063 - BMI Neurophysiology: Decoding, Neurophysiology, and Processing I

Add to Itinerary

PSTR063.09 / DD27 - Functional ultrasound imaging through a human cranial window for mesoscopic mapping of motor effector encoding within the sensorimotor cortex

November 15, 2026, 8:00 AM - 12:00 PM | WCC Halls A-C

Presenter at Poster
Sun., Nov. 15, 2026 8 - 9 a.m.

Session Types
Poster

Grant Support
NIH Grant F30 NS145610

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Tianqiao and Chrissy Chen BMI Center

Grant Support
Merkin Institute for Translational Research

Citation
*L. J. LIN[1,4], T. CALLIER[2], K. PEJSA[3], C. LIU[4,5], M. G. SHAPIRO[3,6], R. A. ANDERSEN[7];
[1]Caltech, Los Angeles, CA; [2]Caltech, Monterey, CA; [3]Caltech, Pasadena, CA; [4]Keck Sch. of Med. of USC, Los Angeles, CA; [5]Rancho Los Amigos Natl. Rehabil. Ctr., Downey, CA; [6]Howard Hughes Med. Inst., Los Angeles, CA; [7]BBE, Calif Inst. of Technol., Pasadena, CA.
Functional ultrasound imaging through a human cranial window for mesoscopic mapping of motor effector encoding within the sensorimotor cortex. Program No. PSTR063.09. 2026 Neuroscience Meeting Planner. Washington, D.C. : Society for Neuroscience, 2026. Online.

Authors
*L. J. LIN[1,4], T. CALLIER[2], K. PEJSA[3], C. LIU[4,5], M. G. SHAPIRO[3,6], R. A. ANDERSEN[7];
[1]Caltech, Los Angeles, CA; [2]Caltech, Monterey, CA; [3]Caltech, Pasadena, CA; [4]Keck Sch. of Med. of USC, Los Angeles, CA; [5]Rancho Los Amigos Natl. Rehabil. Ctr., Downey, CA; [6]Howard Hughes Med. Inst., Los Angeles, CA; [7]BBE, Calif Inst. of Technol., Pasadena, CA

Disclosures
L.J. Lin: None. T. Callier: None. K. Pejsa: None. C. Liu: None. M.G. Shapiro: None. R.A. Andersen: None.

Abstract
Understanding movement encoding within human cortical circuits has been essential for advancing brain computer interfaces (BCIs). However, there are limited minimally invasive, high resolution neurorecording methods sensitive enough to detect single-trial movement-correlated neural activity. Electrophysiological methods require highly invasive brain surgery for electrode implantation while conventional non-invasive imaging techniques like fMRI and EEG lack sufficient spatial resolution for high-bandwidth BCI use. Functional ultrasound imaging (fUSI) provides submillimeter spatial resolution of deep cortical tissue with high sensitivity and, when paired with acoustically transparent skull implants, enables transcutaneous recording of human neurovascular changes. Prior studies have used fUSI in participants with acoustically transparent skull implants for on-off task mapping and decoding. In this study, we demonstrate fUSI's ability to reliably resolve multi-body-part and single digit movement encoding within the primary sensorimotor cortex in a participant with an acoustically transparent skull implant.
Experiments were performed on a human participant who had previously undergone a hemicraniectomy procedure and polymeric skull reconstruction including an acoustic window. The participant was asked to perform randomized instructed movement tasks in a blocked design using different body parts or "effectors" - multi-body-part (wrist, finger, lip, tongue) and single digit (thumb, index, middle, ring, pinkie fingers) - while we acquired fUSI data from a fUSI plane containing the left sensorimotor cortex and the supramarginal gyrus.
Using fUSI, we obtained fine-grained mappings of individual effector representation that were consistent with classic somatotopy for both multi-body-part and single digit movement. We were able to resolve single-trial event-related activity, enabling single-trial decoding of both conditions. Analysis of voxels important for decoding suggested differential encoding of single digit movement information across the different Brodmann areas. Finally, we show that these patterns of representation can be approximated across sessions recorded on different days, allowing for cross session decoding.
These results establish that fUSI can reliably delineate somatotopically organized motor representations at submillimeter resolution, bridging a critical gap between invasive electrophysiology and noninvasive hemodynamic imaging in a human subject. This highlights the potential of fUSI as a minimally invasive alternative for BMIs in the future.

NEUROSCIENCE 2026

(https://www.abstractsonline.com/pp8/#!/21503)

Add to Itinerary

Session PSTR063 - BMI Neurophysiology: Decoding, Neurophysiology, and Processing I

PSTR063.18 / EE6 - Decoding mechanisms of micturition in the human brain during bladder filling and emptying using functional ultrasound imaging

November 15, 2026, 8:00 AM - 12:00 PM | WCC Halls A-C

Presenter at Poster
Sun., Nov. 15, 2026 9 - 10 a.m.

Session Types
Poster

Citation
*K. A. AGYEMAN[1], D. J. LEE[2], H. ZAREIAN[3], E. KREYDIN[1], C. LIU[4], V. N. CHRISTOPOULOS[3]; [2]Neurolog. Surgery, [3]Bioengineering, [1]USC, Los Angeles, CA; [4]USC, Loas Angeles, CA. Decoding mechanisms of micturition in the human brain during bladder filling and emptying using functional ultrasound imaging. Program No. PSTR063.18. 2026 Neuroscience Meeting Planner. Washington, D.C. : Society for Neuroscience, 2026. Online.

Authors
*K. A. AGYEMAN[1], D. J. LEE[2], H. ZAREIAN[3], E. KREYDIN[1], C. LIU[4], V. N. CHRISTOPOULOS[3];
[2]Neurolog. Surgery, [3]Bioengineering, [1]USC, Los Angeles, CA; [4]USC, Loas Angeles, CA

Disclosures
K.A. Agyeman: None. D.J. Lee: None. H. Zareian: None. E. Kreydin: None. C. Liu: None. V.N. Christopoulos: None.

Abstract
Lower urinary tract dysfunction remains inadequately treated yet affects over 30 million adults in the United States. Current care mostly focuses on symptom management rather than restoration of normal bladder sensation and function. In part, because most of the mechanistic understanding of micturition is derived from animal studies with minimal validation from humans, due to constraints inherent to conventional functional neuroimaging. Consequently, while the pontine micturition center (PMC) and periaqueductal gray (PAG) serve as critical relay and integration hubs for coordinating micturition, their functional mechanisms and dynamics remain poorly defined in humans. Here, we utilize functional ultrasound imaging (fUSI) to characterize dynamics of the human brainstem underlying micturition and to decode bladder pressure (BP) from brain activity. To this end, we acquired fUSI recordings through a cranial window, simultaneously with BP signals during controlled bladder filling and emptying - intraoperatively from three patients undergoing standard-of-care Chiari decompression surgery under general anesthesia (Fig. 1ABCD). A linear support vector machine regression model trained on fUSI power Doppler and BP signals accurately reconstructed bladder pressure changes and revealed cerebellar and midbrain (PMC, PAG) regions where the hemodynamic signal strongly correlates with bladder pressure (Fig. 1 EFG). Interestingly, in assessing the temporal effects of micturition on local neural connectivity and energy dynamics, we found strong generalized regional decrease in local connectivity during bladder filling and emptying, but distinct dynamic local network-level alterations in autocorrelation function and pD residuals signal energy in cerebellar, PMC and PAG regions (Fig. 1H). Together, our study provides a first inhuman application of fUSI for deciphering neural mechanisms of the brain during micturition - providing proof-of-concept for ultrasound-based brain machine interfaces aimed at restoring bladder function in neurogenic bladder disorders.

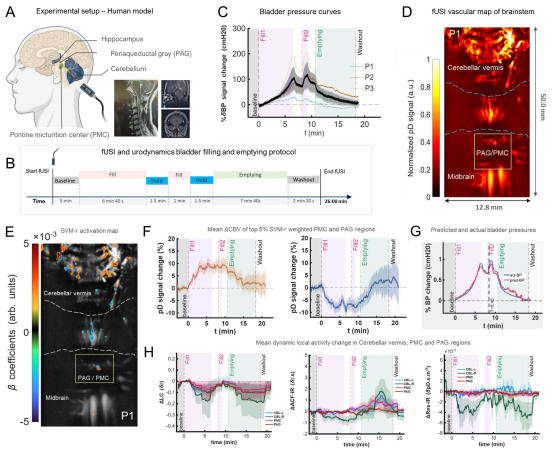

Figure 1: **A)** Model for studying micturition evoked effects in the human brain. **B)** Experimental protocol for simultaneous fUSI of the brainstem and bladder filling and emptying. **C)** Percentage change of bladder pressure signals over time for three patients. **D)** fUSI power Doppler 2D vascular map of the brain (representative patient). **E)** SVM-r weighted map of micturition related brain regions (patient P1) overlayed on fUSI pD greyscale background image. **F)** Average change in cerebral blood volume (ΔCBV) of PMC and PAG midbrain regions identified by SVM-r that are positively (orange curve) and negatively (blue curve) correlated with BP from panel E. **G)** Actual (blue curve) and SVM-r reconstructed (red curve) bladder pressures. **H)** Curves of the dynamic local connectivity (LC), autocorrelation function impulse response (ACF-IR) and pD residuals impulse response (Res-IR) measures of local neural activity and signal energy changes relative to baseline activity using 3-min data frames at 10 s sliding window steps, for cerebellar (green and blue curves, left and right sides respectively), PMC (light red curves) and PAG (brown curves) regions, across all patients.

NEUROSCIENCE 2026

(https://www.abstractsonline.com/pp8/#!/21503)

Session PSTR063 - BMI Neurophysiology: Decoding, Neurophysiology, and Processing I

Add to Itinerary

PSTR063.07 / DD25 - Resolving the functional organization and neural basis of visuomotor planning in posterior parietal cortex with functional ultrasound and electrophysiology

November 15, 2026, 8:00 AM - 12:00 PM | WCC Halls A-C

Presenter at Poster
Sun., Nov. 15, 2026 10 - 11 a.m.

