The 4th Taiwan-Japan

Neuroscience

Exchange Conference

- Islands of Mountain & Ocean -

August 24-25, 2026

Institute of Biomedical Sciences, Academia Sinica

Taipei, Taiwan

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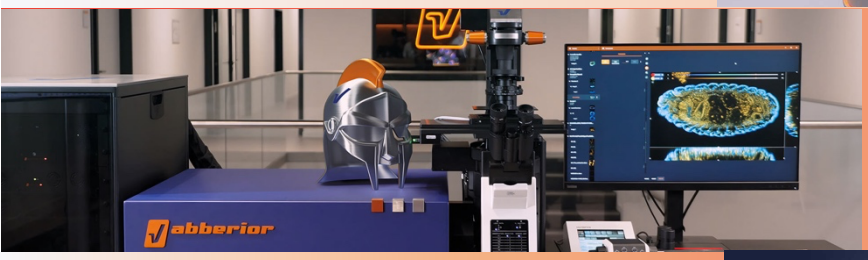

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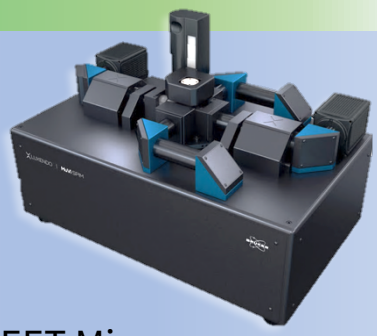
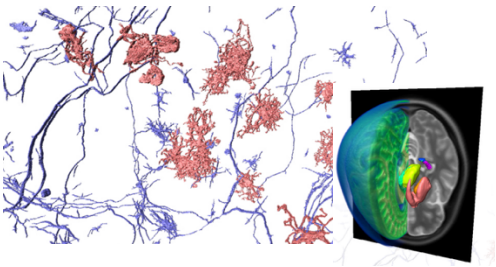


LIGHT SHEET Microscope

Imaging software



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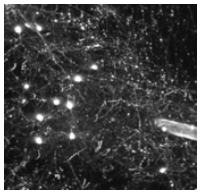

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Scientific Volume Imaging
Deconvolution - Visualization - Analysis

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Scientific program

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About the Conference

Taiwan-Japan Neuroscience Exchange

The Taiwan-Japan Neuroscience Exchange began in 2023 as a social gathering associated with the annual meeting of the Japan Neuroscience Society (JNS). During its first three years, the meeting was held in Japan as a JNS satellite program, providing an informal platform for researchers from Taiwan and Japan to meet, exchange scientific ideas, and develop new connections.

The first meeting was held in Sendai in 2023 as **JNS Taiwan Night**, with discussions extending beyond science to research environments, academic communities, and research life in Taiwan and Japan. In 2024, the meeting moved to Fukuoka and evolved into the **Taiwan-Japan Neuroscience Young Researcher Exchange Workshop**, placing greater emphasis on scientific presentations, discussion, and networking, while creating more opportunities for students and early-career researchers. The workshop continued in Niigata in 2025, further connecting researchers across institutions, disciplines, and career stages.

In 2026, **the 4th Taiwan-Japan Neuroscience Exchange Conference** marks the first time the conference is held in Taiwan. The meeting has expanded from a one-day satellite event into a two-day conference featuring scientific sessions, presentations by emerging researchers, poster discussions, and laboratory visits.

Looking Forward

Taiwan and Japan share distinctive strengths in neuroscience, from diverse model organisms and marine biology to advanced imaging, engineering, and circuit neuroscience. As neighboring island communities with strong but complementary research environments, closer exchange can create opportunities that extend beyond individual laboratories.

This meeting aims to provide a sustained platform where researchers across career stages can connect across disciplines and areas of expertise, develop new collaborations, and help strengthen connections within the broader Asian neuroscience community.

Conference Team

Organizers

Kuo-Sheng Lee (Academia Sinica)

Nao Nakagawa-Tamagawa (Kagoshima University)

Pin-Wu Liu (National Yang Ming Chiao Tung University)

Takeshi Imai (Kyushu University)

Co-organizers

Institute of Biomedical Sciences (IBMS), Academia Sinica

Emergence of Brain Functions from the Dynamic Connectome (Dynamic Brain), JSPS Transformative Research Area (A) project

Neuroscience Program of Academia Sinica (NPAS), Academia Sinica

Local Organization & Administrative Support

Supporting Staff, IBMS, Academia Sinica

Supporting Staff, NPAS, Academia Sinica

Sponsors

SCHEDULE OVERVIEW

Time	August 24 (Mon)
08:40-09:00	Registration
09:00-09:10	**Opening Remark** **Yijuang Chern** Distinguished Research Fellow, Academia Sinica Director, Institute of Biomedical Sciences **Takeshi Imai** Distinguished Professor, Kyushu University Project leader, JSPS Transformative Research Area (A) “Dynamic Brain”
09:10-10:30	**Joint session with JSPS Dynamic Brain (I)** *Chairs:* Yi-Chun Yen & Owen Y. Chao *Speakers:* **Yu-Wei Wu,** Academia Sinica **Masanori Murayama,** RIKEN **Li-An Chu,** National Taiwan University **Yoshiyuki Kubota,** National Institute for Physiological Sciences
10:30-10:45	Break
10:45-12:05	**Joint session with JSPS Dynamic Brain (II)** *Chairs:* Yi-Chun Yen & Owen Y. Chao *Speakers:* **Wei-Li Wu,** National Cheng Kung University **Yoko Yazaki-Sugiyama,** OIST **Egger Seth William,** Taipei Medical University **Takeshi Imai,** Kyushu University
12:05-12:10	Group photo
12:10-13:30	Lunch — **NIKON Imaging lunch seminar** 12:20-13:20 B1A *Speaker:* Clement Khaw, Healthcare Group, Nikon Singapore
13:30-14:30	**Community Research Highlights (I)** *Chairs:* Wen-Kai You & Ting-Yu Chang *Speakers:* **Keizo Takao,** University of Toyama **Chun-Hui Chang,** National Tsing Hua University **Ryo Nakamura,** Ushimado Marine Institute **Yusuke Nasu,** Academia Sinica
14:30-14:40	Break
14:40-15:40	**Community Research Highlights (II)** *Chairs:* Wen-Kai You & Ting-Yu Chang *Speakers:* **Tzu-Ting Huang,** Tohoku University **Nao Nakagawa-Tamagawa,** Kagoshima University **Poulomi Adhikari,** Academia Sinica **Pin-Wu Liu,** National Yang Ming Chiao Tung University
15:40-17:00	**Poster session**
17:30-	**Breakout discussion & Dinner (INVITED ONLY)** *Chair:* Hwai-Jong Cheng

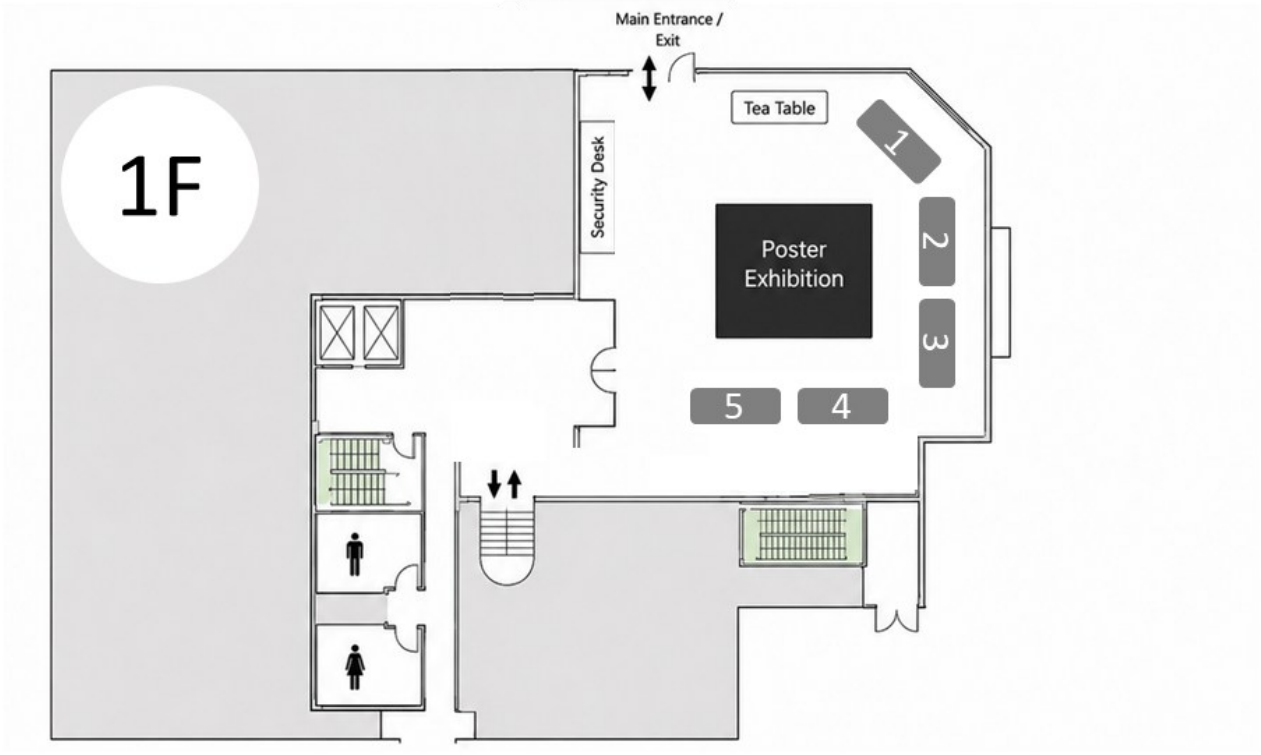
Time	August 25 (Tue)
08:40-09:00	Registration
09:00-10:30	**Comparative Neural Circuits: From Primates to Cephalopods (I)** *Chairs:* Chun-I Yeh & You-Ping Yang *Speakers:* **Tomohiko Takei,** Tamagawa University **Ke-Hsin Chen,** National Defense Medical University **Chih-Yang Chen,** Tohoku University
10:30-10:45	Break
10:45-12:15	**Comparative Neural Circuits: From Primates to Cephalopods (II)** *Chairs:* Chun-I Yeh & You-Ping Yang *Speakers:* **Yung-Che Tseng,** Academia Sinica **Tomoyuki Mano,** OIST **Kuo-Sheng Lee,** Academia Sinica
12:15-12:25	Award Ceremony & Group photo
12:25-13:30	Lunch
13:30-17:30	**Laboratory Tours** **Kuo-Sheng Lee,** Academia Sinica **Yusuke Nasu,** Academia Sinica **Yu-Wei Wu,** Academia Sinica **Ke-Hsin Chen,** National Defense Medical University **Li-An Chu,** National Taiwan University

ACCESS

Academia Sinica is accessible from Taiwan Taoyuan International Airport (TPE, approximately 40–60 minutes) and Taipei Songshan Airport (TSA, approximately 20–30 minutes) by taxi or public transportation.

More information: https://www.sinica.edu.tw/en/paragraph/10

FLOOR MAP


Main Entrance / Exit
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Tea Table
Security Desk
Poster Exhibition
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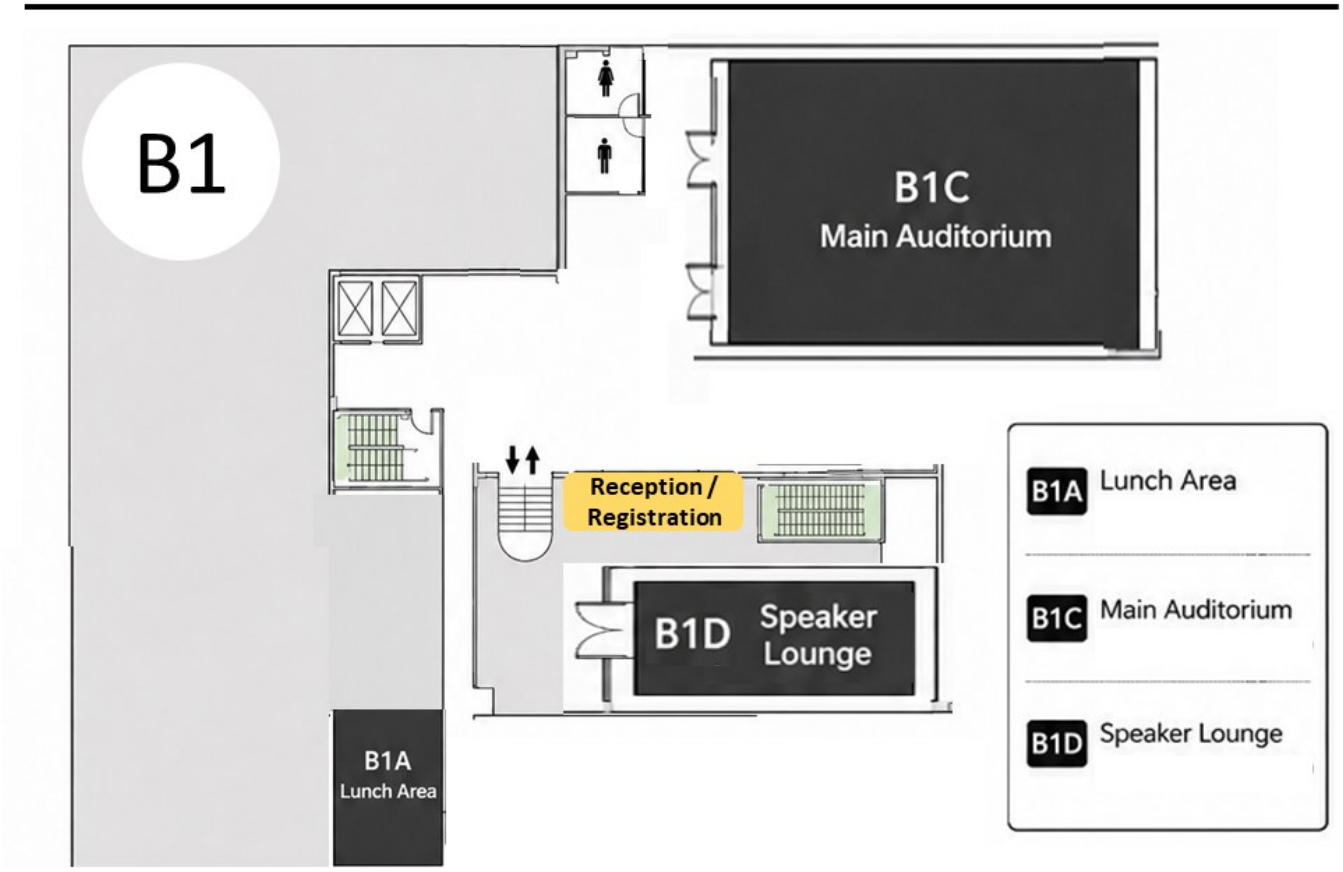
B1
B1C
Main Auditorium
Reception / Registration
B1D
Speaker Lounge
B1A
Lunch Area
B1A Lunch Area
B1C Main Auditorium
B1D Speaker Lounge

OPENING REMARKS

Yijuang Chern

Director of IBMS

Distinguished Research Fellow

Academia Sinica

Takeshi Imai

Project leader of JSPS "Dynamic Brain"

Distinguished Professor

Kyushu University

09:10-10:30 Joint session with JSPS Dynamic Brain (I)

09:10-09:30 Inferring interactions across multi-regional neural population under motor control

Yu-Wei Wu — Academia Sinica, Assistant Research Fellow

09:30-09:50 Study on Cortical Information Processing

Masanori Murayama — RIKEN, Team Director

09:50-10:10 Whole-Brain Intravital Imaging Reveals Asymmetric Serotonin-Dependent Post-Shock Firing in Drosophila

Li-An Chu — National Taiwan University, Associate Professor

10:10-10:30 Large Volume Electron Microscopy Reveals Synaptic Architecture of Cortical Circuits in the Primate Prefrontal Cortex

Yoshiyuki Kubota — National Institute for Physiological Sciences, Project Researcher