Session Types
Poster

Grant Support
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Citation
*T. CALLIER[1], L. SHE[1], W. S. GRIGGS[2], T. DEFFIEUX[3], C. LIU[4], M. TANTER[5], M. G. SHAPIRO[1], R. A. ANDERSEN[6]; [2]BBE, [1]Caltech, Pasadena, CA; [3]Physmed Inserm U1273, Paris, France; [4]USC, Los Angeles, CA; [5]INSERM, Paris, France; [6]BBE, Calif Inst. of Technol., Pasadena, CA. Resolving the functional organization and neural basis of visuomotor planning in posterior parietal cortex with functional ultrasound and electrophysiology. Program No. PSTR063.07. 2026 Neuroscience Meeting Planner. Washington, D.C. : Society for Neuroscience, 2026. Online.

Authors
*T. CALLIER[1], L. SHE[1], W. S. GRIGGS[2], T. DEFFIEUX[3], C. LIU[4], M. TANTER[5], M. G. SHAPIRO[1], R. A. ANDERSEN[6];
[2]BBE, [1]Caltech, Pasadena, CA; [3]Physmed Inserm U1273, Paris, France; [4]USC, Los Angeles, CA; [5]INSERM, Paris, France; [6]BBE, Calif Inst. of Technol., Pasadena, CA

Disclosures
T. Callier: None. L. She: None. W.S. Griggs: None. T. Deffieux: None. C. Liu: None. M. Tanter: None. M.G. Shapiro: None. R.A. Andersen: None.

Abstract
The posterior parietal cortex (PPC) receives visual information about the external world and transforms it into plans for action, yet we still do not understand how this association cortex organizes and processes the many visual, motor, and cognitive variables that guide behavior. Functional ultrasound (fUS) offers a way to study this organization at the mesoscale, combining wide field of view, high spatial resolution, and stable signals over time. We previously showed that fUS can resolve the functional organization of planned saccade direction in macaque lateral intraparietal area (LIP), and more recently found that PPC activity is modulated by action context and internal state. In a value-modulated saccade task, expected reward produced broad changes in PPC activity, while both saccade direction and reward value could be decoded from the same imaging plane. Direction decoding was stronger on high-value trials, suggesting that motivational state changes the population activity patterns supporting visuomotor planning. During the preparatory period of the task, before target location was available, PPC exhibited widespread suppression with smaller regions of increased activity. This preparatory activity showed distinct spatial patterns before saccade versus reach trials and greater relative activation in high-value contexts, indicating that PPC enters a task- and value-dependent state before visual information is transformed into an action plan. Parallel electrophysiological recordings revealed corresponding changes in spiking activity and local field potentials, providing candidate neural correlates of these hemodynamic signals. Together, these results show that fUS can map spatially organized visual, motor, and motivational signals across macaque PPC. By revealing how planned actions and internal states can be read out from hemodynamic activity, this work motivates continued development of fUS-based brain-machine interfaces for minimally invasive access to cognitive and motor variables in association cortex.

NEUROSCIENCE 2026

(https://www.abstractsonline.com/pp8/#!/21503)

Session PSTR049 - Alzheimer's Disease: Blood Flow and Metabolism

Add to Itinerary

PSTR049.04 / U13 - Neurovascular changes in DOCA-hypertension model in mice

November 15, 2026, 8:00 AM - 12:00 PM | WCC Halls A-C

Presenter at Poster
Sun., Nov. 15, 2026 11 a.m. - 12 p.m.

Session Types
Poster

Citation
R. IMMONEN[1], T. MIETTINEN[1], J. RYTKÖNEN[1], *K. LEHTIMÄKI[1], T. HUHTALA[1], Y. LI[2], J. C. DODGE[3];
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Neurovascular changes in DOCA-hypertension model in mice. Program No. PSTR049.04. 2026 Neuroscience Meeting Planner. Washington, D.C. : Society for Neuroscience, 2026. Online.

Authors
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Disclosures
R. Immonen: A. Employment/Salary (full or part-time):; IQVIA Laboratories Finland Oy. **T. Miettinen:** A. Employment/Salary (full or part-time):; IQVIA Laboratories Finland Oy. **J. Rytkönen:** A. Employment/Salary (full or part-time):; IQVIA Laboratories Finland Oy. **K. Lehtimäki:** A. Employment/Salary (full or part-time):; IQVIA Laboratories Finland Oy. **T. Huhtala:** A. Employment/Salary (full or part-time):; IQVIA Laboratories Finland Oy. **Y. Li:** A. Employment/Salary (full or part-time):; Sanofi. **J.C. Dodge:** A. Employment/Salary (full or part-time):; Sanofi.

Abstract
Hypertension induces structural and functional changes in the brain, including changes in the blood vessels, neurons and their function. These alterations can lead to impaired cerebral blood flow, blood-brain-barrier disruption and ultimately increase the risk of vascular dementia and Alzheimer's disease (AD). Deoxycorticosterone acetate (DOCA) is a mineralocorticoid that affects Renin-Angiotensin-Aldosterone system (RAAS). DOCA mimics effects of aldosterone leading to increased sodium reabsorption and excretion of potassium in the kidneys. Together with reduced kidney capacity and increased salt uptake it creates chronic hypertension mimicking neurovascular pathology seen in early vascular dementia. In this study the changes in neurovascular function were characterized using functional ultrasound (fUS) imaging in DOCA hypertension model.

The study was performed in adult female C57BL/6J mice. The hypertension model was induced with unilateral nephrectomy, s.c. deoxycorticosterone acetate (DOCA) pellet and excess sodium from drinking water (1% NaCl), w/v). The bodyweight and blood pressure of the animals was monitored. CINE MRI was utilized to evaluate the cardiac function and cardiac hypertrophy. Finally, fUS was performed for vascular reactivity and for perfusion response to somatosensory stimulation.

The DOCA-salt mice had reduced bodyweight compared to Sham group at weeks 2-5 after pellet implantation. Elevated blood pressure was observed in DOCA mice (SYS 140-150 mmHg) compared to sham operated animal (SYS approx. 120 mmHg). Hypertension was significant at D7, D21, D28 and D35 after the DOCA pellet implantation and 1%-NaCl drinking water initiation. Heart rate during the BP measurement did not differ between DOCA and sham groups. A decreased response to Acetazolamide, a carbonic anhydrase inhibitor and a potent vasodilator, was detected with fUS imaging, indicating impaired vascular reactivity in DOCA mice. Decrease was significant in cortex and present as trend in hippocampus and thalamus. DOCA mice also showed decreased response to Whisker stimulation compared to Sham mice indicating functional hyperemia

Session PSTR067 - Functional Imaging and Brain Connectivity

Add to Itinerary

PSTR067.04 / FF15 - Restrain stress enhances LC-PVH functional connectivity

November 15, 2026, 8:00 AM - 12:00 PM | WCC Halls A-C

Presenter at Poster
Sun., Nov. 15, 2026 11 a.m. - 12 p.m.

Session Types
Poster

Citation
*A. J. PARK;
Seoul Natl. Univ., Seoul, Korea, Republic of. Restrain stress enhances LC-PVH functional connectivity. Program No. PSTR067.04. 2026 Neuroscience Meeting Planner. Washington, D.C. : Society for Neuroscience, 2026. Online.

Authors
*A. J. PARK;
Seoul Natl. Univ., Seoul, Korea, Republic of

Disclosures
A.J. Park: None.

Abstract
Stress constitutes a fundamental physiological state that supports homeostatic integrity and adaptive behavioral responses to environmental demands. The locus coeruleus (LC), the primary source of norepinephrine (NE) in the brain, is a key regulator of stress-related neural activity and projects widely throughout the brain, including the central amygdala (CeA), medial prefrontal cortex (mPFC) and lateral septal nucleus (LS). However, while stress-induced alterations in individual brain regions have been extensively investigated, whole-brain connectivity dynamics and their persistence following stress remain insufficiently understood. Here, we employed functional ultrasound imaging (fUS) to monitor whole-brain hemodynamic changes before, during, and following restraint stress in mice. We observed a progressive increase in functional connectivity between the LC and PVH from the pre-stress to post-stress period, whereas LC connectivity with the CeA, mPFC, and LS remained unchanged. These findings suggest that acute stress induces persistent alterations in LC-PVH network dynamics, highlighting a potential circuit mechanism underlying sustained stress responses.

NEUROSCIENCE 2026

(https://www.abstractsonline.com/pp8/#!/21503)

Add to Itinerary

Session LBP010 - H.04. Emotion

LBP010.05 / B39 - Physical touch activates hypothalamus for stress resilience by orchestrating dopamine-acetylcholine signaling

November 15, 2026, 1:00 PM - 5:00 PM | WCC Halls A-C

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Sun., Nov. 15, 2026 4 - 5 p.m.

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Citation
*N. WANG[1], J. NIE[2], W. LU[2], R. LIU[2], J. XU[2], P. YUAN[2]; [1]institute for translational brain research, Fudan university, shanghai, China; [2]Fudan Univ., Shanghai, China. Physical touch activates hypothalamus for stress resilience by orchestrating dopamine-acetylcholine signaling. Program No. LBP010.05. 2026 Neuroscience Meeting Planner. Washington, D.C. : Society for Neuroscience, 2026. Online.

Authors
*N. WANG[1], J. NIE[2], W. LU[2], R. LIU[2], J. XU[2], P. YUAN[2];
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Disclosures
N. Wang: None. J. Nie: None. W. Lu: None. R. Liu: None. J. Xu: None. P. Yuan: None.