10:45-12:05 Joint session with JSPS Dynamic Brain (II)

10:45-11:05 Strain-specific Microbe Modulates Stress Response via a Phenylalanine Co-metabolite

Wei-Li Wu — National Cheng Kung University, Associate Professor

11:05-11:25 Learning to communicate by listening and vocalizing during development

Yoko Yazaki-Sugiyama — OIST Graduate University, Professor

11:25-11:45 The neural circuit basis of flexible action policies

Seth W. Egger — Taipei Medical University, Assistant Professor

11:45-12:05 Live tissue clearing with SeeDB-Live

Takeshi Imai — Kyushu University, Distinguished Professor

12:20-13:20 NIKON Imaging Lunch Seminar (Room: B1A)

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Dr. Clement Khaw, Manager, Healthcare Group, Nikon Singapore

13:30-14:30 Community Research Highlights (I)

13:30-13:45 Mouse phenotype-driven approach to neuropsychiatric disorders

Keizo Takao — University of Toyama, Professor

13:45-14:00 The Role of the Perirhinal Cortex in Trace Fear Conditioning

Chun-hui Chang — National Tsing Hua University, Professor

14:00-14:15 Decoding the acoel nervous system: single-cell vs. single-nucleus RNA sequencing in *Praesagittifera naikaiensis*

Ryo Nakamura — Ushimado Marine Institute, Assistant professor

14:15-14:30 Genetically encoded fluorescent biosensors for neuroscience

Yusuke Nasu — Academia Sinica, Assistant Research Fellow

14:40-15:40 Community Research Highlights (II)

14:40-14:55 Behavioral persistence maintained by *C. elegans* GPCR kinase GRK-1 in a dynamic thermal environment

Tzu-Ting Huang — Tohoku University, Assistant Professor

14:55-15:10 My Specialized Techniques as a Seed of Synergy - In Utero Electroporation (IUE) & Patch-Clamp Recording

Nao Nakagawa-Tamagawa — Kagoshima University, Assistant Professor

15:10-15:25 Continual motor learning recruits stage-specific synaptic remodeling for exploration and refinement

Poulomi Adhikari — Academia Sinica, Postdoctoral researcher

15:25-15:40 Seeing Synaptic Organization through Liquid-Liquid Phase Separation

Pin-Wu Liu — National Yang Ming Chiao Tung University, Assistant professor

15:40-17:00 Poster session

SESSION 1

Joint session with JSPS Dynamic Brain

Session Chairs

Owen Y. Chao

Assistant Professor

National Taiwan University

Yi-Chun Yen

Assistant Professor

National Chengchi University

Academia Sinica

Institute of Molecular Biology

Yu-Wei Wu (吳玉威)

Assistant Research Fellow

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Inferring Interactions across Multi-Regional Neural Population under Motor Control

Dexterous movement depends on coordinated activity across multiple cortical regions, yet these interactions are often analyzed only in pairs. Using simultaneous large-scale recordings during mouse reach-to-grasp behavior, we combined latent-factor modeling, reference-frame alignment, and empirical dynamic modeling to infer cross-area interactions among motor cortex (M1), premotor cortex (M2), and primary somatosensory cortex (S1). The analysis revealed stage-specific, time-varying interaction motifs spanning movement preparation, reach onset, and grasp. Inter-areal coupling also differed between successful and failed trials, consistent with divergences in neural state-space trajectories. Removing cross-area interactions reduced the accuracy of reconstructing paw trajectories, indicating that distributed cortical communication is essential for precise motor output.

Research interest

Neural circuit mechanisms of movement control, motor learning, and Parkinson's disease; astrocyte heterogeneity and Ca2+ signaling in motor cortex; large-scale neural interfaces and AI-enabled behavioral analysis.

Current research project

STN population dynamics and optimization of deep-brain stimulation in Parkinsonian models; chronic CMOS-mated microwire arrays for multi-regional recording and targeted stimulation; single-trial intercortical dynamics during dexterous forelimb movement; CASTLE for unsupervised behavioral classification; layer-specific astrocyte specialization in M1

Techniques

In vivo two-photon calcium imaging and longitudinal spine imaging; optogenetics, DBS/oDBS, and Parkinsonian mouse models; chronic high-density electrophysiology with microwire-CMOS interfaces; behavior tracking and machine learning; LFADS, manifold alignment, and empirical dynamic modeling; scRNA-seq, CRISPR/Cas9, and super-resolution microscopy.

Aspects or techniques of interest for future collaboration

Tissue clearing and whole-brain mapping; advanced optical and electrical microscopy; spatial transcriptomics; computational interpretation of large-scale neural datasets; neural interfaces and precision neuromodulation.

Short Bio

Yu-Wei Wu received his Ph.D. in Neurology & Neuroscience from University College London and trained at RIKEN Brain Science Institute (BSI) and Stanford University. He is Assistant Research Fellow at Academia Sinica, where his lab integrates in vivo imaging, electrophysiology, neuroengineering, and computational modeling to study movement control, Parkinson's disease, astrocyte biology, and next-generation brain-computer interfaces.

RIKEN
Center for Brain Science

Masanori Murayama (村山 正宜)

Team Director

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Study on Cortical Information Processing

Cortical information processing emerges from interactions among local circuits, large-scale networks, and global brain states. Our studies have shown how top-down input shapes perception (1), sleep-related activity supports memory consolidation (2), and amygdalo-cortical interactions enhance perceptual memory (3). By developing large-scale imaging approaches, we revealed cortical network architectures at single-cell resolution (4) and their reorganization during unconsciousness (5). Together, these studies will provide a multi-scale view of cortical function in perception, memory, and disease.

Research interest

Perception, neocortex, single-cell computation, circuit and network dynamics

Current research project

Circuit mechanisms underlying somatosensory perception, memory consolidation, and large-scale cortical network dynamics in mice and marmosets

Techniques

We use multidisciplinary approaches, including two-photon microscopy, fiber photometry and fiberoptic imaging, wide-field and mesoscale brain imaging, optogenetic and chemogenetic manipulation, and electrophysiological recordings in awake and anesthetized animals.

Aspects or techniques of interest for future collaboration

I am particularly interested in collaborations on computational analysis of large-scale network dynamics, development of new probes and imaging technologies using mice and marmosets.

Short Bio

[1] Manita et al., Neuron 2015; [2] Miyamoto et al., Science 2016; [3] Saito et al., Neuron 2025; [4] Ota et al., Neuron 2021; [5] Kiyooka et al., Cell Reports 202

National Taiwan University
Department of Biomedical Engineering

Li-An Chu (朱麗安)

Associate Professor

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Whole-Brain Intravital Imaging Reveals Asymmetric Serotonin-Dependent Post-Shock Firing in *Drosophila*

Volumetric imaging of intact adult brains remains challenging due to optical scattering and the speed limitations of conventional scanning microscopy. Here we present V-shape Bessel-beam light-sheet microscopy (vSPIM), an upright, high-speed imaging platform that achieves subcellular resolution across large, opaque volumes in vivo. Compared to spinning-disk and confocal systems, vSPIM increases volumetric acquisition speed by over 30-fold while maintaining comparable signal quality and minimizing phototoxicity.

We applied vSPIM to perform real-time, whole-brain calcium imaging in adult Drosophila, uncovering anpreviously uncharacterized asymmetric, serotonin-dependent post-shock firing (PsF) response. This activity emerges within the mushroom body and dopaminergic neurons only after repetitive aversive stimulation and is distinct from canonical dopamine-driven reinforcement signals. vSPIM also resolved complex (18 distinct neural activity patterns) odor valence coding within the dense mushroom body calyx that aligns with connectomic architecture. Finally, we demonstrated the system's versatility by capturing rapid neuro-epithelial dynamics in the curved mouse cornea. vSPIM establishes a scalable framework for intravital imaging, bridging the gap between optical innovation and circuit physiology in intact adult tissues.

Research interest

Brain/tumor multiplex imaging and live imaging.

Current research project

High-speed Multiplex labeling in large FFPE biopsy /whole brain functional and super resolution imaging to study memory formation in Drosophila brain.

Techniques

Tissue clearing, Multi-round organ antibody labeling, Lightsheet microscopy, Live calcium imaging

Aspects or techniques of interest for future collaboration

Antibody/dye technologies

National Institute for Physiological Sciences
Division of Multisensory Integration Systems

Yoshiyuki Kubota (窪田 芳之)

Project Researcher

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Large Volume Electron Microscopy Reveals Synaptic Architecture of Cortical Circuits in the Primate Prefrontal Cortex

Over the past decade, large-volume electron microscopy (vEM) has enabled detailed analysis of cortical synaptic wiring. Here, we developed an efficient vEM pipeline to study synaptic microcircuitry in the prefrontal cortex (PFC) of the common marmoset. We optimized an automated tape-collecting ultramicrotome (ATUM) to stably collect over 1,000 serial ultrathin sections (50 nm), which were imaged at high resolution (2.38 nm/pixel) using a high-throughput TEM system (Blade). This enabled acquisition of ultrastructural data across a 1.7 × 1.2 mm cortical area within about one month. To examine cortico-cortical connectivity, we co-injected anterograde (GFP) and retrograde (td-Tomato) AAV tracers into area 10, labeling projections between areas 9 and 10. Confocal imaging identified labeled structures, followed by vEM analysis of the same regions. Anterogradely labeled axons primarily targeted dendritic spines of pyramidal neurons (89%), with fewer synapses on non-pyramidal cells (11%). In contrast, retrogradely labeled pyramidal neurons mainly innervated other pyramidal cells (65%), with additional connections to fast-spiking basket cells (32%) and rare contacts with double bouquet cells (2%). These results provide new insights into primate PFC circuitry and demonstrate the power of vEM for resolving synaptic connectivity at nanometer resolution.

Research interest

Connectome in cortex

Current research project

1) Marmoset cortical microcircuit investigation using large volume EM

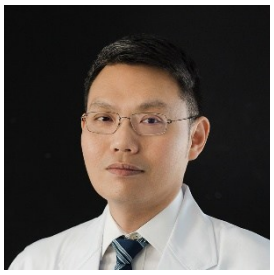
2) EM analysis of astrocytic processes approaching to synapse in cortex

Techniques

large volume EM, CLEM, in vivo imaging, EM image analysis

Short Bio

I would like to find out the microcircuit architecture of neocortex. My main tools are EM and in vivo imaging.



National Cheng Kung University
Department of Physiology, College of Medicine

Wei-Li Wu (吳偉立)

Associate Professor

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Strain-specific Microbe Modulates Stress Response via a Phenylalanine Co-metabolite

Commensal microbiota critically modulate host stress responses, yet specific mechanisms remain elusive. Here, we report that colonizing microbiota-deficient mice with specific Enterococcus faecalis strains significantly alleviates stress-induced gut dysmotility. This protective effect operates via the central nervous system, independent of peripheral adrenal or sympathetic pathways, as chemogenetic inhibition of central stress circuits recapitulates the dysmotility phenotype. Utilizing multi-omics, we identified phenylacetylglycine, a microbial-host co-metabolite, as the key mediator. Delivering this metabolite mitigated stress-induced dysmotility, and genomic analyses linked this strain-specific protection to a distinct bacterial enzyme in phenylacetate metabolism. These findings highlight a novel microbiome-metabolite-brain axis by which a single microbe mitigates stress, revealing therapeutic potential for stress-related disorders.

Research interest

Gut-Brain Axis; Host-Microbe Interaction

Current research project

Decoding Microbial Signals in the Gut-Brain Axis

Techniques

Microbial manipulations; Chemogenetics; Behaviors

Aspects or techniques of interest for future collaboration

Open to discuss

Short Bio

Wei-Li Wu, Ph.D. is an Associate Professor in the Department of Physiology, College of Medicine, National Cheng Kung University. He received his Ph.D. in Neuroscience from Academia Sinica. From 2012–2018, he trained as a postdoctoral fellow at Caltech in late Prof. Paul Patterson's and Sarkis Mazmanian's group to study the gut–brain axis and microbial influences on behavior. Since 2018, Dr. Wu has led his own lab at NCKU, focusing on how gut microbiota shape brain circuits and innate behaviors, aiming to uncover microbial signals that influence brain health and inspire microbiota-based therapies.

OIST Graduate University
Neuronal Mechanism for Critical Period Unit

Yoko Yazaki-Sugiyama (杉山(矢崎) 陽子)

Professor

yazaki-sugiyama@oist.jp

Learning to Communicate by Listening and Vocalizing during Development

Like human babies lean to speak, songbirds learn to sing through vocal communication with a tutor intensively during developmental critical periods. Juvenile zebra finches, a premier model of songbirds, first listen and memorize tutor's songs (TS) in the auditory learning phase and then match their vocals to the memorized TS in the following sensorimotor learning phase. We found a subset of neurons in the zebra finch higher auditory cortex, the caudomedial nidopallium (NCM) acquire selective responsiveness to TS after learning from it, suggesting TS memories form in NCM. We further found axonal projections in the song premotor area in the "song system", HVC from the NCM neurons responsive to playback of TS in juveniles, but not in adults. Ablating TS-responsive NCM neurons in juveniles, but not in adults, disrupts song learning. The density of axonal projections in HVC from TS-responsive NCM neurons negatively correlated with the level of song crystallization. Our studies have demonstrated neuronal circuits from/to the zebra finch higher auditory cortex, NCM, regulate efficient song memorization by vocal communications with adult tutors and auditory-memory guided song learning in well-orchestrated developmental auditory and sensorimotor learning period.

Research interest

Neuronal circuit development, Plasticity, Learning, Social behavior

Current research project

We have been investigating the neuronal mechanism underlying songbirds (zebra finches) to form memories and to learn to sing from vocal communication

Techniques

Electrophysiology, Behavior, Viral vector, Molecular biology

Aspects or techniques of interest for future collaboration

Computational approach, Molecular biological /Biochemical approach

Taipei Medical University
College of Medicine

Seth W. Egger

Assistant Professor

eggerneuro.github.io

The Neural Circuit Basis of Flexible Action Policies

Intelligence requires computing a policy for action by integrating information represented internally with that encoded in sensory populations. To determine the circuit mechanism of this computation, we examine cortical processing during smooth pursuit eye movements in two areas critical to the behavior: area MT, where neurons encode visual motion information and the smooth pursuit eye movement region of the frontal eye fields (FEFsem), where neurons flexibly modulate pursuit behavior. We determine how MT inputs are transformed into an action policy embedded in the FEFsem population response by recurrent circuit connections. Beyond simply integrating MT inputs, the circuit implements interactions between internal representations critical to the computation of the action policy. Together, the results connect sensory drive, individual neuron responses, and circuit dynamics to the formation and manipulation of internal representations critical to achieving intelligent behavior.

Research interest

Cognition, sensory-motor behavior, neural circuits, dynamical systems

Current research project

Neural circuit basis of flexible action policies, Neural implementation of mental simulation

Techniques

Psychophysics, neurophysiology, computational modeling, recurrent neural networks

Aspects or techniques of interest for future collaboration

High dimensional neural recording and stimulation, neural circuit segmentation, multi-area interconnectivity and processing, learning and development, brain-computer interface

Short Bio

I study the neural mechanisms underlying complex behavior using experimental and computational approaches in humans and nonhuman primates. I received my PhD in Neuroscience with Kenneth Britten at UC Davis and then went on to postdoctoral positions with Mehrdad Jazayeri and Stephen Lisberger at MIT and Duke University, respectively.

Kyushu University
Graduate School of Medical Sciences

Takeshi Imai (今井 猛)

Distinguished Professor

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Live Tissue Clearing with SeeDB-Live

Tissue clearing has been widely used for fluorescence imaging of fixed tissues, but not for live tissues due to its toxicity. Here we develop minimally invasive optical clearing media for fluorescence imaging of live mammalian tissues. Light scattering is minimized by adding spherical polymers with low osmolarity to the extracellular medium. A clearing medium containing bovine serum albumin (SeeDB-Live) is minimally invasive to live cells, allowing for structural and functional imaging of live tissues, such as spheroids, organoids, acute brain slices, and the mouse brain in vivo. SeeDB-Live minimally affects the electrophysiological properties and sensory responses of neurons. SeeDB-Live facilitates fluorescence imaging of deep cortical layers in live animals without noticeable toxicity to neurons and animal behavior. We also demonstrate its utility for epifluorescence voltage imaging in acute brain slices and in live animals in vivo. Thus, SeeDB-Live expands the scale and modalities of fluorescence imaging of live mammalian tissues.