Abstract
Introduction
Physical touch is a potent emotional modulator in humans and animals, and touch-based therapy or grooming relieves anxiety. However, how somatosensory information is translated into stress-buffering signals remains unknown.
Methods
Using customized head hoods in mice to isolate grooming-associated touch from behavior execution, we combined behavioral assays, serum stress-hormone measurements, hybridization in situ, in vivo recording, anterograde tracing, fiber photometry, opto/chemogenetics, and functional ultrasound imaging under multi-modal stress to dissect neural mechanisms of stress processing mediated by physical touch.Sample sizes ranged from 6-15 mice per group. Experiments were replicated across at least two cohorts. Investigators were blinded to group allocation during behavioral scoring and data analysis. Appropriate controls included sham-grooming, vehicle injection, and GFP-only viral controls.
Results
Grooming-related touch produced stress-relieving effects across sexes and stress models. Touch signals from trigeminal and dorsal root ganglia converge in the posterior nucleus of the hypothalamus (PHN) via Sp5c/spinal cord relay. Grooming activated GABAergic PHN neurons (PHN^{vGat}), which activated ventral tegmental area (VTA) dopaminergic neurons, increasing nucleus accumbens (NAc) dopamine (DA), and inhibited basal forebrain cholinergic neurons (MS/vDB^{ChAT}), suppressing hippocampal acetylcholine (ACh) through nicotinic receptors. Modulating each junction of the PHN^{vGat}-MS/vDB-hippocampus or PHN^{vGat}-VTA-NAc pathway enhanced or blocked touch-induced stress relief. Chronic blockage of grooming increased vulnerability to subthreshold stress and induced aberrant changes in PHN-embedded functional connectivity, while chemogenetic activation or silencing of the PHN^{vGat}-MS/vDB^{ChAT}-hippocampus circuit promoted resilience or susceptibility, respectively. Together, these findings demonstrate that PHN^{vGat} neurons coordinate dopaminergic-cholinergic signaling to mediate physical touch-induced stress resilience.
Discussion
PHN^{vGat} neurons act as a touch-sensitive hub coordinating DA and ACh for stress coping, with serotonin and oxytocin likely acting in concert. This circuit provides a framework for the emotional benefits of clinical touch interventions, though targeting it therapeutically requires further validation and safer, circuit-specific tools.

NEUROSCIENCE 2026

(https://www.abstractsonline.com/pp8/#!/21503)

Session PSTR133 - Study of the SCI Lesion Environment , Stem Cell, and Scaffold Interventions

Add to Itinerary

PSTR133.03 / X1 - Recapitulating developmental tip-cell-guided sprouting promotes functional vascular regeneration after spinal cord injury

November 16, 2026, 8:00 AM - 12:00 PM | WCC Halls A-C

Presenter at Poster
Mon., Nov. 16, 2026 10 - 11 a.m.

Session Types
Poster

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Citation
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Authors
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Disclosures
S. Yu: None. J. Xu: None. Z. Li: None. Y. Li: None.

Abstract
Functional vascular regeneration remains limited after spinal cord injury (SCI), but the basis of this failure remains unclear. We hypothesized that vascular repair after SCI fails because it does not reactivate developmental angiogenic programs. During embryonic spinal cord development, vascular networks are established through tip-cell-guided sprouting angiogenesis. In contrast, adult SCI lesions contained enlarged, disorganized, and poorly perfused vessels with minimal sprouting activity, indicating pathological vascular remodeling rather than regenerative angiogenesis. To determine whether developmental vascular programs can be re-engaged after injury, we transplanted embryonic spinal neural tissue into injured adult or postnatal day 10 (P10) mouse spinal cord. Vascular architecture, hemodynamics, ultrastructure, and spatial molecular organization were examined using whole-mount imaging, functional ultrasound localization microscopy (fULM), two-photon imaging, transmission electron microscopy (TEM), lineage tracing, and spatial transcriptomics. Analyses were performed in n = 3-5 mice per group across independent cohorts, with blinded quantification. Embryonic grafts promoted host-vessel ingrowth, increased endothelial tip-cell formation, and restored endothelial-pericyte organization. In P10 hosts, vascular regeneration extended throughout the lesion and rebuilt integrated microvascular networks. In adult hosts, recovery remained spatially restricted, with improved vascular remodeling in graft centers but incomplete integration at graft-host boundaries. fULM and two-photon imaging demonstrated restoration of effective perfusion following grafting, whereas injury-only lesions exhibited flow stasis and impaired hemodynamics. TEM further revealed recovery of mature vascular ultrastructure. Lineage tracing showed that regenerated vessels were derived predominantly from host cells, indicating that embryonic grafts act primarily as organizers of vascular repair rather than direct vascular donors. Spatial transcriptomic analysis identified a pro-angiogenic microglial population enriched at graft-host interfaces. Microglial depletion impaired boundary vascular remodeling, whereas microglial supplementation improved vascular integration, indicating that host microglia actively support regenerative vascular repair. Together, these findings demonstrate that functional vascular regeneration after SCI requires re-engagement of developmental tip-cell-guided angiogenesis and identify host microglia as key regulators of graft-host vascular integration.

Session PSTR184 - Visual Motion

Add to Itinerary

PSTR184.06 / AA7 - Measuring Hemodynamic Modulation to Optic Flow in Macaque Extrastriate Visual Cortex using functional Ultrasound Imaging (fUSI)

November 16, 2026, 1:00 PM - 5:00 PM | WCC Halls A-C

Presenter at Poster
Mon., Nov. 16, 2026 2 - 3 p.m.

Session Types
Poster

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National Science and Technology Innovation 2030 Major Program (2022ZD0205000)

Citation
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Authors
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[1]Syst. neuroscience, Ctr. for Excellence in Brain Sci. and Intelligence Technology, Chinese Acad. of Sci., Shanghai, China; [2]Univ. of Chinese Acad. of Sci., Beijing, China

Disclosures
Q. Luo: None. Y. Gu: None.

Abstract
Self-motion is a crucial ability for individuals to interact wither environment, which is a process involving multiple sensory modalities including vestibular, visual, and proprioceptive (Mao & Gu 2025, Nature Reviews Neuroscience). Numerous studies have indicated that these self-motion signals are prevalently existing in neocortex, yet their properties and functions have not been well identified, partially due to limitations in each respective techniques employed in previous studies. Here we adopted functional ultrasound imaging (fUSI), a minimally invasive technique with a number of merits including high spatiotemporal resolution, high signal sensitivity, and large spatial coverage, to measure sensory hemodynamic signals in primates under self-motion condition. In our previous work, we have successfully measured vestibular-related signals during physical self-motion using fUSI in macaques (Liu et al., 2025, PNAS), validating its feasibility. In our current study, we focused on measuring the hemodynamics modulation to optic flow by imaging parietal cortex. The fUSI successfully captured hemodynamics modulation to optic flow in a number of areas in the parietal cortex including MST, VIP, LIP. In particular, across the spatial domain, fine heading directions could be successfully decoded on a trial by trial basis using fUSI data. A reference eccentricity dependent effect on heading discrimination threshold was also observed particularly in area MST, matching previous electrophysiological data. Across the temporal domain, different motion velocity profiles could also be decoded based on a single trial level. To our knowledge, such a decoding accuracy based on the fUSI data in the spatial and temporal domain are significantly better than those in fMRI. Thus, our findings suggest that fUSI holds a promising tool for studying the spatiotemporal dynamics of sensory signals, as well as their cognitive process such as perceptual decision making.

NEUROSCIENCE 2026

(https://www.abstractsonline.com/pp8/#!/21503)

Session PSTR207 - Computational Methods for Experimental Neuroscience

Add to Itinerary

PSTR207.19 / MM5 - A Bayesian framework for efficient low-intensity focused ultrasound parameter mapping

November 16, 2026, 1:00 PM - 5:00 PM | WCC Halls A-C

Presenter at Poster
Mon., Nov. 16, 2026 3 - 4 p.m.

Session Types
Poster

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Brain and Behavior Research Foundation Young Investigator Award (to AB)

Citation
*A. BOSCUTTI[1], V. GRASSO[2], T. DI IANNI[3]; [1]Univ. of California, San Francisco, San Francisco, CA; [2]Univ. of California San Francisco, San Francisco, CA; [3]Univ. of California San Francisco, San Francicso, CA. A Bayesian framework for efficient low-intensity focused ultrasound parameter mapping. Program No. PSTR207.19. 2026 Neuroscience Meeting Planner. Washington, D.C. : Society for Neuroscience, 2026. Online.

Authors
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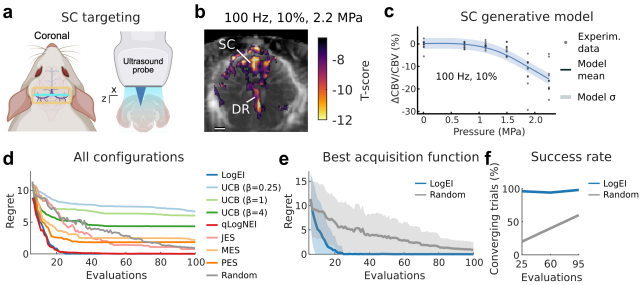
Disclosures
A. Boscutti: None. V. Grasso: None. T. Di Ianni: None.

Abstract
Low-intensity focused ultrasound (LIFU) is an emerging non-invasive neuromodulation technique whose potential is currently limited by a poorly understood parameter space. Conventional parameter mapping methods rely on grid searches, which are particularly inefficient with large parameter spaces, as in LIFU neuromodulation. Here we developed and validated a Bayesian-optimization (BO) approach for efficient, data-driven mapping of LIFU stimulation parameters. In BO, a Gaussian-process surrogate of the stimulation-response function is iteratively refined, and an acquisition function selects the next parameter set. To validate our method, we built two virtual environments based on real-world LIFU stimulation experiments in rats. The first environment was created from functional ultrasound imaging recordings during LIFU stimulation of the superior colliculus (SC) (***a-b***) and had a monotonic landscape with a boundary optimum (***c***). The second environment was based on behavioral readouts recorded during LIFU stimulation of the centromedial thalamus (CMT) and had a non-monotonic landscape with a local optimum. In each configuration, we ran 50 independent BO trials of 100 evaluations under realistic noise levels (1- and 2-fold the estimated experimental noise) and benchmarked the BO against conventional random and grid searches.Comparing eight acquisition functions (***d***), log expected improvement (LogEI) converged most reliably and rapidly (***e***), reaching the optimum in 96% of SC trials within 25 evaluations (***f***) and outperforming the random search ($P < 0.001$). LogEI also outperformed the random search with 2-fold the experimental noise ($P < 0.001$), demonstrating robustness to the variability expected in live experiments. Smaller initialization budgets were most efficient ($P < 0.001$). In the CMT environment, the BO approach outperformed the grid search ($P < 0.001$) and correctly selected the target region. Together, our results support BO as a data-driven and efficient approach for LIFU parameter mapping under realistic experimental conditions.