Current research project

- Chemical senses (Olfaction and gut-brain axis)
- Neural development in the olfactory bulb and the cerebral cortex
- Synaptic development and neuropsychiatric diseases
- Tissue clearing and light microscopy-based connectomics

Techniques

Tissue clearing, multicolor imaging, light microscopy, ex vivo / in vivo 2-photon imaging

Short Bio

I obtained Ph.D. in 2006 at the University of Tokyo under the supervision of Prof. Hitoshi Sakano. After spending four years as a postdoc in the same lab, I started my own lab at RIKEN Center for Developmental Biology in 2010. I then joined Kyushu University as a full professor.

SESSION 2

Community Research Highlights

Session Chairs

Wen-Kai You

Assistant Professor

National Defense Medical University

Ting-Yu Chang

Assistant Professor

National Defense Medical University

University of Toyama
Department of Behavioral Physiology, Faculty of Medicine

Keizo Takao (高雄 啓三)

Professor

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Mouse Phenotype-Driven Approach to Neuropsychiatric Disorders

Behavioral analysis in mice allows evaluation of the effects of genetic and pharmacological manipulations at the organismal (whole-animal) level. In our laboratory, we investigate gene–brain–behavior relationships using a comprehensive behavioral test battery covering sensory, motor, emotional, and cognitive functions in various genetically modified mice. This approach is effective for screening models of neuropsychiatric disorders, and we have identified multiple lines with disease-relevant phenotypes. When similarities are observed not only in behavior but also in brain phenotypes, these models are more likely to reflect human pathology and may lead to the discovery of novel intermediate phenotypes. If such phenotypes are confirmed in patients, they can serve as new endophenotypes. This talk presents examples of phenotype identification based on behavioral analyses and optogenetic studies of underlying neural mechanisms, and discusses their implications for model development and therapeutic exploration.

Research interest

Our laboratory aims to elucidate cellular and molecular mechanisms underlying cognitive and emotional processes, including memory and learning, using behavioral genetics, optogenetics, pharmacological and physiological approaches, and genome-edited mouse models. We investigate the pathophysiology of neuropsychiatric disorders and explore therapeutic strategies. In parallel, we develop reproductive technologies to support these efforts.

Current research project

Our laboratory aims to elucidate cellular and molecular mechanisms underlying cognitive and emotional processes, including memory and learning, using behavioral genetics, optogenetics, pharmacological and physiological approaches, and genome-edited mouse models. We investigate the pathophysiology of neuropsychiatric disorders and explore therapeutic strategies. In parallel, we develop reproductive technologies to support these efforts.

Techniques

Mouse behavior analysis; Mouse reproductive engineering; Genome editing–based mouse generation; Optogenetics

Aspects or techniques of interest for future collaboration

Mouse behavior analysis; Mouse reproductive engineering; Genome editing–based mouse generation; Optogenetics

Short Bio

Prof. Keizo Takao graduated from The University of Tokyo (Dept. Psychology) and received a Ph.D. in Informatics (Kyoto University, 2006) and in Medical Sciences (University of Toyama, 2024). He has been a Professor at the University of Toyama since 2015 and currently serves as Chair of the Program of Cognitive and Emotional Neuroscience, and Director of the Division of Animal Resources and Development.

National Tsing Hua University
Institute of Systems Neuroscience

Chun-hui Chang (張鈞惠)

Professor

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The Role of the Perirhinal Cortex in Trace Fear Conditioning

The perirhinal cortex (PRC) serves as a hub for the information exchange between the medial prefrontal cortex (mPFC) and the hippocampus (HPC), two regions important for trace fear regulation. Through a series of experiments, I will talk about our recent findings about its importance in the acquisition and retrieval of long-term trace fear memory.

Research interest

Pavlovian and Operant Fear Learning and Memory

Techniques

Pavlovian Fear Conditioning, Operant Fear Conditioning, Behavioral Pharmacology, Chemogenetics, Immunohistochemistry

Aspects or techniques of interest for future collaboration

Viral based pathway tracing and reconstruction

Okayama University
Ushimado Marine Institute, Faculty of Science

Ryo Nakamura (中村 遼)

Assistant professor

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Decoding the Acoel Nervous System: Single-Cell vs. Single-Nucleus RNA Sequencing in *Praesagittifera naikaiensis*

Xenacoelomorpha — proposed either as sister to all other Bilateria or to Ambulacraria — represents one of the early branching bilaterian lineages, making it a valuable model for studying the ancestral organization of the nervous system. Acoela differ substantially from mammalian systems: they lack circulatory and vascular systems with body fluid in direct contact with cells, yet possess well-developed nervous system. Here we compare scRNA-seq and snRNA-seq in the acoel Praesagittifera naikaiensis. Both methods yielded comparable data quality. snRNA-seq showed enrichment of neuronal, muscle, and ciliated cell transcripts, and revealed additional cell populations not detected by scRNA-seq, including neural clusters. In addition, we identified genes encoding neuropeptides, glutamate decarboxylase (GAD), and the transcription factor Six3, with expression enriched in the anterior neural region. These findings provide a starting point for exploring the origins of anterior central nervous system patterning in Bilateria.

Research interest

Evolution of the nervous system in early-branching animals

Current research project

- Cell type diversity in acoels, with a focus on neural populations and their development/differentiation

- Biochemical innovation and function of the monoaminergic system in metazoa (joint project with University of Perugia, Italy)

Techniques

snRNA-seq, scRNA-seq, Visium HD, in situ HCR, RNAi knockdown in acoels

Aspects or techniques of interest for future collaboration

Cross-species transcriptomic comparisons across Xenacoelomorpha (and Bilateria); **establishing the calcium imaging or electrophysiological approaches** for detecting neural activity **in living acoels**

Short Bio

Ryo Nakamura is a researcher at the Ushimado Marine Institute, Okayama University, on the shores of the Seto Inland Sea — home to the acoel Praesagittifera naikaiensis. Research in the lab investigates how the nervous system evolved in Bilateria, using this locally abundant yet phylogenetically interesting animal as a model organism.

Academia Sinica
Institute of Biological Chemistry

Yusuke Nasu (那須 雄介)

Assistant Research Fellow

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Genetically Encoded Fluorescent Biosensors for Neuroscience

At the core of our laboratory's work is the pioneering field of protein engineering, aimed at developing functional proteins with exceptional properties. A key focus is the creation of fluorescent biosensors that can reversibly alter their fluorescence intensity in response to specific targets. To further our research goals, we collaborate with a global network of experts in neuroscience. Through these partnerships, we aim to accelerate scientific discovery and enhance our understanding of critical biological processes. In this seminar, we will introduce our technology and the state-of-the-art biosensors.

Research interest

Protein engineering for fluorescent biosensors

Current research project

Development of genetically encoded biosensors for neuronal metabolism

Techniques

Protein engineering

Aspects or techniques of interest for future collaboration

Application of biosensors in living model organisms to investigate metabolism in neurons and glial cells with spatiotemporal resolution

Short Bio

Yusuke Nasu obtained his BSc in chemistry from the University of Tokyo in 2009 and his PhD in analytical chemistry from the University of Tokyo in 2016. He subsequently worked on analytical method development for pharmaceuticals at Chugai Pharmaceutical Co., Ltd. (Roche Group). He then held postdoctoral positions at the University of Alberta and the University of Tokyo, where he specialized in directed protein evolution for the development of fluorescent biosensors. In 2024, he established his independent research group at the Institute of Biological Chemistry, Academia Sinica, where his research focuses on deepening and broadening protein engineering approaches for fluorescent biosensors.

Tohoku University
Graduate School of Life Sciences

Tzu-Ting Huang (黃子庭)

Assistant Professor

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Behavioral Persistence Maintained by *C. elegans* GPCR Kinase GRK-1 in a Dynamic Thermal Environment

Animals often encounter fluctuating sensory inputs as they navigate complex environments. How the nervous system stabilizes behavior over time despite such sensory variability remains poorly understood. In this talk, I will introduce a neural mechanism that sustains a stable forward locomotor state specifically at temperatures associated with prior food experience in the nematode Caenorhabditis elegans. My previous work with Professor Ikue Mori and colleagues showed that C. elegans maintains prolonged temperature tracking at the cultivation temperature by simultaneously inhibiting two head interneurons, RIM and AVA. Furthermore, we found that a worm homolog of human GPCR kinase GRK5 functions cell-autonomously in both RIM and AVA interneurons to maintain sustained isothermal tracking. Our findings reveal how a GPCR kinase acts within defined neurons to stabilize a behavioral state over time in animals freely moving in a sensory environment. Given the conserved and broad expression of GRK-1/GRK5 in the nervous systems of worms and mammals, our work provides insights into understanding persistent behavioral states in more complex nervous systems and environments.

Research interest

Genetic and neural basis of adaptive behaviors

Current research project

Genetic and neural basis of adaptive behaviors

Techniques

Behavioral genetics, animal tracking and neuronal imaging

Aspects or techniques of interest for future collaboration

Comparative studies of adaptive behaviors from model and non-model animals

Kagoshima University
Graduate School of Medical and Dental Sciences

Nao Nakagawa-Tamagawa (玉川(中川) 直)

Assistant Professor

naonaka@m.kufm.kagoshima-u.ac.jp

My Specialized Techniques as a Seed of Synergy - In Utero Electroporation (IUE) & Patch-Clamp Recording

I will introduce my experimental techniques and some past/current works to seek for seeds of collaboration. IUE can directly introduce multiple plasmids into a specific subset of neurons in the mouse neocortex. (1) Various mutants can be co-expressed with fluorescent proteins, enabling the efficient screening of the effects of mutations. No transgenic mice needed; only plasmids. (2) Using CRISPR-Cas9 technology, genes of interest can be knocked out in a specific subset of neurons. Genes that would be lethal with whole-body knockout are also applicable. Patch-Clamp Recording is my expertise, with >15 years of experience and five collaborative publications. I can record neuronal membrane properties, firing pattern, synaptic connection, gap junction, and evoked and spontaneous synaptic inputs from acute brain slices and dissociated primary culture neurons. I can also record channel currents from cell lines.

Research interest

Neuronal morphogenesis and circuit formation in neocortex

Current research project

(1) Analyzing how epilepsy-related Nav1.2 mutations affect channel properties, neuronal morphology, migration, and axonal projection in mouse neocortex. (2) Mechanism of soma-to-AIS structure determination and remodeling.

Techniques

in utero electroporation, patch-clamp recording, dissociated neuron primary culture

Aspects or techniques of interest for future collaboration

I'm open to any form of international joint research and collaboration. I want to discuss with researchers on topics related to mine or who have techniques applicable to my research (calcium signaling analysis, time-lapse confocal imaging of dissociated culture neurons, neuron or circuit modelling, etc).

Short Bio

- 2006 – 2011. Ph.D. student, Department of Physiological Sciences (belonging to NIPS), School of Life Science, SOKENDAI
- 2011 – 2018. Researcher, Laboratory for Local Neuronal Circuits, RIKEN BSI
- 2018 – Now. Assistant professor, Grad Sch Med & Dent Sci, Kagoshima Univ.

Academia Sinica
Institute of Molecular Biology

Poulomi Adhikari

Postdoctoral Researcher

poulomiadhikari@gmail.com

Continual Motor Learning Recruits Stage-Specific Synaptic Remodeling for Exploration and Refinement

Continual learning in biological systems requires both flexibility to acquire new skills and stability to retain existing ones. At the synaptic level, how cortical circuits are remodeled to meet these competing demands remains unclear. We trained head-fixed mice on a continual joystick paradigm and performed longitudinal two-photon imaging of apical dendrites in the primary motor cortex (MOp). We identified two distinct, stage-dependent phases of structural plasticity. First, an initial drop in reward acquisition upon a task switch triggered a transient surge in new dendritic spine formation, consistent with an error-driven exploratory search for a new motor strategy. Second, the subsequent refinement of movement was accompanied by delayed, widespread spine turnover that selectively stabilized a sparse set of new connections. Task similarity governed the extent of circuit reuse; when a new task shared trajectory structure with a prior one, previously stabilized, task-related spines were preferentially preserved, providing a structural basis for knowledge transfer. These results outline a dynamic structural blueprint for continual learning, where cortex first implements an exploratory, error-driven search to select a motor program, and then consolidates a sparse, clustered network to refine its execution.

Research interest

Motor learning, mouse behaviour, neural plasticity

Current research project

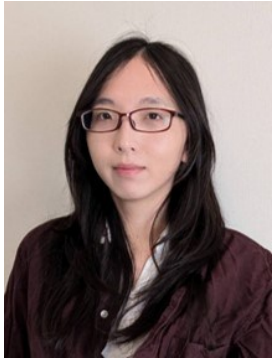
I am currently working on dissecting the synaptic plasticity that occurs in different stages of motor learning by utilizing mouse behavior and two-photon imaging.

Techniques

I would like to know more about different techniques.

Aspects or techniques of interest for future collaboration

Calcium imaging of dendritic spines; neural encoding at population level



National Yang Ming Chiao Tung University
Institute of Molecular Medicine and Bioengineering

Pin-Wu Liu (劉品吾)

Assistant Professor

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Seeing Synaptic Organization: Liquid-Liquid Phase Separation

Synaptic transmission relies on the precise molecular organization of proteins within the postsynaptic density (PSD), a dense and dynamic protein assembly. How this organization emerges and reorganizes in response to activity remains unclear. Liquid-liquid phase separation (LLPS) provides a mechanism for organizing synaptic proteins. In particular, CaMKII drives activity-dependent segregation of synaptic receptors, enabling rapid reconfiguration of postsynaptic structure at the nanoscale. To visualize this organization, we use super-resolution imaging (dSTORM) to resolve receptor nanoclusters and their spatial arrangement in neurons. Ongoing work extends these approaches to live-cell imaging with dual-color DNA-PAINT, allowing us to follow the dynamics of synaptic molecules in real time. These efforts aim to connect molecular mechanisms with nanoscale organization and provide a platform for exploring synaptic function.

Research interest

Molecular and cellular mechanisms underlying memory formation and maintenance, with a focus on molecular organization and plasticity.

Current research project

- Reconstitution of synaptic nanostructures through liquid-liquid phase separation (LLPS) using purified protein systems.
- Visualization and quantitative analysis of synaptic nanostructure using super-resolution microscopy.

Techniques

Molecular cloning and CRISPR/Cas9 gene editing; protein purification and in vitro LLPS reconstitution; dissociated neuronal culture and brain slice preparation; confocal, two-photon microscopy, and super-resolution imaging

Aspects or techniques of interest for future collaboration

Approaches that link molecular synaptic organization with neuronal activity, including label-free imaging and nanoscale multi-electrode array technologies.

Short Bio

I study how transient experiences become long-lasting biological traces. My work combines molecular reconstitution and super-resolution imaging to understand synaptic function across scales. Starting in August 2026, I will establish an independent research team at NYCU (CEB) in nanoscale neuroscience. In parallel, raising a five-year-old, a daily reminder of plasticity.