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NEUROSCIENCE 2026

(https://www.abstractsonline.com/pp8/#!/21503)

Add to Itinerary

Session PSTR184 - Visual Motion

PSTR184.08 / AA9 - Reliability and electrophysiological correspondence of functional ultrasound imaging in macaque MT/MST

November 16, 2026, 1:00 PM - 5:00 PM | WCC Halls A-C

Presenter at Poster
Mon., Nov. 16, 2026 4 - 5 p.m.

Session Types
Poster

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Citation
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Disclosures
E. Rudolph: None. S. Hwang: None. H. Ramezanpour: None. K. Kar: None.

Abstract
Functional ultrasound imaging (fUS) enables high-resolution mapping of stimulus-evoked changes in cerebral blood volume across mesoscopic fields of view in awake, behaving animals. However, for systems neuroscience applications, it remains important to establish what information fUS responses capture, how reliable these responses are across repeated measurements, and how closely they relate to local neuronal activity measured with electrophysiology. Here, we addressed these questions in macaque area MT/MST, a well-characterized dorsal-stream region with robust motion sensitivity. Awake macaque monkeys (n=2) viewed visual motion stimuli that parametrically varied motion evidence while we acquired fUS signals from cortical regions encompassing MT/MST using an Iconeus One system (Iconeus, Paris, France). We quantified stimulus-evoked fUS responses and assessed reliability across repeated stimulus presentations and imaging sessions. Ultrafast plane-wave imaging was performed, and the custom imaging sequence and real-time power Doppler reconstruction were executed using dedicated acquisition software (IcoScan, Iconeus, Paris, France), with an effective functional frame rate of 0.4 sec per frame. To directly evaluate the relationship between fUS signals and local neuronal activity, we also performed single-unit recordings from the same region. This allowed us to compare response functions derived from fUS pixels with neurometric functions derived from neuronal responses. We found that fUS responses in MT/MST were spatially clustered and reliably modulated by visual motion stimuli. Pixel-wise response functions showed graded changes with stimulus strength and were reproducible across measurements. Critically, fUS-derived response functions showed systematic correspondence with neuronal neurometric functions from the same cortical region, indicating that fUS preserves information about local neuronal sensitivity despite measuring a hemodynamic signal at a mesoscopic scale. These results suggest that fUS can provide reliable measurements of stimulus-dependent response structure in macaque MT/MST and recover response profiles related to electrophysiological activity. Taken together, this work evaluates the reliability and electrophysiological correspondence of fUS responses in a well-characterized visual area, clarifying the scale and type of information available from fUS measurements. We also developed fUS-studio, a freely available software environment for visualizing fUS data, generating stimulus-aligned response maps, extracting ROI signals, and comparing voxel-wise responses across conditions.

NEUROSCIENCE 2026

(https://www.abstractsonline.com/pp8/#!/21503)

Session PSTR226 - Pain: Spinal Circuits

Add to Itinerary

PSTR226.26 / AA8 - Neuromodulatory effects of invasive and non-invasive stimulation on spinal cord hemodynamics in failed back surgery syndrome using functional ultrasound imaging

November 17, 2026, 8:00 AM - 12:00 PM | WCC Halls A-C

Presenter at Poster
Tues., Nov. 17, 2026 9 - 10 a.m.

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Poster

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*H. ZAREIAN[1], K. A. AGYEMAN[2], D. J. LEE[3], C. LIU[4], V. N. CHRISTOPOULOS[5]; [1]Biomed. Engin., Univ. of Southern California (USC), Los Angeles, CA; [2]Biomed. Engin., [3]Neurolog. Surgery, [5]Bioengineering, [4]USC, Los Angeles, CA. Neuromodulatory effects of invasive and non-invasive stimulation on spinal cord hemodynamics in failed back surgery syndrome using functional ultrasound imaging. Program No. PSTR226.26. 2026 Neuroscience Meeting Planner. Washington, D.C. : Society for Neuroscience, 2026. Online.

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Disclosures
H. Zareian: None. K.A. Agyeman: None. D.J. Lee: None. C. Liu: None. V.N. Christopoulos: None.

Abstract
Chronic low back pain affects approximately 619 million people worldwide and is the leading cause of years lived with disability. A subset of spinal surgery patients develop failed back surgery syndrome (FBSS), persistent pain affecting up to 50%, frequently refractory to both pharmacological and surgical management, leaving spinal cord stimulation (eSCS) as a primary neuromodulatory option. Yet its efficacy remains inconsistent, primarily due to limited understanding of how stimulation modulates spinal neurodynamics. Its invasiveness further motivates the search for non-invasive alternatives such as peroneal nerve stimulation (PNS), whose effect on spinal cord hemodynamics remains unknown.We used functional ultrasound imaging (fUSI) to track spinal hemodynamics as an indirect readout of neural activity, acquiring power Doppler (pD) recordings from FBSS patients (N=6) at T10 via laminectomy under general anesthesia. In each patient, eSCS and PNS were performed in one session with an identical imaging window. For eSCS, we delivered five 30s ON/OFF cycles (40 Hz, 250 μs) in bilateral and unilateral configurations. For PNS, we applied 3 cycles of 2-min ON/1-min OFF in left, right, and bilateral configurations. Responses were quantified with event-related averaging (ERA) and statistical parametric maps (SPMs).In a representative patient, eSCS evoked focal activation in the dorsal spinal cord across all laterality configurations, with spatially distinct increases and decreases in pD signal and clear biphasic ON/OFF dynamics. Laterality modulated response amplitude more than spatial distribution, with right unilateral stimulation evoking the largest response. PNS independently evoked measurable dorsal hemodynamic responses in the same patient, with laterality-dependent differences across left and right configurations. These findings demonstrate that both invasive eSCS and non-invasive PNS evoke detectable spinal cord hemodynamic responses, with laterality-dependent modulation, motivating further investigation of non-invasive spinal neuromodulation.

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NEUROSCIENCE 2026

(https://www.abstractsonline.com/pp8/#!/21503)

Session LBP048 - B.07. Network Interactions

Add to Itinerary

LBP048.06 / C9 - A high-order thalamocortical circuit couples affective and motor dysfunction through frequency-specific synchrony

November 17, 2026, 8:00 AM - 12:00 PM | WCC Halls A-C

Presenter at Poster
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S. CHENG[1], Z. PANG[2], Y. XIAO[1], Q. LI[1], *C. JI[1], X. LIU[3], B. WANG[1], Z. GAO[1]; [1]Shanghai Sixth People's Hosp. Affiliated to Shanghai Jiao Tong Univ. Sch. of Med., Shanghai, China; [2]Dept. of Neurol. & Inst. of Neurology, Ruijin Hospital, Shanghai Jiao Tong Univ. Sch. of Med., Shanghai, China; [3]Yuanshen Rehabil. Institute, Shanghai Jiao Tong Univ. Sch. of Med., Shanghai, China. A high-order thalamocortical circuit couples affective and motor dysfunction through frequency-specific synchrony. Program No. LBP048.06. 2026 Neuroscience Meeting Planner. Washington, D.C. :

Authors
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Disclosures
S. Cheng: None. Z. Pang: None. Y. Xiao: None. Q. Li: None. C. Ji: None. X. Liu: None. B. Wang: None. Z. Gao: None.

Abstract
Affective and motor dysfunction frequently coexist in depression and post-stroke neuropsychiatric conditions, yet the neural mechanism linking these two symptom domains remains unclear. In this study, we provide evidence that dysfunction of the high-order posterior thalamic nucleus (PO) contributes to both affective and motor abnormalities. In two etiologically distinct mouse models, photothrombotic stroke (PT) and chronic unpredictable mild stress (CUMS), co-occurring affective and motor deficits were accompanied by reduced behavior-related activity of PO excitatory neurons (n = 12). We further established that bilateral inhibition of PO in control mice was sufficient to induce both deficits, whereas activation of PO significantly improved affective and motor performance in PT (n = 6) and CUMS (n = 6) mice. Building on these findings, functional ultrasound imaging revealed a convergent reduction in S1 responsiveness to PO activation, indicating impaired communication between PO and primary somatosensory cortex (S1) (n = 6). Selective inhibition of the PO-S1 projection reproduced concurrent affective and motor deficits in control mice (n = 6), while activation of this pathway ameliorated both phenotypes in disease models, identifying PO-S1 as a shared thalamocortical substrate. Importantly, electrophysiological recordings showed that dysfunction within this common pathway was organized in a frequency-specific manner: reduced alpha-band PO-S1 synchrony was associated with affective abnormalities, whereas reduced beta-band synchrony was associated with motor impairment (n = 6). This spectral segregation was paralleled by downstream functional specialization, as primary motor cortex (M1) inhibition selectively abolished the motor benefit induced by PO-S1 activation (n = 6), whereas anterior cingulate cortex (ACC) inhibition selectively attenuated its affective benefit (n = 6). Overall, our findings reveal a hierarchical organization in which PO-S1 dysfunction provides a shared circuit basis for affective-motor comorbidity, while frequency-specific synchrony and downstream cortical pathways distinguish affective from motor components. These results provide a circuit-level framework for understanding multidomain dysfunction and suggest the PO-S1 axis as a potential target for coordinated neuromodulation.