Evening Program

Dinner & Breakout Discussion for Invited Guests

Discussion Moderator

Hwai-Jong Cheng

Distinguished Research Fellow

Academia Sinica

09:00-10:30 Comparative Neural Circuits: From Primates to Cephalopods (I)

09:00-09:30 Neural mechanisms for skilled motor control

Tomohiko Takei — Tamagawa University, Professor

09:30-10:00 A multi-contrast MRI brain template for Taiwanese macaque

Ke-Hsin Chen — National Defense Medical University, Assistant professor

10:00-10:30 Role of marmoset frontal eye field in saccades

Chih-Yang Chen — Tohoku University, Lecturer

10:45-12:15 Comparative Neural Circuits: From Primates to Cephalopods (II)

10:45-11:15 How ocean acidification rewires squid optic lobes and breaks hunting

Yung-Che Tseng — Academia Sinica, Associate Research Fellow

11:15-11:45 Hierarchical processing and polarization encoding in the cephalopod visual system

Tomoyuki Mano — OIST, Staff Scientist

11:45-12:15 Sensing the Environment and Self in Mammals and Cephalopods

Kuo-Sheng Lee — Academia Sinica, Assistant Research Fellow

13:30-17:30 Laboratory Tours

SESSION 3

Comparative Neural Circuits: From Primates to Cephalopods

Session Chairs

You-Ping Yang

Assistant Professor

National Defense Medical University

Chun-I Yeh

Assistant Professor

National Taiwan University

Tamagawa University
Brain Science Institute

Tomohiko Takei (武井 智彦)

Professor

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Neural Mechanisms for Skilled Motor Control

Dexterous hand movements are highly developed in primates and indispensable for daily activities. Traditionally, such movements were thought to depend primarily on the evolutionarily “newer” direct corticomotoneuronal (CM) pathway. However, recent evidences suggest that the “older” indirect pathways, mediated by spinal premotor interneurons (PreM-INs), also play an important role, highlighting the need to clarify their functional differences. To address this, we recorded neuronal activity from spinal PreM-INs and CM cells in macaques during a precision grip task, and compared their roles in generating hand muscle activity. Our results show that PreM-INs exert stronger facilitation across a broader set of muscles, promoting synergistic coactivation, whereas CM cells provide more selective facilitation, enabling control of relatively individual muscles. Further decomposition analysis revealed that these two systems correspond to different control modes—synergy-based and individual-based control—balancing stability and flexibility. These findings redefine our understanding of primate dexterous hand control as emerging from the cooperative integration of evolutionarily distinct premotoneuronal systems.

Research interest

Neural and computational basis for skilled motor control

Current research project

Frontoparietal dynamics underlying voluntary reaching/ Neural network modelling of frontoparietal interactions/ Establishment of artificial proprioceptive for voluntary motor control

Techniques

Electrophysiology (single unit recordings/ electrocorticography), Cortical cooling/ Neural network modeling/ Theoretical modeling

Aspects or techniques of interest for future collaboration

Integration of large-scale neural recordings with advanced analysis of neural population dynamics/ Cross-species comparison of motor control and motor learning mechanisms

Short Bio

Ph.D. at Kyoto University/ Section Chief at the National Institute of Neuroscience, Postdoctoral Fellow at the Queen’s University/ Program-specific Associate Professor at Kyoto University/ Associate Professor at Tamagawa University.

National Defense Medical University
Brain Science Center
Ke-Hsin Chen (陳可欣)

Assistant professor

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A Multi-Contrast MRI Brain Template for Taiwanese Macaque

Non-human primates (NHPs) have long been critical models in biomedical research. Compared to other lab animals, NHPs are phylogenetically closer to humans, and thus provide better models of the health and diseases in terms of genetics, anatomy, physiology and behavior. NHPs' large brain, high intelligence and sociability make them especially suitable for the studies of higher cognitive functions and neuropsychiatric disorders. Taiwanese macaque (Macaca cyclopis) is the native primate living in Taiwan and is a close relative of the rhesus (Macaca mulatta) and Japanese macaques (Macaca fuscata). However, the feasibility of using it in biomedical research, especially in neuroscience, has rarely been studied. To facilitate this species to be used in brain researches, a standard anatomical template is required for data analysis and comparison across subjects and studies. As a first step, we build an in-vivo MRI brain template with multiple MR contrasts and an averaged skull model from CT images. These basic image tools can be used for surgical planning, parameter simulation for neuromodulation tools and so on. A comprehensive brain atlas will be developed in the future by combining high-resolution ex-vivo MRI image and histological images via whole-brain sectioning.

Research interest

Experience-induced whole brain connectivity alteration, caused by neuromodulation, learning, or drug addiction etc.

Current research project

Comparative neuroanatomy and histology of Taiwanese macaque and other non-human primates

Techniques

MRI, tape-transfer cryosection

Aspects or techniques of interest for future collaboration

DNA-related process and analysis, any type of AI-aid image processing for histological images, animal body motion, or emotional facial expression

Short Bio

A mother of a three-year-old kid

Tohoku University
Graduate School of Medicine

Chih-Yang Chen (陳志揚)

Lecturer

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Role of Marmoset Frontal Eye Field in Saccades

The frontal eye field (FEF) is a critical cortical hub for oculomotor control and higher-order cognitive functions. While the FEF of Old World monkeys has been characterized extensively over the past four decades, the existence and functional properties of a homologous high-level oculomotor center in New World monkeys remain poorly defined. I will show you how we utilize the common marmoset—a lissencephalic New World primate—to identify the anatomical location and functional role of the FEF in saccade generation. Using viral-mediated neuroanatomical tracing, we first mapped the putative FEF within the marmoset frontal cortex. We subsequently employed electrical microstimulation to confirm the area's involvement in evoking specific saccadic profiles. To establish a causal link between neural activity and behavior, we utilized optogenetic manipulation while subjects performed a visually guided saccade task. Our results demonstrate that the marmoset FEF is a robust model for oculomotor research. Furthermore, this work suggests that investigating saccadic control in marmosets provides unique insights into the evolution and circuit logic of the primate oculomotor system, extending beyond mere replication of previous Old World monkey studies.

Research interest

Primate, eye movement, electrophysiology, disease model, circuit manipulation

Current research project

Large scale recording in macaque monkey during saccadic tasks

Techniques

Head fixation, gaze tracing, electrophysiology, optogenetics

Aspects or techniques of interest for future collaboration

MRI, computation, circuit manipulation, neuro-glia interaction

Short Bio

Started with molecular background, I have studied sensory or motor alone and their interactions using various animal model and methods. Hope to networking in this workshop and potentially find collaborators.

Academia Sinica
Institute of Cellular and Organismic Biology

Yung-Che Tseng (曾庸哲)

Associate Research Fellow

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How Ocean Acidification Rewires Squid Optic Lobes and Breaks Hunting

Bigfin reef squid (Sepioteuthis lessoniana) are agile predators whose success depends on rapid visual processing and precisely timed strikes. We asked what happens to that system under chronic ocean acidification. Laboratory-reared squid exposed from hatching to pH 7.8, the projected year-2100 condition, showed substantially reduced predatory success after 90 days. The retina still worked. Custom electroretinogram recordings confirmed that peripheral photoreception remained functional across light intensities, prompting attention to what lies beyond the eye: the optic lobes. There, acetylcholine receptor expression was down, systemic HCO3- was elevated, and metabolic rates had shifted. Transcriptomics fleshed out the timeline. Acute exposure suppressed energy metabolism and synaptic signaling broadly; chronic exposure brought partial compensation through upregulated cellular maintenance. The squid adapted, but not enough to hunt normally. Acid-base disruption, cholinergic signaling, and behavioral failure appear connected at the level of neural integration, not at the sensory periphery. What that means for predator-prey dynamics in a high-CO2 ocean is something we are only beginning to measure.

Research interest

Comparative marine animal physiology, with a focus on acid-base regulation, neural and behavioral responses to environmental stress, and adaptation mechanisms under ocean acidification and hydrothermal vent conditions

Current research project

(1) Neuro-behavioral physiology of cephalopods under ocean acidification; (2) Extreme environment adaptation in the hydrothermal vent crab, including host-symbiont interactions; (3) Multi-generational epigenetic mechanisms of CO2 adaptation in fish

Techniques

Whole-animal behavioral assays, electroretinography, transcriptomics (RNA-seq, scRNA-seq), acid-base physiology (blood gas analysis, ion transport measurements), SCUBA-based field sampling

Aspects or techniques of interest for future collaboration

In vivo neural imaging and electrophysiology approaches applicable to cephalopod central nervous systems; methods for dissecting sensory processing versus higher-order integration; comparative neurophysiology frameworks linking environmental physiology with behavioral outcomes

Short Bio

Yung-Che Tseng is an Associate Research Fellow at Academia Sinica's Marine Research Station (ICOB), Taiwan. His research examines how marine animals respond physiologically and neurally to environmental change as well as extreme marine settings, with a particular focus on cephalopods, hydrothermal vent organisms, and multi-generational epigenetic adaptation.

Okinawa Institute of Science and Technology (OIST)
Computational Neuroethology Unit

Tomoyuki Mano (真野 智之)

Staff Scientist

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Hierarchical Processing and Polarization Encoding in the Cephalopod Visual System

Vertebrates and cephalopods independently evolved camera-type eyes through convergent evolution. Unlike most vertebrates, cephalopods are colorblind but detect light polarization, which aids underwater object detection and communication. However, the neural processing underlying their vision is largely unknown. We developed a novel head-fixation method to perform two-photon calcium imaging and Neuropixels electrophysiology in awake squids, providing the first in vivo recordings of the cephalopod visual system at cellular resolution. In the optic lobe cortex, we identified distinct neuron classes tuned to polarization orientation and intensity. In the optic lobe medulla, we found evidence for hierarchical processing: receptive fields expanded with depth, and intensity and polarization signals were integrated with progressively greater complexity. These findings reveal neural mechanisms of cephalopod vision and broaden our understanding of convergent evolution in visual systems.
Cephalopods, Vision, Sleep

Research interest

Cephalopods, Vision, Sleep

Current research project

Squid visual system

Techniques

Two-photon calcium imaging, Neuropixels recording, Single-cell RNA-seq, Tissue clearing and whole-brain imaging

Aspects or techniques of interest for future collaboration

Freely moving calcium imaging

Short Bio

I obtained my B.A. in physics from the University of Tokyo, studying biophysics. I then earned a Ph.D. in Information Science & Technology from the University of Tokyo, working on tissue clearing and 3D imaging of mouse brains. In 2021, I moved to OIST as a postdoc and began working on cephalopods, an emerging model for understanding the evolution and convergence of intelligence.

Academia Sinica
Institute of Biomedical Sciences

Kuo-Sheng Lee (李國昇)

Assistant Research Fellow

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Sensing the Environment and Self in Mammals and Cephalopods

Animals constantly monitor both the external world and the internal state of their own bodies. How nervous systems integrate these signals to guide behavior is a fundamental question across neuroscience, physiology, and bioengineering. In this seminar, I will present a comparative perspective on body sensing in mammals and octopuses. First, I will discuss our work in mice on vibrotactile interoception—the perception of internally generated mechanical signals. Using a behavioral paradigm with controlled internal vibration, we show that mice can detect vibrations arising from different anatomical sites. By combining biomechanics measurements, computational modeling, electrophysiology, in vivo imaging, and causal circuit perturbations, we identify how these signals propagate through the body and are encoded by somatosensory pathways, revealing a body–brain circuit for internal mechanical sensing. I will then connect these findings to our ongoing octopus research, focusing on proprioception, arm control, camouflage, wound healing, and regeneration of complex neural circuits. Comparing mammals and octopuses highlights shared challenges and distinct solutions for sensing the self in very different bodies.

Current research project

1. System neuroscience: exteroception and interoception
2. Brain–body interactions with 2P holographic optogenetics
3. Cross-species neuroethology: mice/human/octopus!

Techniques

Free moving two-photon imaging, holographic optogenetics, electrophysiology, and closed-loop behavior.

Short Bio

I am an Assistant Research Fellow at the Institute of Biomedical Sciences, Academia Sinica. My research focuses on sensory coding in mechanoreceptors and their central circuits, combining free moving two-photon imaging, holographic optogenetics, electrophysiology, and closed-loop behavior. I trained at the Max Planck Florida Institute and the University of Geneva.

LIST of POSTERS

P1 **Transcriptomic profiling of identified cells using Vac-seq**
Wen-Hsin Lu, *Okinawa Institute of Science and Technology*

P2 **Isotonic and minimally invasive optical clearing media for live cell imaging ex vivo and in vivo**
Shigenori Inagaki, Kyushu University

P3 **In Vivo Visualization of AMPA Receptor Trafficking and Spine Dynamics in the Primary Motor Cortex During Motor Learning**
Chih-Wei, Fu, *National Institute for Physiological Sciences*

P4 **A Distinct Layer 1 Astrocyte Program Shapes Perisynaptic Structure and Calcium Signaling in Mouse Motor Cortex**
Srimayee Bhattacharjee, *Institute of Molecular Biology, Academia Sinica*

P5 **Activity- and dopamine-dependent stabilization of motor cortex synapses by subthalamic deep brain stimulation in prodromal Parkinson's disease**
Han-Yuan Yeh, *Institute of Molecular Biology, Academia Sinica*

P6 **Light Microscopy based connectome mapping**
Biswanath Saha, *Kyushu University*

P7 **Investigating the cellular micro-architecture of cephalopod optic lobe**
Rudi Tong, *Okinawa Institute of Science and Technology*

P8 **Comparative Evaluation Of Three In Vitro Sarcopenia Models Using C2C12 And Human IPSC-Derived Myoblasts**
Tran Minh Nghia, *Taipei Medical University*

P9 **Nutrient discrimination by distinct enteroendocrine cell subpopulations in the intestine**
Shih-Hua, Chou, *Graduate School of Medical Sciences, Kyushu University*

P10 **Diverse respiration-related encoding in the nucleus of the solitary tract**
Kexuan Wu, *Graduate School of Arts and Sciences, The University of Tokyo*

P11 **Memory consolidation during artificial hibernation: persistence of hippocampal ripples and replay despite reduced neural activity**
Ming-Ching Chiang, *Okinawa Institute of Science and Technology*

P12 **Visualizing Sensory Processing in Synthetic Hibernation**
Ching-Pu Chang, *ExCELLs, National Institute for Physiologic sciences*

P13 **Interplay Between Glucose Homeostasis and Thermoregulation**
Ming-Liang Lee, *National Institute for Physiologic sciences*

P14 **Data-driven models of C. elegans neural network dynamics and behavior: Effects of neuronal and synaptic manipulations**
Yuichi Iino, *University of Tokyo*

P15 **Neural-Body Simulation in Caenorhabditis elegans**
Yutaro Ueoka, *University of Tokyo*

P16 **Acoustic Degradation Reweights Cortical and ASR Processing: A Brain-Model Alignment Study**
Francis Pingfan Chien, *National Taiwan University*

P17 **Prodromal-like states of neuropsychiatric disorders in a novel DISC1 knockout macaque model: from social withdrawal to brain network reorganization**
Ziguo Lan, *Graduate School of Medicine, Kyoto University*

Lab Tour Arrangement

Participants traveling to NDMU and NTU will be provided with shuttle transportation. Please refer to **PAGE 34 for detailed information.**

Time	Academia Sinica			National Defense Medical University	National Taiwan Universitt
	Kuo-Sheng Lee IBMS, R209	Yusuke Nasu IBC, 612	Yu-Wei Wu IMB, 8B07	Ke-Hsin Chen	Li-An Chu
1330 - 1410	· 村山 正宜 · 玉川-中川 直 · 趙元新 · Poulomi Adhikari · Biswanath Saha · 張菁圃 · 謝采揚 · 廖祐成	· 陳志揚 · 中川 遼 · 張廷宇 · 顏怡君 · Srimayee Bhattacharjee · 傅至偉	· 窪田 芳之 · Seth Egge · 武井 智彦 · 郭聰榮 · 周昱樺 · 江明憬 · 蔡譽良 · 金珉成 · 莊雅伶	· 楊鎮誠 · 陳忠寬	· 楊幼屏** · 今井 猛 · 上岡 雄太郎 · 根本 知己 · Mohammad Uzair · 李明亮 · Rudi Tong
1410 - 1450	· Seth Egger · 陳志揚 · 武井 智彦 · 窪田 芳之 · 顏怡君 · Srimayee Bhattacharjee	· 玉川-中川 直 · 廖祐成 · 蔡譽良 · 江明憬 · 金珉成 · 周昱樺 · 莊雅伶	· 趙元新 · 傅至偉 · 張菁圃 · 謝采揚	· 高雄 敬三 · Francis Pingfan Chien** · Ayodeji Zabdiel Abijo · Asha Muraleedharan	· 劉品吾** · 游文愷 · 林祐薇 · 飯野 雄一 · 呂文心 · 稲垣 成矩
1450 - 1530	· 楊幼屏 · 周昱樺 · 江明憬 · 金珉成 · 莊雅伶 · 傅至偉 · 蔡譽良	· 今井 猛 · 趙元新 · 上岡 雄太郎 · 根本 知己 · 謝采揚 · 張菁圃 · 周昱樺 · 莊雅伶	· 玉川-中川 直 · 陳志揚 · 李明亮 · Rudi Tong · 廖祐成	-	· 張廷宇** · 中川 遼 · 楊鎮誠 · 陳忠寬 · 葉瀚元
1530 - 1610	· Francis Pingfan Chien · Rudi Tong · 李明亮 · 根本 知己 · 飯野 雄一	· 高雄 敬三 · 游文愷 · 楊幼屏 · Ayodeji Zabdiel Abijo · 林祐薇	· 今井 猛 · 劉品吾 · 呂文心 · 稲垣 成矩 · 上岡 雄太郎 · Asha Muraleedharan	-	· 顏怡君** Seth Egger · 武井 智彦
1610 - 1650	· 中川 遼 · 游文愷 · 今井 猛 · 呂文心 · 楊鎮誠 · 林祐薇 · 上岡 雄太郎 · 葉瀚元	· 劉品吾 · Asha Muraleedharan · 稲垣 成矩 · 陳忠寬	· 高雄 敬三 · Ayodeji Zabdiel Abijo · 楊鎮誠 · 陳忠寬 · 根本 知己 · 飯野 雄一	· 趙元新 玉川-中川 直 · 謝采揚 · 廖祐成 · 金珉成 · 傅至偉 · 江明憬**	· 陳志揚** · 張菁圃 · 周昱樺 · 莊雅伶 · 蔡譽良

Lab Tour Instructions

- Each lab tour slot is 40 minutes, including approximately 30 minutes for the lab visit and 10 minutes for moving between laboratories.
- Participants visiting laboratories within **Academia Sinica** can go directly to their assigned laboratories. Please refer to the map below for the laboratory locations.
- Participants traveling to **NDMU** or **NTU** will be provided with shuttle transportation. **Please pay close attention to the shuttle departure times and arrive at the designated meeting point on time.**
- For groups traveling to NDMU or NTU, each group will be accompanied by a Taiwanese researcher. The person marked with ** on the participant list is the designated contact person for the group. Group members should meet with this person before departure, and lab hosts may also contact them if they need to reach the group.
- After the visits at NDMU and NTU, participants will travel together by shuttle.

Academia Sinica Lab Locations & Shuttle Meeting Point

A: Kuo-Sheng Lee lab, IBMS R209
B: Yusuke Nasu lab, IBC 612
C: Yu-Wei Wu lab, Interdisciplinary Research Building, 8B07
Shuttle Meeting Point: IBMS 1F Main Entrance

Shuttle Bus Schedule

Please arrive at the meeting point before the DEPARTURE time shown for each shuttle.

DEPARTURE Time	From AS	From NDMU	From NDMU	From AS	From NTU
	to NDMU	to AS	to NTU	to NTU	to AS
1300	· 陳可欣** · 楊鎮誠 · 陳忠寬			· 楊幼屏** · 朱麗安 · 今井 猛 · 上岡 雄太郎 · 根本 知己 · Mohammad Uzair · 李明亮 · Rudi Tong	
1330	· Francis Pingfan Chien** · 高雄 敬三 · Ayodeji Zabdiel Abijo · Asha Muraleedharan			· 劉品吾** · 游文愷 · 林祐薇 · 飯野 雄一 · 呂文心 · 稲垣 成矩	
1410			· 陳忠寬** · 楊鎮誠	· 張廷宇** · 中川 遼 · 葉瀚元	· 楊幼屏** · 今井 猛 · 上岡 雄太郎 · 根本 知己 · Mohammad Uzair · 李明亮 · Rudi Tong
1450		· Francis Pingfan Chien** · 高雄 敬三 · Ayodeji Zabdiel Abijo · Asha Muraleedharan		· 顏怡君** · Seth Egger · 武井 智彦	· 劉品吾** · 游文愷 · 林祐薇 · 飯野 雄一 · 呂文心 · 稲垣 成矩
1530	· 江明憬** · 趙元新 · 玉川-中川 直 · 謝采揚 · 廖祐成 · 金珉成 · 傅至偉			· 陳志揚** · 張菁圃 · 周昱樺 · 莊雅伶 · 蔡譽良	· 張廷宇** · 中川 遼 · 楊鎮誠 · 陳忠寬 · 葉瀚元
1610					· 顏怡君** · Seth Egger · 武井 智彦
1650		· 江明憬** · 趙元新 · 玉川-中川 直 · 謝采揚 · 廖祐成 · 金珉成 · 傅至偉			· 陳志揚** · 張菁圃 · 周昱樺 · 莊雅伶 · 蔡譽良

Guide to National Defense Medical University (NDMU)

Host information of 08/25

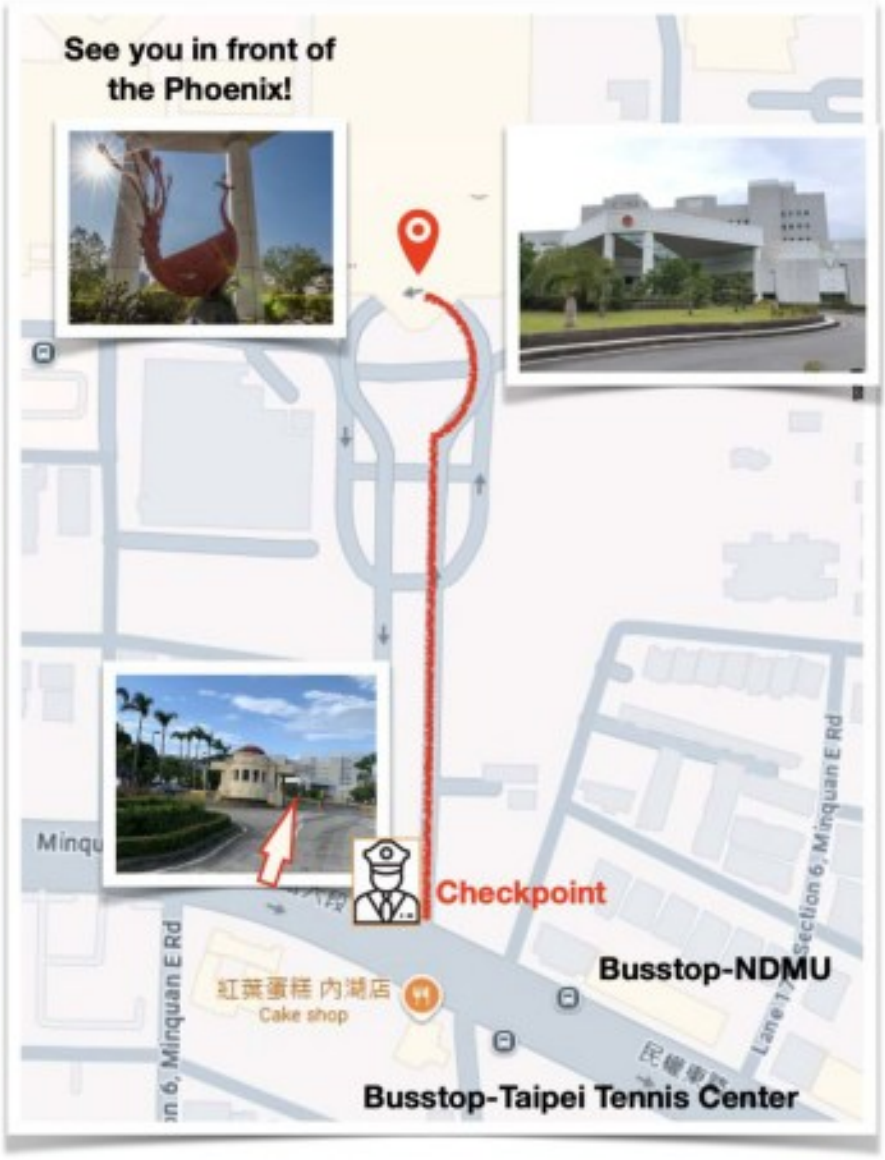
- Department of Medicine, Brain Research Center, Asst. Prof. Ke-Hsin Chen, 0953-159455 (醫學系腦科中心陳可欣助理教授)

By taxi or Uber (recommended)

- No. 161, Section 6, Minquan E Rd, Baohu Village, Neihu District, Taipei City, 114 國防醫學大學(NDMU) https://maps.app.goo.gl/qdQ8Mdc4exnrbWSj9
- provide the host information at the checkpoint in the front gate and then drive toward the pickup zone of the main building

By public traffic

- from MRT Minquan West Road station (R13/O11, red/orange line), take Minquan Metro bus to Taipei Tennis Center, and then walk to the main building of the NDMU
- from MRT Kunyang Station (BL21, blue line), take BL36 route bus to Taipei Tennis Center



Visitor guidelines

- the PI or lab member will meet you in front of the phoenix and guide you to the PI's office R4304 in Brain Research Center
- One representative per visiting group must leave their contact information at the 3F front desk.
- Only pre-registered visitors are permitted to visit labs located within the animal center, and a confidentiality agreement must be signed prior to entry.
- No photography allowed in the animal center. No food or drink in the lab.

Parking guidelines for drivers

- The pick-up zone at the building is for temporary parking only to set down or pick up passengers.（建築物前的接送區只能臨停供乘客上下車）
- Please park in the designated spaces shown on the map, and pay the parking fee at the payment machine before exiting the campus.（若需長時間停車，請由引道往下開至宿舍區附近停車格，離開校園前需至繳費機繳交停車費。）

Guide to National Taiwan University (NTU)

Visitor Transportation Guide

Academia Sinica →Room 621, Yong-Lin Biomedical Engineering Center, NTU

No. 49, Fanglan Road, Da'an District, Taipei 106038, Taiwan

🚕 Recommended: By Taxi

Starting Point: Academia Sinica

Estimated Travel Time: Approximately 30–40 minutes, depending on traffic.

What to tell the taxi driver: 台北市大安區芳蘭路 49 號 國立臺灣大學永齡生醫工程館

🚇 MRT + Walking

1.From Academia Sinica, take a taxi or one of the following buses (205 / 276 / 306 / 620 / 645) to Taipei Nangang Exhibition Center.

2.From Taipei Nangang Exhibition Center Station, take the Blue Line (Bannan Line) to Ximen Station.

3.At Ximen Station, transfer to the Green Line (Songshan–Xindian Line) and take the train to Gongguan Station.

4.At Gongguan Station, take Exit 2 and walk toward the National Taiwan University campus. Continue toward Fanglan Road and the Yong-Lin Biomedical Engineering Center.

The building is located at No. 49, Fanglan Road.

Estimated Total Travel Time: Approximately 45–60 minutes, depending on the connection and walking time.

Please note:

1. Upon arrival, our staff will meet you at the first-floor lobby and guide you to Room 621.

2.No food and drinks in the lab.

No. P1

Transcriptomic profiling of identified cells using Vac-seq

Wen-Hsin Lu

Okinawa Institute of Science and Technology

Patch-seq is a tool commonly used for profiling single cells, to collect transcripts from identified neurons, which was first reported 10 years ago (Fuzik et al., 2016; Cadwell et al., 2016). However, the whole-cell patch-clamp is a specialized technique often requiring extended training time. Also, when Patch-seq is applied to cell types that are not particularly easy to patch with low membrane resistance, such as astrocytes, the success rate is dramatically reduced. Therefore, to circumvent the need to form a whole-cell patch and to speed up transcriptomic analysis from identified single cells, we have established a new suction-based Vac-seq method. Vac-seq uses electrophysiological recording setups as used for Patch-seq but with easier handling. Comparison of Vac-seq and Patch-seq methods using the same cell numbers shows that Vac-seq has a higher cDNA recovery with a better quality for the following sequencing steps than Patch-seq. Furthermore, Vac-seq can be reliably applied to analysis at a single cell level and used to target astrocytes and neurons with cell-specific labeling in cell cultures to tissues. In conclusion, Vac-seq provides a quick and simple method that is alternative to Patch-seq for spatially resolved transcriptomic analysis of specific cell types.

No. P2

Isotonic and minimally invasive optical clearing media for live cell imaging ex vivo and in vivo

Shigenori Inagaki

Kyushu University

Tissue clearing has been widely used for fluorescence imaging of fixed tissues, but not for live tissues due to its toxicity. Here we developed isotonic and minimally invasive optical clearing media for fluorescence imaging of live mammalian tissues.

We found that matching the refractive index of the extracellular solution to that of the cytosol minimizes light refraction and scattering, thereby rendering live cells transparent. We focused on spherical polymers because they exhibit low osmolality when dissolved in water. In particular, media containing bovine serum albumin (BSA) showed minimal osmolality. We used BSA to prepare isotonic media that achieve the optimal refractive index with minimal changes in the original ionic composition. Cultured cells exhibited normal proliferation for more than 3 days in this medium, suggesting minimal toxicity. We named this refractive index–matching medium, SeeDB-Live.

SeeDB-Live minimally affected the electrophysiological properties of neurons and enabled functional imaging at deeper regions in acute brain slices. It increased the maximum imaging depth by 2-fold, allowing calcium imaging of neuronal activity at a depth of 200 μm using conventional confocal microscopy. Moreover, SeeDB-Live improved in vivo imaging. We applied SeeDB-Live to the cerebral cortex of living mice after durotomy. SeeDB-Live increased the fluorescence signals from layer 5 neurons by 3-fold, enabling clear visualization of dendritic spines in the basal dendrites. We obtained reliable calcium and voltage signals from the somata in layer 5. Using a removable optical window, we demonstrated repeated optical clearing and imaging over 4 months without detectable inflammation or behavioral abnormalities. Thus, SeeDB-Live expands both the spatial scale and imaging modalities for studying neuronal circuit dynamics.

No. P3

In Vivo Visualization of AMPA Receptor Trafficking and Spine Dynamics in the Primary Motor Cortex During Motor Learning

Chih-Wei, Fu

National Institute for Physiological Sciences

Motor learning drives robust structural plasticity in the primary motor cortex (M1), characterized by rapid dendritic spine formation followed by selective elimination. This spine turnover and local circuit remodeling are pronounced in the apical tuft dendrites of Layer V pyramidal neurons. While motor training is known to induce rapid spine morphogenesis, glutamate uncaging studies suggest that the persistence of enlarged spine heads depends on the stable incorporation of AMPA receptors (AMPARs) into the postsynaptic density (PSD). However, the longitudinal in vivo spatiotemporal dynamics of AMPAR trafficking during spine turnover remains poorly understood, despite its critical role in coupling postsynaptic current amplitude and structural stability.

In this study, we aim to visualize the in vivo distribution of AMPARs at the spine heads within the contralateral and ipsilateral M1 during motor training. By integrating longitudinal two-photon imaging with a covalent AMPAR labeling reagent (CAM2-Ax647) and post-hoc immunohistochemistry, we will monitor the changes in structural morphology and AMPAR expression on the apical tufts of Layer V pyramidal neurons. Through the analysis of afferent-specific spine turnover across distinct training phases, this research seeks to elucidate the molecular mechanisms that distinguish transient spines from sustained spines, specifically focusing on the contribution of presynaptic inputs to synaptic potency and long-term retention.