NEUROSCIENCE 2026

(https://www.abstractsonline.com/pp8/#!/21503)

Session PSTR295 - Ultrasound Neuromodulation

Add to Itinerary

PSTR295.01 / MM29 - Bayesian-enhanced closed-loop optimization of ultrasound protocols for targeted and precise neuromodulation

November 17, 2026, 1:00 PM - 5:00 PM | WCC Halls A-C

Presenter at Poster
Tues., Nov. 17, 2026 1 - 2 p.m.

Session Types
Poster

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UCSF Catalyst Program and UCSF Weill Institute for Neurosciences

Citation
A. BOSCUTTI[1], V. GRASSO[2], *T. DI IANNI[3];
[1]Univ. of California, San Francisco, San Francisco, CA; [2]Univ. of California San Francisco, San Francisco, CA; [3]Psychiatry and Behavioral Sci., Univ. of California San Francisco, San Francicso, CA. Bayesian-enhanced closed-loop optimization of ultrasound protocols for targeted and precise neuromodulation. Program No. PSTR295.01. 2026 Neuroscience Meeting Planner. Washington, D.C. : Society for Neuroscience, 2026. Online.

Authors
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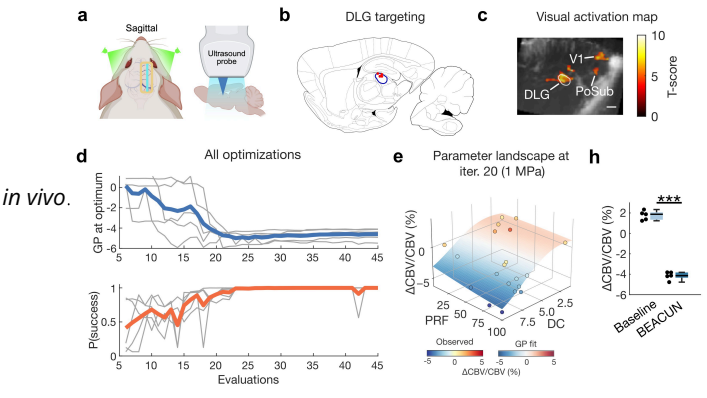
Disclosures
A. Boscutti: None. V. Grasso: None. T. Di Ianni: None.

Abstract
Low-intensity focused ultrasound (LIFU) is an emerging noninvasive neuromodulation technique that combines high spatiotemporal resolution with the ability to target deep brain structures. Despite its promise, the clinical efficacy of LIFU neuromodulation is challenged by a poorly understood parameter space and by high intra- and inter-subject response variability. To address these challenges, here we developed and validated *in vivo* a platform for Bayesian-enhanced adaptive control of ultrasound neuromodulation (BEACUN). BEACUN enables efficient closed-loop parameter mapping using a limited number of stimulation-response evaluations.To validate the BEACUN approach for effective LIFU protocol optimization, we combined LIFU with functional ultrasound imaging (fUSI). After each LIFU stimulation, the evoked cerebral blood volume (CBV) signal at the target was quantified online and used to update a Gaussian-process surrogate of the stimulation-response function. The next stimulation parameters were then selected by the BEACUN acquisition function and updated at runtime in the fUSI-LIFU platform. We evaluated BEACUN in two inhibitory LIFU applications: one targeting the rat superior colliculus (SC; N = 5 rats), and a visual-evoked-response paradigm at the dorsal lateral geniculate nucleus (DLG; N = 5 rats) (**a-c**). In both experiments, pressure, pulse repetition frequency, and duty cycle were treated as continuous parameters (**e**). To enable fully automated optimization, we equipped BEACUN with a stopping criterion that halts the loop once a candidate point is deemed optimal.At the SC, BEACUN outperformed a real-world random search (P < 0.01; Hedge's g = -4.24) and produced a CBV signal reduction of -7.3% ± 1.19% (median ± IQR). At the DLG, BEACUN consistently suppressed the visual-evoked response (-5.7% ± 1% CBV reduction, P < 0.001, Hedge's g = -12.68) (**h**), and the stopping criterion halted the optimization after 23 ± 3.67 evaluations (**d**). These results establish BEACUN as an end-to-end closed-loop framework for data-driven, efficient LIFU parameter optimization *in vivo*.



NEUROSCIENCE 2026

(https://www.abstractsonline.com/pp8/#!/21503)

Add to Itinerary

Session PSTR253 - Autism: Synaptic and Cellular Mechanisms

PSTR253.18 / F7 - Socially evoked prefrontal hyperexcitation in Shank3B mutant mice reveals ASD-relevant state-dependent circuit dysfunction

November 17, 2026, 1:00 PM - 5:00 PM | WCC Halls A-C

Presenter at Poster
Tues., Nov. 17, 2026 2 - 3 p.m.

Session Types
Poster

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Tan-Yang Collective

Grant Support
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Citation
*X. JIN[1], Z. ZHOU[2], M. ZENG[2], Y. DE ANDA ACOSTA[2], Y. WANG[2], R. FU[2], W. MENEGAS[1], C. ZHANG[1], D. MCCORMACK[1], G. FENG[1];
[1]MIT, Cambridge, MA; [2]Mcgovern Inst. for Brain Res. (MIT), Cambridge, MA. Socially evoked prefrontal hyperexcitation in Shank3B mutant mice reveals ASD-relevant state-dependent circuit dysfunction. Program No. PSTR253.18. 2026 Neuroscience Meeting Planner. Washington, D.C. : Society for Neuroscience, 2026. Online.

Authors
*X. JIN[1], Z. ZHOU[2], M. ZENG[2], Y. DE ANDA ACOSTA[2], Y. WANG[2], R. FU[2], W. MENEGAS[1], C. ZHANG[1], D. MCCORMACK[1], G. FENG[1];
[1]MIT, Cambridge, MA; [2]Mcgovern Inst. for Brain Res. (MIT), Cambridge, MA

Disclosures
X. Jin: None. Z. Zhou: None. M. Zeng: None. Y. De anda Acosta: None. Y. Wang: None. R. Fu: None. W. Menegas: None. C. Zhang: None. D. McCormack: None. G. Feng: None.

Abstract
Social interaction is essential for adaptive behavior, and altered social communication and interaction are core features of autism spectrum disorder (ASD). SHANK3 encodes a postsynaptic scaffolding protein strongly linked to Phelan-McDermid syndrome and ASD-related social phenotypes. Shank3B mutant mice recapitulate autism-relevant behavioral abnormalities, including impaired social interaction and repetitive grooming, and have been widely used to study how SHANK3 loss alters neural function. Prior studies have identified synaptic, striatal, and prefrontal abnormalities in Shank3 mutant mice, but how neural activity dynamics change across behavioral states, particularly during active social experience, remains less well defined. To address this gap, we examined state-dependent neural activity in male Shank3B mutant and wild-type (WT) mice using functional ultrasound (fUS) and fiber photometry, with fUS providing a large-scale measure of cortical activity and calcium recordings resolving excitatory neuronal activity in orbitofrontal subregions. fUS recordings revealed state-dependent cortical abnormalities in Shank3B mutants, including widespread cortical hypoconnectivity under anesthetized resting-state conditions and large-scale cortical hyperactivation during awake social interaction. To determine whether this social-evoked cortical hyperactivation was associated with increased excitatory neuronal activity in orbitofrontal cortex, we measured calcium responses from CaMKIIα-GCaMP8m-expressing neurons in the lateral orbitofrontal cortex (LOFC) using fiber photometry during freely moving social interaction. Compared with WT controls, Shank3B mutant mice showed elevated social-evoked LOFC calcium responses, indicating increased excitatory neuronal activity in this orbitofrontal region during social experience. In contrast, medial orbitofrontal cortex (mOFC) recordings did not show a comparable genotype-dependent increase, suggesting that social-evoked hyperexcitation is regionally specific rather than uniform across orbitofrontal cortex. Together, these findings indicate that Shank3B loss produces state-dependent cortical dysfunction and identify social-evoked LOFC hyperexcitation as an ASD-relevant physiological phenotype in Shank3B mutant mice. More broadly, altered neural dynamics during active social experience may represent a physiological substrate for altered social processing in SHANK3-related neurodevelopmental disorders.

NEUROSCIENCE 2026

(https://www.abstractsonline.com/pp8/#!/21503)

Session PSTR295 - Ultrasound Neuromodulation

Add to Itinerary

PSTR295.02 / MM30 - Functional ultrasound imaging-guided low-intensity focused ultrasound neuromodulation in a model of focal epilepsy

November 17, 2026, 1:00 PM - 5:00 PM | WCC Halls A-C

Presenter at Poster
Tues., Nov. 17, 2026 2 - 3 p.m.

Session Types
Poster

Citation
*V. GRASSO[1], J. KUM[1], Y. CHEN[1], T. DI IANNI[2]; [1]Univ. of California San Francisco, San Francisco, CA; [2]Univ. of California San Francisco, San Francicso, CA. Functional ultrasound imaging-guided low-intensity focused ultrasound neuromodulation in a model of focal epilepsy. Program No. PSTR295.02. 2026 Neuroscience Meeting Planner. Washington, D.C. : Society for Neuroscience, 2026. Online.

Authors
*V. GRASSO[1], J. KUM[1], Y. CHEN[1], T. DI IANNI[2];
[1]Univ. of California San Francisco, San Francisco, CA; [2]Univ. of California San Francisco, San Francicso, CA

Disclosures
V. Grasso: None. J. Kum: None. Y. Chen: None. T. Di Ianni: None.

Abstract
Low-intensity focused ultrasound (LIFU) is a promising neuromodulation modality, but the parameters required to induce reliable and robust neuromodulatory effects remain poorly characterized. Here, we combined functional ultrasound imaging (fUSI) and LIFU to enable ultrasound-based monitoring and modulation of neural activity within the same experimental framework and applied this approach in a rat model of focal epilepsy.
We first mapped the LIFU parameter space during visual stimulation in rats to identify effective neuromodulation protocols. We varied the pulse repetition frequency (PRF), the duty cycle (DC), and the acoustic pressure while targeting the superior colliculus (SC). LIFU protocols using a PRF of 100 Hz, a DC of 10%, and peak-negative pressure greater than 1 MPa effectively suppressed visual-evoked responses in the SC.
We then applied the optimized LIFU stimulation protocol in a rat model of focal epilepsy. We performed intrahippocampal injections of 4-aminopyridine (4-AP) to induce epileptiform activity. LIFU stimulation of the hippocampus effectively reduced the frequency of ictal events in treated (n = 3) vs. control rats (n = 3), as measured by fUSI and concurrent EEG recordings.