No. P4

A Distinct Layer 1 Astrocyte Program Shapes Perisynaptic Structure and Calcium Signaling in Mouse Motor Cortex

Srimayee Bhattacharjee

Institute of Molecular Biology, Academia Sinica

Although layer-specific molecular and morphological diversity among cortical astrocytes is increasingly recognized, how these distinct states are linked to specialized calcium signaling and maintained in the adult cortex remains unclear. Here, combining super-resolution structural imaging, two-photon calcium imaging, and analysis of public single-cell and spatial transcriptomic resources, we identify Layer 1 (L1) astrocytes in the mouse primary motor cortex as a distinct superficial astrocyte program. These cells occupy compact territories yet contain dense synapse-associated loop-like structures and display frequent, fast, broadly spreading calcium events that engage a large fraction of the territory. Transcriptomic analyses identify Id1 and Id3 as enriched components of this superficial program. CRISPR–Cas9 deletion of Id1 and Id3 in adult astrocytes selectively disrupts L1 and superficial Layer 2/3 (L2/3) astrocytes, expanding territory size, reducing fine-process complexity, and suppressing calcium activity. Thus, adult layer-specific transcriptional programs maintain specialized astrocyte structure and signaling.

No. P5

Activity- and dopamine-dependent stabilization of motor cortex synapses by subthalamic deep brain stimulation in prodromal Parkinson's disease

Han-Yuan Yeh

Institute of Molecular Biology, Academia Sinica

Parkinson’s disease (PD) involves progressive loss of midbrain dopaminergic neurons and can impair cognition before overt motor symptoms emerge. Dopamine depletion induces aberrant dendritic spine remodeling in the primary motor cortex (MOp), disrupting cortical plasticity and motor learning. Although subthalamic nucleus deep brain stimulation (STN-DBS) effectively alleviates motor symptoms, cognitive side effects remain a major concern, and how STN-DBS reshapes cortical synaptic circuits during prodromal PD remains unclear. We asked whether STN-DBS broadly or selectively stabilizes dopamine-loss-induced spine remodeling and improves motor learning. Here we show that long-term STN-DBS stabilizes cortical spine dynamics in an activity- and dopamine-dependent manner. Using a mouse model of prodromal PD, mild MPTP treatment significantly reduced substantia nigra pars compacta dopaminergic neurons despite preserved locomotion. Long-term optogenetic STN-DBS (STN-oDBS) reduced excessive spine formation induced by dopamine loss without affecting overall spine elimination, suggesting non-uniform effects across cortical neurons. To test whether STN-oDBS preferentially modulates activity-defined neuronal populations, we used cFos-TRAP to label MOp neurons activated during stimulation. In these DBS-associated neurons, STN-oDBS reduced both spine formation and elimination while enhancing spine survival, demonstrating activity-dependent stabilization of synaptic remodeling. Pharmacological blockade of dopamine D1 and D2 receptors abolished DBS-induced stabilization of spine dynamics, revealing a requirement for dopamine signaling. However, STN-oDBS did not improve motor skill acquisition. Together, these findings show that STN-DBS broadly normalizes aberrant spine formation while selectively stabilizing synaptic remodeling in DBS-activated cortical ensembles, suggesting that behavioral improvement may require engagement of behaviorally relevant neuronal populations in PD.

No. P6

Light Microscopy based connectome mapping

Biswanath Saha

Kyushu University

Understanding how neuronal functions are embedded within the connectome is a fundamental challenge in neuroscience. Achieving this requires methods that combine large-scale connectome mapping with functional recording of neurons. While electron microscopy (EM) provides ultrastructural accuracy, its limited throughput and complex reconstruction workflows hinder its integration with functional imaging. Here, we present a light microscopy (LM) based pipeline for synapse-level connectome mapping that can be directly linked to in vivo functional data. We performed in vivo two-photon calcium imaging in the mouse primary visual cortex (V1) to characterize neuronal visual response selectivity using jGCaMP8m. Neurons were additionally labeled with a presynaptic marker (Synaptophysin-mAmetrine), a postsynaptic marker (dPSD95-mNeonGreen), and a filler (tdTomato). Following functional imaging, the same tissue was imaged ex vivo using high-resolution confocal microscopy (100x oil objective, NA 1.4; voxel size 60 x 60 x 130 nm) with tiled acquisition and a custom trans-scale Z-alignment strategy which enables seamless reconstruction of large cortical volumes at an effective synaptic resolution of ~150 nm in x-y and ~300 nm in z, sufficient to identify many synaptic pairs and assign them to sparsely labeled neurons. Automated image processing pipelines were used to segment synaptic puncta, extract centroids, and identify putative synapses based on presynaptic-postsynaptic distances below 300 nm. Across a volume of 876 x 480 x 550 um3, we detected approximately 4.4 million presynaptic and 3.9 million postsynaptic puncta, yielding ~200,000 putative synapses (~5% of candidate pairs) consistent with previous EM-based estimates. Reconstructed axonal and dendritic segments were used to assign synapses to individual neurons, enabling preliminary functional connectivity mapping. Ongoing analyses indicate sparse local connectivity and preferential connections between neurons with similar orientation tuning. Together, these results demonstrate that LM-based approaches can bridge structural and functional analyses of neural circuits, providing a scalable and accessible framework for reconstructing the functional connectome, which is compatible with in vivo functional imaging.

No. P7

Investigating the cellular micro-architecture of cephalopod optic lobe

Rudi Tong

Okinawa Institute of Science and Technology

Coleoid cephalopods (squids, octopus, cuttlefish), with their ability to camouflage, are promising, novel model organism to study complex visually-guided behaviour. To understand the neural mechanisms underlying sensorimotor transformation, a detailed knowledge of the underlying neural circuitry is required. However, little is known about the cells and their connections comprising the optic lobe (OL) - the main processing centre for visual information. Here, we set out to build a comprehensive cell atlas of the OL of the bigfin reef squid Sepioteuthis lessoniana by measuring (a) morphological, (b) electrical, (c) biochemical (i.e. neurotransmitters and receptors), (d) genetic, and (e) functional properties of individual cells, and establish a link between them. We have developed an acute slice preparation of the optic lobe which allows us to combine electrophysiological recordings, morphological reconstructions, pharmacology, single-cell RNA sequencing, and RNA FISH. We have identified major cell types of the OL cortex, including three functionally distinct first order visual neurons (homologous in function to mammalian bipolar cells), a set of local inhibitory neurons, and a subclass of cells which project back to the eye. From this, we have identified a feedback circuit that is potentially involved in dynamic gain control of the photoreceptor output, allowing for efficient coding of visual information.

No. P8

Comparative Evaluation Of Three In Vitro Sarcopenia Models Using C2C12 And Human IPSC-Derived Myoblasts

Tran Minh Nghia

Taipei Medical University

Sarcopenia is the age-related decline in skeletal muscle mass and function, closely associated with the accumulation of senescent muscle stem cells. Clinically relevant senescence myoblast models to study this condition remain limited. This study aims to establish three C2C12 myoblast senescence models, including replicative senescence, glucocorticoid-induced senescence with Dexamethasone, and DNA damage-induced senescence with Doxorubicin, and to benchmark them against human induced pluripotent stem cell (hiPSC) derived myoblasts from young and aged donors. C2C12 myoblasts are subjected to prolonged passaging, or treatment with 10 μM Dexamethasone for 96h, or 100 nM Doxorubicin for 48h, and senescence is evaluated by senescence-associated (SA) β-galactosidase staining, mRNA expression of cell cycle regulators (p53, Cdkn2a) and senescence-associated factors (IL-6, TNF-α), as well as genomic DNA telomeric length and mitochondrial DNA copy number. Result indicates that Dexamethasone and Doxorubicin both markedly increase the proportion of SA β-galactosidase positive C2C12 myoblasts, upregulate the expression of senescence markers, and alter telomere length and mitochondrial DNA content. Meanwhile, extensive passaging to high passage numbers induces little change in SA β-galactosidase staining and decreasing expression of cell cycle regulators. Ongoing future work would establish a hiPSC myoblast model from young and aged donors to serve as framework for validation, corroborate current result with additional analysis to complete the senescence profile of established models, and examine the myogenic capacity of senescent myoblasts on μ-molded gelatin hydrogels, both C2C12 and hiPSC-derived. This study aims to deliver standardized and well-characterized in vitro sarcopenia models for future sarcopenia research.

No. P9

Nutrient discrimination by distinct enteroendocrine cell subpopulations in the intestine

Shih-Hua, Chou

Graduate School of Medical Sciences, Kyushu University

As a sensory organ, the intestine detects luminal nutrients and microbial metabolites and conveys this information to the brain and other organs via humoral and neural pathways, thereby maintaining physiological homeostasis. Enteroendocrine cells (EECs) are dispersed throughout the intestinal epithelium and serve as primary chemosensors that relay these signals through hormone secretion and vagal activation. Recent single-cell RNA sequencing studies have revealed extensive heterogeneity among EECs, suggesting that distinct subtypes may respond to different luminal chemicals. However, it remains unclear how EECs discriminate a wide variety of luminal chemicals. Here, we established an experimental platform to systematically analyze subtype-specific EEC responses by combining ex vivo calcium imaging and in vivo activity mapping. Using ex vivo calcium imaging, we found that only a subset of EECs responded to each stimulus, indicating stimulus-specific functional specialization. In vivo activity mapping showed that glucose preferentially activated 5-HT$^+$ and GLP-1$^+$ EECs, whereas glutamate primarily activated PYY$^+$ EECs. GLP-1 and PYY were rarely co-expressed, suggesting that GLP-1$^+$ and PYY$^+$ EECs are distinct subpopulation of the classical N/L cells. In addition, an artificial sweetener, acesulfame K, activated Substance P$^+$ EECs, showing a response pattern distinct from glucose. Together, these results demonstrate that different luminal chemicals evoke distinct EEC responses, providing a framework for understanding nutrient sensing in the gut.

No. P10

Diverse respiration-related encoding in the nucleus of the solitary tract

Kexuan Wu

Graduate School of Arts and Sciences, The University of Tokyo

Increasing evidence suggests that the brain and peripheral organs interact through complex bidirectional mechanisms. Recent studies have demonstrated that respiratory rhythms modulate neural activity across widespread brain regions, thereby influencing large-scale brain dynamics. Moreover, respiration has been shown to affect cognitive processes such as perception, memory, and decision-making through respiration-locked neural activity and oscillatory coordination. As a primary interface between the lung and the brain, the nucleus of the solitary tract (NTS) receives afferent inputs from the lung via the vagus nerve and serves as a key relay linking respiratory states to central neural processing. However, how NTS neurons encode respiration-related information remains poorly understood. Here, we investigated respiration-related neural activity in the NTS. We recorded neuronal activity in the NTS using high-density Neuropixels 2.0 probes, while simultaneously monitoring respiratory signals with a thoracic piezoelectric sensor in anesthetized mice. We identified multiple functionally distinct populations of NTS neurons. During spontaneous respiration, subsets of neurons showed firing that was phase-locked to the respiratory rhythm, including neurons preferentially locked to either the inspiratory or expiratory phases. In addition, population activity in the NTS exhibited rhythmic modulation aligned with the respiratory cycle. Next, we examined NTS responses to transient nasal occlusion and to immersion of the snout in ice-cold water. During nasal occlusion, some NTS neurons exhibited activity selectively during the occlusion period. Ice-cold water stimulation evoked more heterogeneous response patterns in the NTS. We observed neurons that were active exclusively during the stimulation, as well as neurons that were selectively active after stimulus termination. These results reveal diverse, state-dependent representations of respiratory and sensory conditions within the NTS.

No. P11

Memory consolidation during artificial hibernation: persistence of hippocampal ripples and replay despite reduced neural activity

Ming-Ching Chiang

Okinawa Institute of Science and Technology

The synaptic homeostasis hypothesis has demonstrated that during sleep the number of synapses is downscaled while learning related synapses are preserved. Moreover, optogenetic inhibition of ripple events during sleep prevents the synaptic downscaling which indicates ripple events are active drivers instead of a passive epiphenomenon. This evidence suggests that during sleep ripple-dependent synaptic downscaling and memory consolidation coexist. However, when the animal enters hibernation, the synaptic connections are largely reduced, yet their memory remains preserved after arousal. Whether the severe synaptic downscaling is mediated by the ripple-dependent mechanism during hibernation remains unknown. To test this idea, we applied an artificial hibernation animal model based on Qrfp-induced hypometabolism and hypothermia (QIH). Our data suggested that contextual fear memory is preserved after QIH arousal. Moreover, inhibition of CA1 activity during QIH impaired memory expression which indicates that the activity of CA1 during QIH is essential for memory preservation. To further address the neural mechanism supporting memory during QIH, we implanted tetrodes into hippocampal CA1 and recorded neural activity when the animal performed linear track exploration. After linear track training, the animal was induced to enter QIH for 48hrs while the CA1 activity was recorded simultaneously. Our findings revealed that neural activity and the number of ripple events declined with the body temperature reduction. Regardless of the reduction of neural activity and ripple events, replay of place cell activity within ripple events remains detectable during QIH. Together, these findings raise the possibility that the ripple-dependent mechanism linking synaptic downscaling and memory consolidation continues to operate, albeit at a reduced level, even under the hypometabolic and hypothermic state of QIH.

No. P12

Visualizing Sensory Processing in Synthetic Hibernation

Ching-Pu Chang

ExCELLs, National Institute for Physiologic sciences

Some animals use the strategy, known as hibernation, to survive harsh environments by reducing metabolism and core body temperature. Even during such quiescent state, external stimuli can still rapidly restore sensorimotor response and induce arousal. However, it is unclear how the sensory signals processed in hibernation due to the difficulty of studying real hibernating animals. Recent work has shown that activation of Qrfp neurons in the preoptic area of the hypothalamus (AVPe) can induce a hibernation-like state in non-hibernators such as mice, termed Q-neuron-induced hypothermia and hypometabolism (QIH) (Takahashi et al., Nature, 2020). Interestingly, they show similar immobile behaviours to natural hibernation.

Here, we performed the in vivo calcium imaging to identify the cell type-specific manipulations in the somatosensory (S1) cortex in response to tactile stimulation while mice were awake, anaesthetized or under QIH induced by using DREADD to chemogenetically activate the Qrfp neurons. We found that the QIH mice remind response to the hind paw pinch. In vivo calcium imaging combining cell type-specific promotor-driven expression of the calcium indicator showed heterogeneous response to the hind paw pinch. Notably, astrocytes exhibited stronger calcium responses under QIH. Concurrently, glucose utilization was markedly suppressed in the cortex during QIH. Pharmacological blockade of astrocytic lactate transport attenuated stimulus-evoked neuronal activity in QIH, implicating astrocyte derived lactate as a critical metabolic substrate for sustaining sensory processing. It suggested that astrocyte is a key regulator in supporting sensory information processing during hibernation-like state. Moreover, to answer how the cortex responds in real hibernation, we conducted fibre photometry in hamster during artificial arousal and found that mechanical stimulation can trigger neuronal activity even when body temperature is about 12 degrees.

No. P13

Interplay Between Glucose Homeostasis and Thermoregulation

Ming-Liang Lee

National Institute for Physiologic sciences

Glucose is the primary energy source required to maintain normal physiological functions, including thermoregulation. Specialized glucose-sensing neurons, located predominantly in the hypothalamus and brainstem, detect changes in blood glucose levels as an indicator of whole-body energy status and regulate systemic glucose metabolism. In parallel, the brain contains thermosensory circuits that continuously monitor and regulate body temperature. Although alterations in blood glucose have been associated with thermoregulation, the mechanisms linking glucose metabolism and thermal homeostasis remain poorly understood. Our research focuses on the interaction between brain glucose sensing and thermosensing. We have found that body temperature is a critical determinant of systemic glucose metabolism and feeding behavior by modulating the activity of hypothalamic neurons, suggesting that thermosensory circuits contribute to metabolic regulation. More recently, we demonstrated that brain glucose availability is closely associated with body temperature, indicating that central glucose sensing also plays an important role in thermoregulation. Together, these findings suggest that the neural regulation of glucose metabolism and thermoregulation is tightly interconnected. We are currently investigating the underlying mechanisms and seeking to identify the central neural circuits that integrate glucose-sensing and thermosensory signals to coordinate metabolic and thermal homeostasis.

No. P14

Data-driven models of C. elegans neural network dynamics and behavior: Effects of neuronal and synaptic manipulations

Yuichi Iino

University of Tokyo

How neurons communicate within a neural network to generate natural behavior is a major question in neuroscience. Caenorhabditis elegans is an excellent model organism for addressing this question.

We previously developed a model called gKDR-GMM that aims to reproduce neural network dynamics based on whole-brain imaging data and the known C. elegans connectome. The architecture of the gKDR-GMM model is constrained by the connectome; it is trained to probabilistically predict neural activity one step ahead from the preceding activities of presynaptic neurons. The probability distributions are estimated using Gaussian mixture models. The model can also be used as a probabilistic generative model: it can run autonomously and generate non-stereotyped neural dynamics resembling those observed in real animals.

To model larger numbers of neurons and longer time series, we extended this approach and developed NeuroMotorNetGMM, which simultaneously outputs neuronal activity and behavioral values. Combined with a mechanistic model of interactions between the animal and its environment, NeuroMotorNetGMM simulates spontaneous worm movement based on neural network dynamics.

Using these models, we aim to examine the effects of neuronal and synaptic ablation. We find that the network is relatively robust to the ablation of individual neurons and that multiple parallel pathways can transmit sensory signals to motor outputs. We can also identify hub neurons whose perturbation affects multiple other neurons. In addition, we observe considerable inter-individual differences in both neural dynamics and behavior. Based on these results, we seek to identify both general principles and individual-specific features of neural networks in living animals.

No. P15

Neural-Body Simulation in Caenorhabditis elegans

Yutaro Ueoka

University of Tokyo

One of the central challenges in neuroscience is to understand the relationship between neural activity and behavior. Traditionally, this relationship has often been described in a feedforward framework, in which sensory inputs from the external environment are processed by the brain, and motor outputs are subsequently generated based on neural activity. However, in actual biological systems, this description is incomplete. Behavior itself continuously feeds back into the nervous system through proprioceptive inputs, and at the same time modifies the external environment, thereby altering sensory inputs received by sensory neurons. As a result of these closed-loop interactions among the nervous system, the body and neural dynamics can exhibit highly complex and nontrivial behaviors.

The nematode Caenorhabditis elegans provides an ideal model system to study such interactions, as it possesses a compact and well-characterized nervous system and a transparent body. These features make it possible to observe the activity of essentially all head neurons in freely moving animals. Using this advantage, we are now constructing a system, which simultaneously record whole-head neural activity and body movements in freely behaving C. elegans.

In this study, we constructed a model that generates the neural activity and body dynamics. By adopting a constructive, simulation-based approach, we aim to investigate what kinds of complexity are inherent in the real nervous system, how strongly neural dynamics are shaped by bodily and sensory feedback, and which sources of information play dominant roles in shaping behavior. This framework provides a foundation for systematically discussing the limits and explanatory power of neural models that explicitly incorporate brain–body–environment interactions.

No. P16

Acoustic Degradation Reweights Cortical and ASR Processing: A Brain-Model Alignment Study

Francis Pingfan Chien

National Taiwan University

Speech perception in noisy environments challenges the brain's ability to map acoustic inputs to linguistic meaning. Here, we combine computational modeling with multivoxel neural decoding to characterize how cortical processing is reweighted by acoustic degradation and how prior knowledge enables rapid speech disambiguation. First, to quantify baseline effects of degradation, we mapped layer-wise embeddings from the Whisper Automatic Speech Recognition (ASR) model to fMRI responses in 25 participants listening to clean and noisy (−3 dB SNR) Mandarin sentences. Under clean speech, model–brain alignment peaked in deeper, predictive representations within frontal regions, including the right inferior frontal gyrus (IFG) and the left middle frontal gyrus (MFG). Under noise, this high-level correspondence was disrupted, with peak alignment shifting toward earlier acoustic representations in Heschl's gyrus and toward evaluative representations in orbital IFG.

Second, we asked how the brain overcomes degradation by testing the disambiguation effect in an independent cohort (N = 21) using a Pre-Noisy/Clean/Post-Noisy paradigm (−12 dB SNR). Brief exposure to clean speech significantly rescued comprehension of subsequent noisy stimuli. Multivoxel pattern analysis (MVPA) and representational similarity analysis (RSA) showed that this behavioral gain was accompanied by a geometric realignment of neural codes: Post-Noisy multivoxel patterns moved significantly closer to the Clean template than Pre-Noisy patterns in superior and middle temporal cortex (STG/MTG) and IFG. Functional connectivity further indicated that this realignment was supported by strengthened top-down coupling between IFG and parietal/sensorimotor circuits. Together, these results suggest that noise initially biases processing toward low-level acoustic encoding, whereas clean exposure stabilizes a high-fidelity temporal template that enables active reconstruction of degraded speech via frontal–sensorimotor network recruitment.

No. P17

Prodromal-like states of neuropsychiatric disorders in a novel DISC1 knockout macaque model: from social withdrawal to brain network reorganization

Ziguo Lan

Graduate School of Medicine, Kyoto University

Understanding the complex neuronal mechanisms underlying neuropsychiatric disorders remains a fundamental challenge, as rodent brains lack critical structure in humans like the dorsolateral prefrontal cortex. To bridge this translational gap, we generated macaque monkeys with mutations in DISC1, a multifunctional gene essential for neurodevelopment and implicated in transdiagnostic mental health risks. At a developmental stage equivalent to human adolescence, these macaques exhibited blunted responsiveness to social stimuli and increased internal focus, effectively mirroring clinical social withdrawal. Resting-state functional MRI revealed disrupted global functional connectivity and a significant reorganization of network topology. Crucially, the dominance of brain hubs shifted from cognitive prefrontal regions to primary sensory areas, indicating a loss of top-down integration. These findings mirror the neural alterations and social adversity identified in high-risk youth, exhibiting a prodromal-like state characteristic of early adolescence. This primate model provides a unique platform to trace how early biological perturbations evolve into psychiatric pathophysiology.

PARTICIPANTS

Name	Institution / Organization	Position	Research interest/topic/aspect	Main research project	Techniques	For the future collaboration	Email
Abhishek Yadav	International graduate program in medicine, college of medicine, Taipei Medical University	Ph.D. Student	clinical neuroscience, psychosis, alzheimer's disease,	Completed two projects on morphometric brain alterations in schizophrenia, and another was related to morphometric brain alterations in hallucinations across the psychosis continuum.	career paths, techniques, research domain	research questions, specific techniques,	d142111002@tmu.edu.tw
Asha Muraleedharan	GRC	Ph.D. Student	Neurodevelopment and neurodegeneration diseases	Effect of TDP-43 C-terminal on Tau in Alzheimer's disease	New methods in imaging, understand more about their research work and help to know open research positions in future needs	I would like to collaborate on neurodevelopmental diseases and cutting edge mechanisms in drug development	muraleedharo001@as.edu.tw
Ayodeji Zabdiel Abijo	TIGP-INS	Ph.D. Student	Neurodegeneration, Therapy, Neuromodulation	My current work focuses on examining the role of a TDP43 mutant in the pathogenesis of Amyotrophic lateral sclerosis and exploration of potential therapeutic targets	Career paths, Research Ideas, work-life balance	Research Questions, state of the art techniques in answering novel research questions	abijoayodeji@gmail.com
Biswanath Saha	Kyushu University	Ph.D. Student	Connectomics, Light microscopy, open-source tool, AI	Establishing a framework for sparse connectomics using high resolution confocal microscopy.	I would love to get to know about other research that's being done, potential career paths post phd	I would like to know about memory formation and recall circuits	bsaha0659@gmail.com
CHANG Ching Pu	NIPS/ExCELLs	Postdoctoral Fellow	In vivo calcium imaging, Astocyte-neuron interaction, Sensory, Cold adaption, Hypometabolism	I am studying how brain stay in tune to the sensory stimulation under hypothermia and hypometabolism using in vivo imaging	1>Know-how of analysing the in vivo calcium imaging data. 2>Learning Design and analysis of animal behaviour. 3>	Let's study hibernation together!	laurencp@nips.ac.jp
Chen Bo-Yu	KSL Lab, IBMS, Academia Sinica	Undergraduate Student	Mechanoreceptors, 3D Reconstruction, Calcium Indicators	My current work involves processing raw calcium imaging datasets from the mice DRG and interpret underlying spiking patterns. I also participate in the cell-resolution 3D reconstruction of mice muscle spindles, and the investigation of their intricate nerve fiber innervations.	Research backstories (e.g. how a research project is conceived), career advice, self-studying maths and physics, hiking and outdoors	I'm open to learning opportunities in the fields of systems neuroscience. Also interested in further studying techniques including volumetric EM, computer vision, and ML model training.	cheno161@as.edu.tw
CHEN Chung-Kuan	Department of Biological Sciences, Graduate School of Science, The University of Tokyo	Postdoctoral Fellow	neuroscience,behavior, computational biology	My current research is using calcium imaging to measure and elucidate how neural activity controls behavioral decisions in nematode C. elegans.	career paths,general interests	I am interested in perspectives about impact of AI (especially the LLM) on fields of the academic research .	chungkuanchen@g.ecc.u-tokyo.ac.jp
Chen-Cheng Yang	Kaohsiung Medical University	Professor / Research Fellow	AI, machine learning, deep learning, exposome, proteomics	My current research focuses on occupational neuroscience, particularly the neurocognitive and functional recovery of workers with occupational injuries, including traumatic brain injury. I integrate functional assessments (e.g., ADL/IADL), behavioural data, and multimodal biomarkers with advanced machine learning models to predict return-to-work outcomes and neurological prognosis. In parallel, I develop digital health interventions and AI-driven risk prediction models to support brain health, cognitive resilience, and precision rehabilitation in occupational settings.	techniques, reseach idea	new techniques, translation science	abcmacoto@gmail.com

PARTICIPANTS

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CHOU SHIH-HUA	Graduate School of Medical Sciences, Kyushu University	Ph.D. Student	enteroendocrince cells, nutrient sensing, calcium imaging	I am investigating the nutrient or chemical discrimination in the gut with multiple approaches including ex vivo calcium imaging and in vivo stimulation. I now further working on elucidating the physiological effects of the discrimination.	Through this chance, I would like to gain experiences about career paths and general interests.	If possible, I would also like to get new oppurtunites in model systems and research questons	shihhuachou@gmail.com
Francis Pingfan Chien	National Taiwan University	Ph.D. Student	Computational Neuroscience, cognitive function	I am currently pursuing research to decipher the neural representations underlying human language and speech processing. My work integrates cognitive neuroscience, fMRI, and state-of-the-art deep neural networks to examine how artificial models can explain the neural mechanisms of language comprehension, especially under varying listening conditions.	general interests	neural data from animal studies	f12b49004@ntu.edu.tw
FU, CHIH-WEI	National Institute for Physiological Sciences	Postdoctoral Fellow	motor learning/ spine dynamics/ primary motor cortex	I analyze layer 1 dendritic spine turnover of layer 5 pyramidal neurons in the primary motor cortex using two-photon in vivo imaging. In addition, I assess spine stability by tracking AMPA receptor dynamics within individual dendritic spines.	techniques and research ideas	specific techniques and research questions	fucw@nips.ac.jp
Han Chin Wang	ICOB, Academia Sinica	Professor / Research Fellow	sensory, autism, cortex	Source and function of representational drift in the sensory cortex. Convergent circuit mechanism of autism spectrum disorders	technique, ideas	pathogenesis of autism	hancwang@gate.sinica.edu.tw
Han-Yuan Yeh	Institiute of Molecular Biology, Academia Sinica	Postdoctoral Fellow	Parkinson's disease, deep brain stimulatio, spine dynamics, two-photon microscopy	I investigate the mechanism of PD and STN-DBS in the neuronal circuit point of view by observing the structural plasticity (spine dynamics) in the motor cortex under two-photon microscopy	career paths (academy or industry) and research ideas	two-photon microscopy, mouse PD model, spine dynamics and motor learning	tubayeh@gmail.com
Hsuan Wei, Lin	國立陽明大學/神經研究所	M.S. Student	Spine plasticity, Motor learning, Development, Cortical-Striatum	I use two-photon microscopy to image dendritic spines of L5PNs in M1 during a reaching task. By comparing the plasticity differences between adolescent and adult mice, I try to figure out the neural mechanisms underlying their different learning capabilities.	SeeDB-Live, Spine Maturation idea	SeeDB-Live, dSTORM imaging	jasonlin2234.ls14@nycu.edu.tw
Hsueh-Te Lee	Anatomy and cell biology, National Young Ming chiao Tung University	Professor / Research Fellow	Neurovascular unit, CSVD, Alzheimer's disease	Our study focuses on investigating multifunctional role of blood-brain barrier/neurovascular unit (NVU) in neurodegeneration disease，metastatic brain tumor and cerebral small vessel disease.	Sure model systems	Model system	incubator.lee@nycu.edu.tw
Jr-Kai Yu	ICOB, Academia Sinica	Professor / Research Fellow	EvoDevo, Evolutionary Genomics, Marine Biology	"My research is focused on the evolution of developmental mechanisms, particularly interested in the origins of novel chordate and vertebrate characters, and the developmental and genomic changes that may have led to the emergence of these novel characters. My research team mainly uses cephalochordates (Amphioxus), an early-branching chordate lineage, as our model system. We also use other invertebrate deuterostomes, including hemichordates and echinoderms, as outgroups for comparative studies.	New techniques and research ideas on using emerging new model organisms for research on basic biological questions	As serving as the chief of Marine Research Station of Academia Sinica, I am looking forward to potential collaboration of using marine/aquatic organisms as models	jkyu@gate.sinica.edu.tw
Mei-Lun Huang	Institute of Molecular Biology, Academia Sinica	Postdoctoral Fellow	Crosstalk between central nervous system and immune system	Meningeal immune cell development and response in disease model	Career path and research idea	Research question	meilunhuang@as.edu.tw

PARTICIPANTS

Name	Institution / Organization	Position	Research interest/topic/aspect	Main research project	Techniques	For the future collaboration	Email
KIM MIN SEONG	Yonsei University	Undergraduate Student	Neuroscience, Cerebellum, Neurodegeneration, Mitochondrial Biology, Neuroimaging	I am an undergraduate student conducting research training in a neuroscience laboratory. My current work involves immunohistochemistry, tissue imaging, and quantitative analysis of cerebellar structures. Through this training, I am building a foundation in experimental neuroscience and neuroanatomical analysis.	I would like to learn about advanced neuroscience techniques, imaging methods, experimental design, and career paths in academia. I am also interested in discussing neurodegenerative diseases, mitochondrial biology, and neural circuit research.	Neurodegeneration, mitochondrial biology, cerebellar function, advanced imaging techniques, and quantitative image analysis.	idyllic486@yonsei.ac.kr
Ming-Ching Chiang	Okinawa Institute of Science and Technology	Postdoctoral Fellow	Learning and Memory, hippocampal physiology, Animal Behavior	I'm investigating the neural dynamics supporting memory consolidation during artificial hibernation	Open to any possibility	Open to any possibility	ming.chiang@oist.jp
Ming-Liang LEE	National Institute for Physiologic sciences	Postdoctoral Fellow	brain glucose-sensing, thermoregulation, hibernation, glucose metabolism	I study the how body temperature modulate hypothalamic glucose-sensing and how glucose-sensing neurons involve thermoregulation.	looking for a faculty job. How to expend you research.	1) Someone who experts in 2-photon, light sheet, and other imaging method. 2)somenes who expert in screening target genes or neurons, like RNA-seq and omics.	lee@nips.ac.jp
Mohammad Uzair	IBMS, Academia Sinica, Taipei, Taiwan	Intern	Neuro–glial–immune interactions, and the central question it raises, i.e., how signaling between neurons, glia, and immune cells shapes sensory processing and its affective dimensions across health and disease. This project motivates me because it connects circuit-level computation to biological state and allows for experimentally testable predictions.	How different glial cell types interact with local neurons in S1 during sensory processing and whether these interactions influence neuronal response properties and circuit plasticity.	I am interested in discussing emerging research ideas, interdisciplinary collaborations, and innovative methodologies with peers to broaden my perspective and identify impactful problems.	I am particularly interested in exploring the research question: _What is the role of genes, mRNAs, miRNAs, and lncRNAs in regulating neuron–glial interactions?_ I would welcome collaboration on experimental and computational approaches that dissect these regulatory networks in neurological contexts.	mohammaduzair37201@gmail.com
Okafor Chinedu Emmanuel	EBONYI STATE UNIVERSITY	Undergraduate Student	Neural circuits dynamic brain tumour	Brain-Computer Interfaces & Neuromodulation: Research into Deep-Brain Stimulation (DBS) is advancing from simple neuromodulation to chronic neuro-remodeling, reshaping network activity to treat movement and neuropsychiatric disorders.	yes by researching ideas	Imaging methodologies	yunusajarma@aol.com