NEUROSCIENCE 2026

(https://www.abstractsonline.com/pp8/#!/21503)

Session PSTR295 - Ultrasound Neuromodulation

Add to Itinerary

PSTR295.04 / MM32 - Contrast-Enhanced Ultrasound Neuromodulation: A Histological Safety Assessment in the Mouse Brain

November 17, 2026, 1:00 PM - 5:00 PM | WCC Halls A-C

Presenter at Poster
Tues., Nov. 17, 2026 4 - 5 p.m.

Session Types
Poster

Grant Support
Raynor Cerebellum Project

Citation
*M. GERLACH[1,2], R. M. JONES-SINNOTT[2], M. E. HEMELT[2], Y. DONG[2], O. V. FAVOROV[2], P. DAYTON[2], A. W. HANTMAN[3], G. PINTON[2]; [1]Emory Univ., Atlanta, GA; [2]Biomed. Engin., Univ. of North Carolina at Chapel Hill and North Carolina State Univ., Chapel Hill, NC; [3]Cell Biol. and Physiology, Neurosci. Ctr., Univ. of North Carolina at Chapel Hill, Raynor Cerebellum Project, Chapel Hill, NC. Contrast-Enhanced Ultrasound Neuromodulation: A Histological Safety Assessment in the Mouse Brain. Program No. PSTR295.04. 2026 Neuroscience Meeting Planner. Washington, D.C. : Society for Neuroscience, 2026. Online.

Authors
*M. GERLACH[1,2], R. M. JONES-SINNOTT[2], M. E. HEMELT[2], Y. DONG[2], O. V. FAVOROV[2], P. DAYTON[2], A. W. HANTMAN[3], G. PINTON[2];
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Disclosures
M. Gerlach: None. R.M. Jones-Sinnott: None. M.E. Hemelt: None. Y. Dong: None. O.V. Favorov: None. P. Dayton: None. A.W. Hantman: None. G. Pinton: None.

Abstract
Transcranial focused ultrasound (tFUS) is an emerging noninvasive neuromodulation technique capable of targeting deep brain structures with high spatial and temporal precision (100 µm, 1 ms). Combined with functional ultrasound imaging (fUSI) using circulating microbubble (MB) contrast agents, tFUS offers the potential for image-guided, closed-loop neuromodulation. However, because the biological effects of neuromodulation in the presence of MBs remain largely unknown, establishing the histological safety of contrast-enhanced tFUS is critical for broader application. Here, we assessed the histological effects of contrast-enhanced tFUS neuromodulation in awake mice across a range of free-field pressures, duty cycles (DC), and sonication durations (SD). Awake head-fixed mice received tFUS targeting the left primary motor cortex (M1; 1.77 mm lateral, 0.7 mm anterior to bregma) using a 1 MHz spherical transducer with an imaging aperture (Philips TIPS; PRF = 1000 Hz). Intravenous MBs were administered, and concurrent volumetric fUSI was performed using a 1024-channel Verasonics Vantage 3D system with a Vermon 32x32 matrix array (7.81 MHz, 500 volumes/s, 5-angle plane wave). Exposure conditions included free-field pressures of 180-300 kPa (40 kPa increments), DCs of 25-75% (pulse length 0.25-0.75 ms), and SDs between 4.5-54 s. Mice were euthanized 2 days after treatment. Brain sections (30 µm) were stained with hematoxylin and eosin (H&E) to assess structural damage and Fluoro-Jade C (FJC) to detect neuronal degeneration. Histological outcomes depended on the combination of pressure, DC, and SD. At 300 kPa and 72 stimulation cycles (1 s pulse train, 4 s inter-train interval (ITI) per cycle), damage occurred at 25% and 50% DC (corresponding SD = 18 s and 36 s, respectively). However, at 36 stimulation cycles, damage was only seen at 50% DC (SD = 18 s). At an intermediate exposure level (260 kPa, 75% DC, 36 stimulation cycles; SD = 27 s), injury occurred in 50% of mice, whereas no damage was detected at lower pressures or at 260 kPa with reduced DC. Comparison of histological stains revealed that FJC detected a greater extent of injury than H&E, identifying neuronal degeneration in regions with no H&E abnormalities. These findings indicate that MB-enhanced tFUS safety is governed by the combined effects of pressure, duty cycle, and sonication duration. Additionally, FJC is more sensitive than H&E for detecting subtle ultrasound-induced injury, supporting the need for complementary histological assessments. Overall, these results help define safer parameter spaces for MB-enhanced tFUS and support comprehensive histological evaluation of safety limits.

NEUROSCIENCE 2026

(https://www.abstractsonline.com/pp8/#!/21503)

Add to Itinerary

Session LBP065 - F.04. Voluntary Movements

LBP065.06 / B62 - Functional ultrasound imaging and analysis of an awake infant's brain activity during goal-directed reaching

November 17, 2026, 1:00 PM - 5:00 PM | WCC Halls A-C

Presenter at Poster
Tues., Nov. 17, 2026 4 - 5 p.m.

Session Types
Late-Breaking Poster

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Citation
*I. SAHIN[1], E. HAKOPIAN[3], A. STEPANIAN[2], S. ZHONG[4], H. F. ZAREIAN[4], M. ALANIZ[5], Y. HARRIS[5], C. LIU[6], S. SAKELLARIDI[7], E. KOKKONI[1], V. N. CHRISTOPOULOS[4]; [1]Bioengineering, [2]Neurosci. Grad. Program, Univ. of California, Riverside, Riverside, CA; [3]Univ. of California, Irvine, Burbank, CA; [4]Biomed. Engin., USC, Los Angeles, CA; [5]Pediatrics, Casa Colina Hosp. and Centers for Healthcare, Pomona, CA; [6]Neurorestoration Ctr. and Dept. of Neurolog. Surgery, Univ. of Southern California Keck Sch. of Med., Los Angeles, CA; [7]Reasearch Inst., Casa Colina Hosp., Pomona, CA. Functional ultrasound imaging and analysis of an awake infant's brain activity during goal-directed reaching. Program No. LBP065.06. 2026 Neuroscience Meeting Planner. Washington, D.C. : Society for Neuroscience, 2026. Online.

Authors
*I. SAHIN[1], E. HAKOPIAN[3], A. STEPANIAN[2], S. ZHONG[4], H. F. ZAREIAN[4], M. ALANIZ[5], Y. HARRIS[5], C. LIU[6], S. SAKELLARIDI[7], E. KOKKONI[1], V. N. CHRISTOPOULOS[4];
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Disclosures
I. Sahin: None. E. Hakopian: None. A. Stepanian: None. S. Zhong: None. H.F. Zareian: None. M. Alaniz: None. Y. Harris: None. C. Liu: None. S. Sakellaridi: None. E. Kokkoni: None. V.N. Christopoulos: None.

Abstract
Reaching is a key motor milestone that emerges and develops throughout the first year of life. Yet, most infant reaching studies rely primarily on behavioral observation and kinematics, providing limited insight into neural mechanisms. Existing functional neuroimaging faces limitations with awake infants due to motion artifacts. Functional ultrasound imaging (fUSI) is an emerging neuroimaging technology that measures cerebral blood volume (CBV) at high spatial and temporal resolution and is more tolerant to motion. Here, we present the preliminary analysis of fUSI in an awake infant while performing goal-directed reaching. An eight-month-old infant participated in a single experimental session structured into 2 minutes of resting state and then alternating blocks: 60 seconds of goal-directed reaching followed by 30 seconds of resting state. The infant was seated on a high chair with straps to ensure trunk stability. During resting state, the infant was presented with an age-appropriate video, and during the reaching task, objects were presented at the infant's body midline. Multi-view video recordings were collected to annotate events of interest, such as reach onset, reach offset, and no-reach epochs. A fUSI probe was placed on the anterior fontanelle using a custom-designed headset, aligned with the superior sagittal sinus, to collect functional neuroimaging data. Power Doppler (pD) images were obtained at 1.25 Hz using the Iconeus One scanner. Potential physiological, motion, and noise-related artifacts were addressed through the adoption of motion correction techniques and filtering algorithms. A total of 12 reaching events were analyzed using 20s epochs consisting of 10s before to 10s after reach onset. We computed the statistical parametric map (SPM) based on a two-sided Student's t-test with false discovery rate (FDR) correction comparing the pre- and post-reach periods. Additionally, we generated an event-related average (ERA) waveform of the normalized percent change in CBV relative to the reference activity (defined herein as the average signal during the 10s before reach onset) to elucidate the temporal patterns of hemodynamic changes during reaching. Preliminary analysis revealed that spatially distributed pixels exhibit significant increases and decreases in normalized pD signal following reach onset, implying temporally evolving hemodynamic changes during reaching. Ongoing efforts, including further analysis of the data from this infant and additional participants, aim to identify reach-associated hemodynamic changes in infants.

NEUROSCIENCE 2026

(https://www.abstractsonline.com/pp8/#!/21503)

Session PSTR297 - Animal Models of Autism

Add to Itinerary

PSTR297.03 / D14 - Resting-state functional ultrasound reveals spatially localized prefrontal network alterations in a maternal immune activation mouse model

November 18, 2026, 8:00 AM - 12:00 PM | WCC Halls A-C

Presenter at Poster
Weds., Nov. 18, 2026 10 - 11 a.m.