PARTICIPANTS

Name	Institution / Organization	Position	Research interest/topic/aspect	Main research project	Techniques	For the future collaboration	Email
Rudi Tong	OIST	Postdoctoral Fellow	Vision, Cephalopods, Synaptic computation	I am investigating the cellular composition of the cephalopod optic lobe, with the ultimate goal of understanding the circuitry that underlies visuomotor transformation in camouflage. In addition, I also study how astrocytes integrate and modulate neuronal activity in the mouse visual cortex.	translating modern neuroscience techniques to the cephalopod system	early visual circuitry of other model systems, single neuron computational modelling	rudi.tong@oist.jp
Samraggi Chakraborty	Academia Sinica, Institute of Biomedical Sciences	M.S. Student	Systems Neuroscience, Sensorimotor Integration, Cross-species Brain Function, Neural Circuits and Comparative Neuroscience	I am currently working on the octopus nervous system, focusing on both central brain and peripheral arm regions using electron microscopy. My work involves optimizing sample preparation protocols for ultrastructural analysis, including tissue-specific fixation and processing. I also participate in 3D reconstruction, segmentation, and data analysis to study neural circuit organization. This project provides training in neural circuit reconstruction and high-resolution imaging techniques.	I am particularly interested in discussing comparative neural circuit organization across species, especially between cephalopods and vertebrates. I would like to learn more about advanced electron microscopy techniques, connectomics, and 3D reconstruction workflows. Additionally, I am keen to exchange ideas on sensorimotor integration, proprioception, and how diverse nervous systems evolve to support complex behaviors and also learn how to make better experimental designs. I am also interested in learning about interdisciplinary research approaches and career pathways in systems neuroscience.	I am interested in collaborations in sensory neuroscience and neural circuits across species, particularly using connectomics, electrophysiology, and computational approaches. I aim to explore how these insights can contribute to brain-computer interfaces and sensory neuroprosthetics, with a focus on sensorimotor integration and adaptive behavior.	mail2samraggichakraborty@gmail.com
Samuel Herianto	Academia Sinica & NTU	Ph.D. Student	Bacterial ESCRT-III proteins, Biological Membranes, Liposomes	My research interests center on membrane-binding proteins, especially bacterial ESCRT-III, with a focus on understanding their biophysical effects on biological membranes. I am also interested in bacterial contamination and chemical decontamination strategies in food products.	research ideas and career paths	research questions	samuelhgmunthe@gmail.com
Sheng-Yao Huang	Soochow University / Department of Mathematics	Professor / Research Fellow	Brain network，Alzheimer's disease，functional connectivity	Research on brain networks	techniques, research ideas	specific techniques, model systems	vic.huang1973@gmail.com
Shigenori Inagaki	Kyushu university	Assistant Professor	Imaging, Tools, sensory processing	Development of a live-tissue clearing technique	techniques, research ideas, career paths	microscopy	inagaki.shigenori.570@m.kyushu-u.ac.jp
Simon Miguel Manatad Lopez	Institute of Biomedical Sciences, Academia Sinica	Ph.D. Student	Neurotechnology, Optogenetics, Tool Development	I am working on engineering channelrhodopsins for efficient and targeted inhibition. I have experience from molecular design until in vivo validation of our tools.	Career paths	Tool validation	simonmiguelmlopez@gmail.com

PARTICIPANTS

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Srimayee Bhattacharjee	IMB	Postdoctoral Fellow	Astrocyte calcium imaging, contextual guidance, astrocyte-neuron interaction	Astrocyte heterogeneity across the MOp revealed specific layer wise properties. Layer 1 astrocytes stood out to be a distinct population with specific morphology, calcium properties and gene expression profiles. Overall my current research highlights the region specificity of astrocytes suggesting contribution to different functions in different layers.	Research ideas and career paths	new techniques that make the neuron-astrocyte study more possible	srimayee.bhattacharjee@gmail.com
Sun-Hsing Ho	IBMS, Academia Sinica	Summer Intern (Undergraduate)	Spike Inference	Spike Inference	career paths, algorithms and ML techniques	ML application	b13209041@g.ntu.edu.tw
Takuma Kitanishi	The University of Tokyo	Professor / Research Fellow	Spatial navigation, memory, hippocampus, nucleus of the solitary tract	Our lab investigates the neural circuit mechanisms that support spatial navigation and memory, focusing on the hippocampus and associated brain areas. Specifically, we perform high-density, multi-area electrophysiological recordings of neuronal activity in behaving rodents to elucidate neuronal population dynamics.	in vivo physiology, career path in Taiwan	In vivo ephys, Alzheimer's disease, lung-brain communication	tkitanishi@g.ecc.u-tokyo.ac.jp
Tien-Ying Tsai	GRC, AS	Postdoctoral Fellow	TDP-43, Amyloid beta, autophagy, Single molecule tracking, LLPS	I'm currently working on investigating Amyloid-β and TDP-43 complex formation and its impacts on autophagy and cellular functions in Alzheimer's Disease. I'm also intersted in the effect of Aβ on TDP-43 LLPS.	Techniques for single molecule tracking and live cell imaging, research ideas, career paths	Open to any collaboration opportunities	tien881009@gmail.com
Tinsae Mekdim Hailu	Taipei Medical University	M.S. Student	Neurodegenerative diseases, Gut-Brain axis, Traumatic brain injury, Gut-Microbiome and Parkinson's disease	How does the Gut microbiota change over the course of Parkinson's disease? What is the spectrum of change in gut-microbiota and microbial metabolites in PD from the prodromal stage to the onset of motor symptoms?	Research ideas, career paths and more importantly how to effectively prepare for my career path as a physician researcher while still I am doing my master's.	Neurodegenerative diseases in Ethiopia. Recently the aging population is increasing in Ethiopia with the neurodegenerative diseases associated with it. But the community lacks the awareness while the physicians lack the experience with these disease spectrums. I want to have a collaboration to solve this problem.	tintinmek2121@gmail.com
Tomomi Nemoto	National Institute for Physiological Sciences	Professor / Research Fellow	Two-photon microscopy, super-resolution microcsopy, in vivo deep imaging, Ca2+ signaling	We aim to elucidate the principles underlying the emergence of physiological functions and their molecular basis by developing new optical imaging methods that leverage cutting-edge laser technology. In particular, by achieving non-invasive, wide-area, and super-resolution imaging of deep biological tissues, I am significantly advancing research on the central nervous system and biological rhythms.	I would like to gain insights into cutting-edge imaging technologies in neuroscience and their applications. In particular, I would also like to discuss the spillover effects of Taiwan's outstanding optical science.	the development of novel imaging techniques for neuroscience	tn@nips.ac.jp
Tran Minh Nghia	Taipei Medical University	M.S. Student	neuromuscular disease, stem cell, bioengineering, cell senescence	My research focuses on the role of senescence and the senescence-associated secretory phenotype (SASP) in sarcopenia. I am particularly interested in establishing and characterizing cellular senescence models to investigate the mechanisms underlying muscle aging and to support the development of potential therapeutic strategies.	I am interested in new techniques, bioengineered models to better simulate physiological nuances, and career opportunities in research and development.	iPSC culture and iPSC-derived model, 3D co-culture	m658113003@tmu.edu.tw

PARTICIPANTS

Name	Institution / Organization	Position	Research interest/topic/aspect	Main research project	Techniques	For the future collaboration	Email
Tsai, Yu-Liang	Institute of Chemistry, Academia Sinica	Postdoctoral Fellow	Neural tissue engineering, neurodegenerative diseases, Neural Networks and Deep Learning	Developing peptide-based materials or therapuetic methods for neuronal tissue repair and alleivating neurodegenerative diseases	techniques, research ideas, career paths	model systems, or research questions	yuliang.jimmy.tsai@gmail.com
Tsung-Rong Kuo	TMU/ Graduate Institute of Nanomedicine and Medical Engineering, College of Biomedical Engineering	Professor / Research Fellow	Bioanalysis,Interfaces, Surfaces,Materials, and Catalysis,Drug Design and Delivery	The convergence of advanced materials science, surface chemistry, and molecular therapeutics has opened new frontiers in precision medicine. This study presents the development of a multifunctional, bio-inspired nanoplatform designed to bridge the gaps between biomimetic catalysis, ultra-sensitive bioanalysis, and targeted drug delivery. By precisely engineering the surface interfaces of mesoporous silica nanoparticles decorated with transition-metal single-atom catalysts (SACs), we created a highly responsive system capable of both diagnostic sensing and therapeutic intervention.	RESEARCH IDEAS	model systems	trkuo@tmu.edu.tw
Tsai-Yang Hsieh	NDMU	Undergraduate Student	decision making, attention, conscious, essence of life	I work in Dr. Yang You Ping's lab in NDMU. We currently make the monkeys play rock paper scissors to observe their theory of mind.	More detail of how to capture the brain's of when animal or us do sth. New treatment or perspective of the neuro disease.	I'm just a studen, so currently I have no idea of collaboration. thanks	henrysonhsieh@gmail.com
Tzu-En Hung	Institute of Molecular Biology, Academia Sinica	Ph.D. Student	behaviors, single-cell/nucleus, autism	I'm investigating the piriform cortex of mouse brain. My work is to compare the composition (Main genes especially) in this region between different genotypes including the autism-related mouse.	research ideas or techniques	research questions	howred1123@gmail.com
Wen-Hsin Lu	OIST	Postdoctoral Fellow	astrocyte, tripartite synapse, transcriptome	The aim of my research is to use a novel method to collect transcripts from identified cell types in hippocampus.	techniques, the function of astrocytes in hippocampus	techniques	wen.lu@oist.jp
WU KEXUAN	Graduate School of Arts and Sciences, The University of Tokyo	M.S. Student	body-brain communication/ respiration/ the nucleus of the solitary tract (NTS)	Recording large-scale neuronal activity in the mouse nucleus of the solitary tract (NTS) using Neuropixels 2.0 probes while simultaneously monitoring respiration.	neural population dynamics/ computational analysis methods	Neuropixels recording/ brainstem circuits/ respiration–brain communication	wukexuan@g.ecc.u-tokyo.ac.jp
You -chain, Liao	中興	Research Assistant	Neuroscience	Neuroscience	Neuroscience	Neuroscience	timecisr8@gmail.com
Younes Kettani	IBMS	Intern	Artificial intelligence; robotics; embedded systems; biomedical devices; sensory neuroscience	I am developing and testing a temperature-controlled device for delivering precise heating and cooling stimuli to rodent paws during neuroscience experiments.	Neural imaging techniques, sensory stimulation methods, experimental device design, and career paths combining engineering and neuroscience.	AI and robotics for biomedical applications, embedded systems, automated experimental tools, and intelligent control systems.	younes.kettani2@gmail.com

PARTICIPANTS

Name	Institution / Organization	Position	Research interest/topic/aspect	Main research project	Techniques	For the future collaboration	Email
Yu ru Liu	Tunghai University	Professor / Research Fellow	Chicken embryo development, molecular biology, animal science	Environmental auditory intervention during chicken embryo development affects adult stress coping response.	Techniques and research ideas	Animal science related research	wallisliu@thu.edu.tw
Yu-Chia Chuang	IBMS, Academia Sinica	Postdoctoral Fellow	Ultrasound, mechanosensation, neuromodulation, sonogenetics, axon outgrowth	I focus on the mechanism of ultrasonic neuromodulation and the application of ultrasonic piezoelectricity.	Techniques and research ideas	Ultrasonic neuromodulation system	tenringben@gmail.com
Yuichi Iino	University of Tokyo	Postdoctoral Fellow	neural circuit, C. elegans, behavior, dynamics	Imaging of nervous system activities and modeling the dynamics of neurons and generated behavior.	Circuit dynamics and network structure in general	Modeling, imaging techniques	iino@bs.s.u-tokyo.ac.jp
Yutaro Ueoka	Univ. of Tokyo	Professor / Research Fellow	Neuroscience, C. elegans, simulation	My research focuses on neuroscience using C. elegans. I use confocal and light-sheet microscopy to record whole-brain neural activity and am currently developing computational simulations based on these datasets.	neural simulation method, imaging technics including fluorescent proteins	simulation of neuron and behavior	yutro10@gmail.com
Yu-Wei Lin	Johns Hopkins University	M.S. Student	neuromodulation, neural degeneration	i am a clinical neurologist and currently studying AI applications in public health	any topics about neurology	AI application in public health of neurology fields	yuweilin86@ntu.edu.tw
Ziguo Lan	Kyoto University Graduate School of Medicine	Ph.D. Student	Psychiatric disorders; Non-human primate; DISC1	My research investigates how genetic risk factors shape the emergence of neuropsychiatric disorders, using a novel DISC1 knockout macaque model that captures developmental processes inaccessible in rodents. I employ a multimodal framework spanning behavioral assays, neuroimaging, and EEG-based endophenotypes to identify early biological signatures that precede clinical manifestation.	I would be very interested in discussing the developmental and circuit-level mechanisms that give rise to positive symptoms such as hallucinations. My own primate work points to disrupted sensory hierarchies and impaired top-down integration, and I am especially curious how these themes relate to findings in human patients and rodent models. Beyond science, I would also welcome conversations about career paths in translational psychiatry research and how to navigate cross-species, cross-disciplinary work.	I am open to collaborations that strengthen the translational value of our primate model. On the technical side, I am particularly interested in advanced circuit-level approaches in non-human primates, such as viral tracing, chemogenetics, and in vivo electrophysiology, as well as computational frameworks for modeling brain network dynamics and predictive coding. On the conceptual side, I would welcome partnerships with clinical researchers working on prodromal or first-episode psychosis cohorts, where cross-species comparison of neural and behavioral signatures could be especially powerful.	lan.ziguo.64p@st.kyoto-u.ac.jp

Acknowledgments

The Organizing Committee gratefully acknowledges everyone who contributed to the 4th Taiwan-Japan Neuroscience Exchange Conference and to its first gathering in Taiwan.

We thank all speakers, session chairs, poster presenters, reviewers, and laboratory hosts for sharing their research, experience, and perspectives, and for creating opportunities for discussion and exchange throughout the meeting. We also sincerely thank the colleagues and administrative staff at the **IBMS and NPAS, Academia Sinica**, as well as all local staff and volunteers, for their support in the preparation and coordination of the conference.

We are equally grateful to our co-organizing institutions for providing excellent venues and facilities throughout the meeting, and to our sponsors not only for their generous support, but also for providing students and early-career researchers with opportunities to engage with industry, learn about emerging technologies, and gain perspectives beyond academia.

We would also like to express our special appreciation to the **JSPS Dynamic Brain project**, whose support enabled the participation of many researchers from Japan and greatly enriched the scientific exchange at this year's meeting.

Most importantly, we thank all participants for bringing their curiosity, ideas, and enthusiasm to the meeting. We hope that the conversations and connections begun here will continue beyond these two days and grow into lasting scientific exchange and collaboration between Taiwan, Japan, and the broader neuroscience community.

Looking ahead, we hope that the Taiwan-Japan Neuroscience Exchange Conference will continue to be held in Taiwan and Japan in alternating years. Please stay connected for future announcements. If you would like to contribute to the future development of this conference in any way, we warmly welcome you to get in touch with us.

Co-organizers

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Transformative Research Area(A) FY2024-2028
Emergence of Brain Functions from the Dynamic Connectome

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