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Poster

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JST Grant JPMXS0450400422

Citation
*K. HIKISHIMA[1,2], H. MIZUMA[3,4,5], T. TSURUGIZAWA[1], K. KASAHARA[1], T. GOTO[1], R. HAYASHI[1], H. ONOE[6,7], N. MIYASAKA[8], K. YOSHINAKA[1], N. NITTA[1];
[1]Natl. Inst. of Advanced Industrial Sci. and Technol., Tsukuba/Ibaraki, Japan; [2]Okinawa Inst. of Sci. and Technol. Grad. Univ. (OIST), Onna-son/Okinawa, Japan; [3]Osaka Metropolitan Univ. Grad. Sch. of Med., Abeno-ku/Osaka, Japan; [4]Natl. Inst. for Quantum Sci. and Technol. (QST), Inage-ku/Chiba, Japan; [5]RIKEN Ctr. for Biosystems Dynamics Res., Kobe/Hyogo, Japan; [6]Kobe Gakuin Univ., Kobe/Hyogo, Japan; [7]Kyoto Univ. Grad. Sch. of Med., Sakyo-ku/Kyoto, Japan; [8]Inst. of Sci. Tokyo, Bunkyo-ku/Tokyo, Japan. Resting-state functional ultrasound reveals spatially localized prefrontal network alterations in a maternal immune activation mouse model. Program No. PSTR297.03. 2026 Neuroscience Meeting Planner. Washington, D.C. : Society for Neuroscience, 2026. Online.

Authors
*K. HIKISHIMA[1,2], H. MIZUMA[3,4,5], T. TSURUGIZAWA[1], K. KASAHARA[1], T. GOTO[1], R. HAYASHI[1], H. ONOE[6,7], N. MIYASAKA[8], K. YOSHINAKA[1], N. NITTA[1];
[1]Natl. Inst. of Advanced Industrial Sci. and Technol., Tsukuba/Ibaraki, Japan; [2]Okinawa Inst. of Sci. and Technol. Grad. Univ. (OIST), Onna-son/Okinawa, Japan; [3]Osaka Metropolitan Univ. Grad. Sch. of Med., Abeno-ku/Osaka, Japan; [4]Natl. Inst. for Quantum Sci. and Technol. (QST), Inage-ku/Chiba, Japan; [5]RIKEN Ctr. for Biosystems Dynamics Res., Kobe/Hyogo, Japan; [6]Kobe Gakuin Univ., Kobe/Hyogo, Japan; [7]Kyoto Univ. Grad. Sch. of Med., Sakyo-ku/Kyoto, Japan; [8]Inst. of Sci. Tokyo, Bunkyo-ku/Tokyo, Japan

Disclosures
K. Hikishima: None. H. Mizuma: None. T. Tsurugizawa: None. K. Kasahara: None. T. Goto: None. R. Hayashi: None. H. Onoe: None. N. Miyasaka: None. K. Yoshinaka: None. N. Nitta: None.

Abstract
Functional ultrasound imaging (fUSI) enables measurement of brain-wide hemodynamic fluctuations with high spatiotemporal resolution and has recently been used to map resting-state networks (RSNs) in awake rodents. However, its ability to detect disease-related alterations in functional brain networks remains unclear. Here, we investigated whether resting-state fUSI can identify spatially localized alterations in functional networks in a mouse model of neurodevelopmental disorders.. Maternal immune activation (MIA) mice exhibiting social interaction deficits and control mice were imaged under awake conditions. Relative cerebral blood volume (rCBV) images were acquired at 10 Hz in awake mice during the resting state using fUSI and processed using spatial masking to exclude non-neural regions (k-means clustering), spatial normalization to a stereotactic brain template, bandpass filtering (0.01-0.1 Hz), and independent component analysis to extract RSNs. Multiple RSNs were identified, including medial prefrontal, sensorimotor, and hippocampal networks. Among these, the medial prefrontal cortex (mPFC) network exhibited a significant increase in spatial extent in MIA mice compared with controls. Notably, voxel-wise analysis revealed that enhanced functional coupling was not uniformly distributed within the network but was spatially localized to the prelimbic cortex and adjacent cingulate and infralimbic regions. These localized alterations suggest that MIA-related effects on functional networks may manifest as subregional differences in coupling within the prefrontal cortex, rather than as uniform changes across networks. Furthermore, increased mPFC coupling showed a trend toward association with impaired social interaction behavior. Our findings demonstrate that resting-state fUSI enables the detection of region-specific functional connectivity abnormalities in awake mouse models of neurodevelopmental disorders. This approach may provide a useful framework for mapping region-specific network dysfunction associated with neurodevelopmental phenotypes.

NEUROSCIENCE 2026

(https://www.abstractsonline.com/pp8/#!/21503)

Session PSTR298 - Schizophrenia Genetics, Pathophysiology, and Mechanisms

Add to Itinerary

PSTR298.08 / H5 - Tracking the evolving Brain-Wide Functional Connectome in psychiatric risk mouse models

November 18, 2026, 8:00 AM - 12:00 PM | WCC Halls A-C

Presenter at Poster
Weds., Nov. 18, 2026 11 a.m. - 12 p.m.

Session Types
Poster

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Stanley Family Foundation

Citation
*N. WANG[1], S. CHOI[1], X. LIU[2], Q. LIU[1], C. WU[1], S. LEE[1], X. YU[2], Z. FU[1]; [1]Broad Inst. of MIT and Harvard, Cambridge, MA; [2]Massachusetts Gen. Hosp., malden, MA. Tracking the evolving Brain-Wide Functional Connectome in psychiatric risk mouse models. Program No. PSTR298.08. 2026 Neuroscience Meeting Planner. Washington, D.C. : Society for Neuroscience, 2026. Online.

Authors
*N. WANG[1], S. CHOI[1], X. LIU[2], Q. LIU[1], C. WU[1], S. LEE[1], X. YU[2], Z. FU[1]; [1]Broad Inst. of MIT and Harvard, Cambridge, MA; [2]Massachusetts Gen. Hosp., malden, MA

Disclosures
N. Wang: None. S. Choi: None. X. Liu: None. Q. Liu: None. C. Wu: None. S. Lee: None. X. Yu: None. Z. Fu: None.

Abstract
Psychiatric disorders, including schizophrenia and bipolar disorder, are increasingly understood as disorders of distributed brain networks, characterized by highly complex symptoms that evolve dynamically over time. Although large-scale exome sequencing initiatives (SCHEMA/BipEx) have identified rare, high-risk loss-of-function variants, how these genetic liabilities disrupt brain-wide network trajectories remains unknown. Given the progressive nature of these disorders, systematically mapping network architecture across development is crucial for uncovering how early circuit abnormalities mature into manifest pathophysiology. To address this, we established a whole-brain functional connectivity framework using functional ultrasound imaging (fUS) for high-throughput, longitudinal resting-state connectomics across 10 SCHEMA/BipEx mutant mouse lines from Stanley Center.We acquired longitudinal resting-state fUS datasets from each line at 1, 2, and 3 months of age. The resulting dataset enabled 16 distinct genotype comparisons, including sex-stratified analyses. Region of Interest (ROI)-to-ROI Pearson correlation matrices were constructed to quantify genotype-dependent differences in functional connectivity. Across models, alterations in resting-state functional connectivity were developmentally dynamic and gene-dependent: some lines showed little divergence at 1 month but pronounced network reorganization by 2-3 months, whereas other lines manifested earlier aberrations and distinct, sex-dependent reversals in connectivity trends across age groups. Overall connectivity disruption progressively increased across development, peaking at 3 months. Despite the marked regional heterogeneity in susceptibility, vulnerable regions shared a non-linear longitudinal trajectory, characterized by the most significant alterations at 1 and 3 months, interspersed with a transient attenuation at 2 months. Specifically, the amygdala emerged as a prominent hub at 2 months, whereas the hippocampus showed the strongest convergence of network deficits by 3 months. Notably, the parietal cortex displayed sustained involvement across all developmental stages, while sensory cortical and amygdala engagement intensified later, indicating progressive recruitment of sensory-association and limbic circuitry.Together, these findings establish longitudinal fUS-based functional connectomics as a sensitive and scalable platform for mapping the systems-level trajectories of psychiatric risk genes and for screening candidate therapeutics designed to restore network balance.

NEUROSCIENCE 2026

(https://www.abstractsonline.com/pp8/#!/21503)

Add to Itinerary

Session LBP084 - I.06. Social Cognition

LBP084.09 / B67 - Reading the social brain with volumetric functional ultrasound imaging in behaving marmosets

November 18, 2026, 1:00 PM - 5:00 PM | WCC Halls A-C

Presenter at Poster
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Late-Breaking Poster

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Simons Center for the Social Brain at MIT

Grant Support
Hock E. Tan and K. Lisa Yang Center for Autism Research

Citation
*C. ZHANG[1], T. YE[2], Y. CHEN[2], W. WONG[2], W. MENEGAS[2], G. LIBERTI[2], H. XU[2], B. ZHANG[2], Z. YANG[3], S. S. GHOSH[2], A. JASANOFF[2], R. DESIMONE[2], G. FENG[2]; [2]McGovern Inst. for Brain Res. at MIT, [1]MIT, Cambridge, MA; [3]Broad Inst., Cambridge, MA. Reading the social brain with volumetric functional ultrasound imaging in behaving marmosets. Program No. LBP084.09. 2026 Neuroscience Meeting Planner. Washington, D.C. : Society for Neuroscience, 2026. Online.

Authors
*C. ZHANG[1], T. YE[2], Y. CHEN[2], W. WONG[2], W. MENEGAS[2], G. LIBERTI[2], H. XU[2], B. ZHANG[2], Z. YANG[3], S. S. GHOSH[2], A. JASANOFF[2], R. DESIMONE[2], G. FENG[2]; [2]McGovern Inst. for Brain Res. at MIT, [1]MIT, Cambridge, MA; [3]Broad Inst., Cambridge, MA

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Abstract
The primate brain exhibits distinct structural and organizational features that support advanced sensory, motor, and social-cognitive functions. Although anatomical, genomic, and cellular differences between primate and rodent brains are well documented, how these differences shape functional brain dynamics during behavior remain poorly understood. The common marmoset (Callithrix jacchus) is an emerging nonhuman primate model because of its evolutionary proximity to humans, short reproductive cycle, and amenability to genetic manipulation. However, methods for measuring brain-wide activity in behaving marmosets remain limited by trade-offs among spatial coverage, temporal resolution, imaging depth, and long-term stability. Functional ultrasound imaging (fUSi) has recently emerged as a powerful modality for capturing brain-wide activity dynamics with high spatiotemporal resolution in behaving animals.

Here, we establish an integrated fUSi framework for awake, head-fixed marmosets encompassing chronic surgical preparation, behavioral integration, data acquisition, and analysis pipelines. We developed a large (15 × 15 mm) chronic cranial window using an acoustically transparent artificial skull implant and combined it with a customized row-column array probe to enable stable, long-term brain-wide imaging. We further generated a whole-brain vascular reference map from four adult marmosets to facilitate atlas registration and group-level alignment. As an example, application, we used a naturalistic live-social stimulus to characterize brain-wide neural dynamics across social conditions. We quantified task-evoked responses and peri-event activity across approximately 100 brain regions, revealing distinct patterns of regional and network-level activity during social interactions.

Together, these results establish a practical, generalizable platform for chronic, brain-wide fUSI in behaving marmosets, applicable to longitudinal phenotyping of transgenic disease models, brain-wide pharmacological testing, and cross-species comparison of functional networks under a single modality.

Session PSTR342 - Pre- and Perinatal Impacts on Neurodevelopment

Add to Itinerary

PSTR342.07 / F5 - In Utero Functional Ultrasound Imaging Reveals Brain Activity in Embryonic Mice and Fetal Non-Human Primates

November 18, 2026, 1:00 PM - 5:00 PM | WCC Halls A-C

Presenter at Poster
Weds., Nov. 18, 2026 3 - 4 p.m.

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Abstract
Investigating brain function during embryonic development has remained challenging due to limited access to the intact developing brain in vivo. Here, we establish functional ultrasound imaging (fUS) as a platform for monitoring brain activity during embryonic development in mice and fetal non-human primates.In mouse embryos, in utero fUS imaging was performed from embryonic day (E) 12.5 to E18.5. Following suppression of cardiac-related hemodynamic signals using frequency-domain deconvolution, spontaneous low-frequency fluctuations (<4 Hz) were consistently observed across forebrain, midbrain, and hindbrain regions. Cross-modal correspondence analyses using multi-electrode array recordings and wide-field calcium imaging at E18.5 revealed similar low-frequency temporal dynamics across modalities, supporting the ability of fUS to capture developmentally relevant functional activity patterns.To evaluate stimulus-associated responses, auditory stimulation (1, 10, and 16 kHz) was delivered to late-stage embryos. Sound presentation elicited localized cerebral blood volume responses in sensory-related brain regions, accompanied by corresponding calcium signal increases. Postnatal behavioral testing further demonstrated stimulus-associated motor responses following auditory stimulation. In addition, deep brain stimulation induced reproducible hemodynamic responses in targeted embryonic brain regions, demonstrating sensitivity to externally evoked neural activation.To assess translational feasibility, we extended fUS imaging to fetal cynomolgus macaques. In gestational day 85 fetuses, sound stimulation evoked localized hemodynamic responses in regions corresponding to immature sensory-related networks, providing a proof-of-principle demonstration of prenatal functional imaging in a non-human primate model.Together, these findings establish fUS as a non-invasive approach for investigating spontaneous and stimulus-associated brain activity during embryonic development across species. This framework provides new opportunities for studying functional brain maturation and may facilitate future investigations of neurodevelopmental disorders during early developmental stages.

Session PSTR345 - Seizure Networks, Circuit Dynamics, Detection, and Post-Seizure States

Add to Itinerary

PSTR345.19 / O3 - Low-mortality chronic epilepsy model using fractionated kainic acid dosing and seizure imaging with functional ultrasound

November 18, 2026, 1:00 PM - 5:00 PM | WCC Halls A-C

Presenter at Poster
Weds., Nov. 18, 2026 3 - 4 p.m.

Session Types
Poster

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Abstract
Chemically induced chronic epilepsy models mimic temporal lobe epilepsy (TLE) and are typically utilized in anticonvulsant drug research. The models are induced either by inducing an initial episode of prolonged continuous seizure (Status epilepticus) with a large dose of chemoconvulsant e.g. kainic acid (KA) or by repeated sub-convulsive stimulations (chemical kindling). The former induction method is faster than the latter but typically causes mortality already in the early phase before the TLE model has fully developed. This does not support 3Rs of test-animal usage. In this study we used fractionated KA dosing to reach status epilepticus to reduce the mortality of the model.
Two parallel cohorts of adult C57BL/6J male mice were studied. In the first cohort, a model of chronic epileptic activity was established by induction of status epilepticus with fractionated KA injections (10 mg/kg + 10 mg/kg + 5 mg/kg + 5 mg/kg, 30-min interval, i.p, total dose 30 mg/kg). The development of epileptic activity was confirmed by continuous 3-weeks EEG recording (cortical electrodes over the hippocampus). In the second cohort, epilepsy was induced by fractionated KA injections as established in the first cohort and functional ultrasound (fUS) imaging utilizing slow KA infusion challenge was performed in the chronic epileptic animals 4 weeks after the model induction. The fUS imaging was used to characterize the activation pattern induced by slow KA infusion under ketamine-medetomidine anesthesia (KA i.p. 10 mg/kg, 10 mL/kg over 30 min infusion). The 55-min fUS scan consisted of a 5-min baseline, and a 50-min follow-up of the response in relative cerebral blood volume (rCBV) during and after the 30-min infusion.
Induction of chronic epileptic activity with fractionated KA injections in mice was successful with 0% acute mortality, and spontaneous epileptiform activity, spiking and seizures manifesting in all animals. In chronic epileptic animals, fUS imaging was used to visualize hippocampal activation and spreading to the cortex and thalamus indicating epileptiform activation and seizure generalization during a slow infusion of KA challenge. Fractionated KA dosing reduces mortality in the induction of status epilepticus. Furthermore, the fUS platform with sub-seizure KA challenge allows testing of novel seizure threshold modulating treatments.

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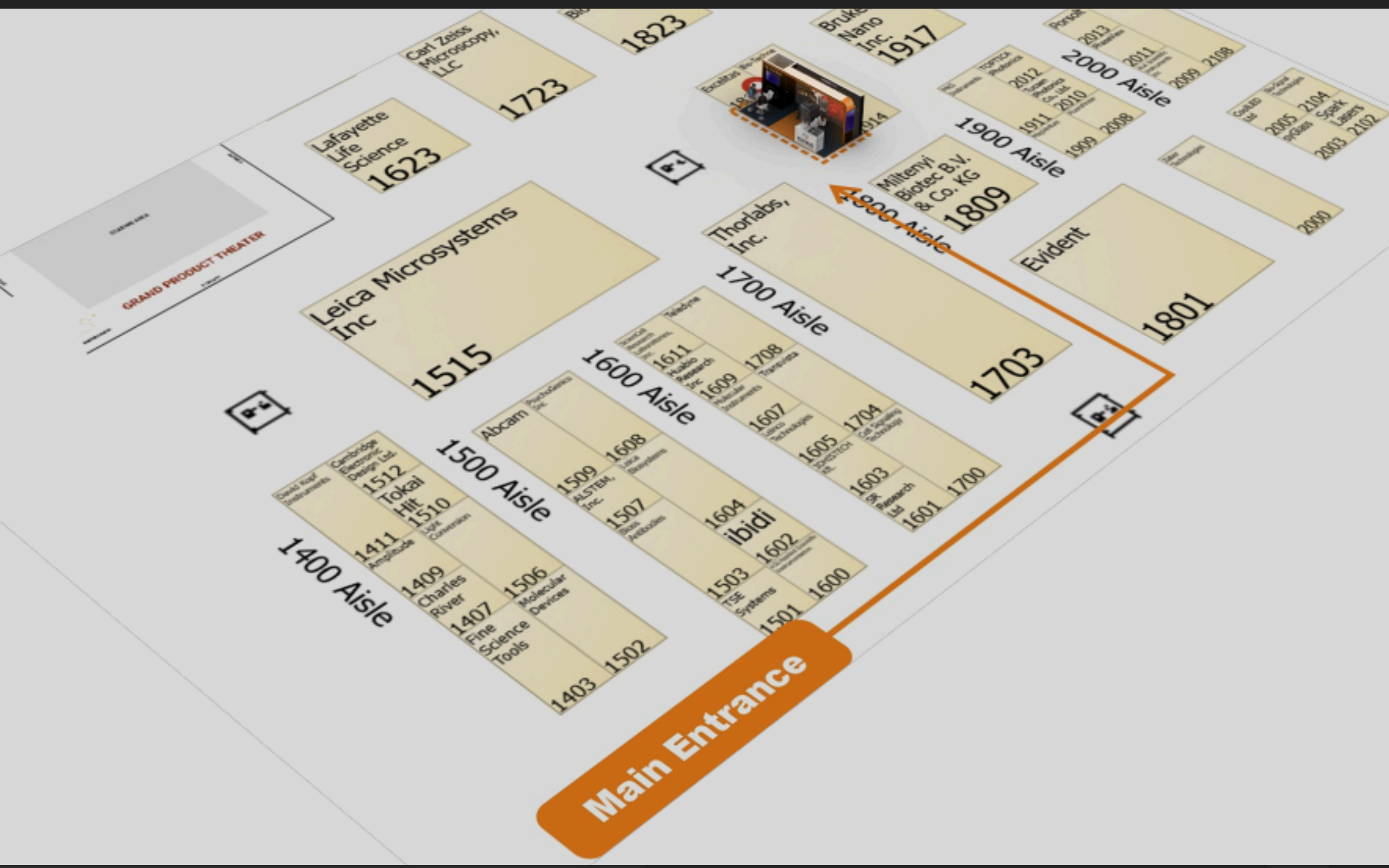

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