2025 INTERNATIONAL FORUM ON MESOSCOPIC BRAIN MAPPING

SEP 20-21, 2025
Shanghai, China

ORGANIZERS

- Pujiang Innovation Forum
- Center for Excellence in Brain Science and Intelligence Technology (Institute of Neuroscience), Chinese Academy of Sciences
- Hainan University
- Shanghai Center for Brain Science and Brain-inspired Technology
- BGI Research

ABOUT THE FORUM

Brain mapping research is the cornerstone of understanding brain structure and function, providing key support for exploring brain mysteries. Mapping the whole-brain mesoscopic map can resolve the cell type and spatial distribution of nearly 100 billion neurons and reveal the connectivity mechanisms between neurons. In particular, analyzing primate mesoscopic brain maps can provide targets for the diagnosis and treatment of brain diseases, inspire new brain-like intelligence research, and drive a new generation of intelligent technology innovation.

The 2025 International Forum on Mesoscopic Brain Mapping will focus on the global cutting-edge brain mapping research results and technological advances, and invite experts from home and abroad to make reports. The conference will further complete the international Consortium for Mesoscopic Mapping of Primate Brains , set up an open and collaborative international platform, and promote exchanges and cooperation in the field of mapping research.

ORGANIZATIONAL STRUCTURE

Organizers

- Center for Excellence in Brain Science and Intelligence Technology (Institute of Neuroscience), Chinese Academy of Sciences
- Hainan University
- Shanghai Center for Brain Science and Brain-inspired Technology
- BGI Research

Supporting Institutions

- State Key Laboratory of Brain Cognition and Brain-inspired Intelligence Technology
- Shanghai Municipal Science and Technology Commission

Hosting Institution

- Center for Excellence in Brain Science and Intelligence Technology (Institute of Neuroscience), Chinese Academy of Sciences

International Organizing Committee

- Alan Evans (Global Brain Consortium, Canada)
- David Kleinfeld (University of California at San Diego, USA)
- Henry Kennedy (Stem Cell and Brain Research Institute in Lyon, France)
- Qingming Luo (Hainan University, China)
- Jan Mulder (Karolinska Institute, Sweden)
- Rosario Moratalla (Cajal Institute, Spain)
- Zoltan Nusser (HUN-REN Institute of Experimental Medicine, Hungary)
- Nicola Palomero-Gallagher (Institute of Neuroscience and Medicine, Germany)
- Muming Poo (Center for Excellence in Brain Science and Intelligence Technology, CAS, China)
- Mohanasankar Sivaprakasam (Indian Institute of Technology Madras, India)
- Dick Swaab (Netherlands Institute for Neuroscience, Netherlands)

Local Organizing Committee

- Yongyong Shi (Center for Excellence in Brain Science and Intelligence Technology, CAS, China)
- Yangang Sun (Center for Excellence in Brain Science and Intelligence Technology, CAS, China)
- Zhiming Shen (Center for Excellence in Brain Science and Intelligence Technology, CAS, China)
- Chun Xu (Center for Excellence in Brain Science and Intelligence Technology, CAS, China)
- Yixi Gu (Shanghai Center for Brain Science and Brain-Inspired Technology, China)
- Yeukuang Hwu (Shanghai Advanced Research Institute, CAS, China)
- Longqi Liu (BGI Research, China)
- Shiping Liu (BGI Research, China)
- Xun Xu (BGI Research, China)
- Anan Li (Hainan University, China)
- Hui Gong (HUST-Suzhou Institute for Brainsmatics, China)
- Xiaoquan Yang (Hainan University, China)

Secretariat

- **CEBSIT:**
  Jinqi Zhu, Chao Wu, Chiyuan Yao, Jiao Fang, Chengjun Zhao, Chengxuan Ge
  Zhiming Shen, Biyu Ren
- **Hainan University:**
  Hua Shi
- **Shanghai Center for Brain Science and Brain-Inspired Technology:**
  Yixi Gu, Yang Wang
- **BGI Research：**
  Shiping Liu, Youning Lin

International Consortium for Primate Brain Mapping (ICPBM)

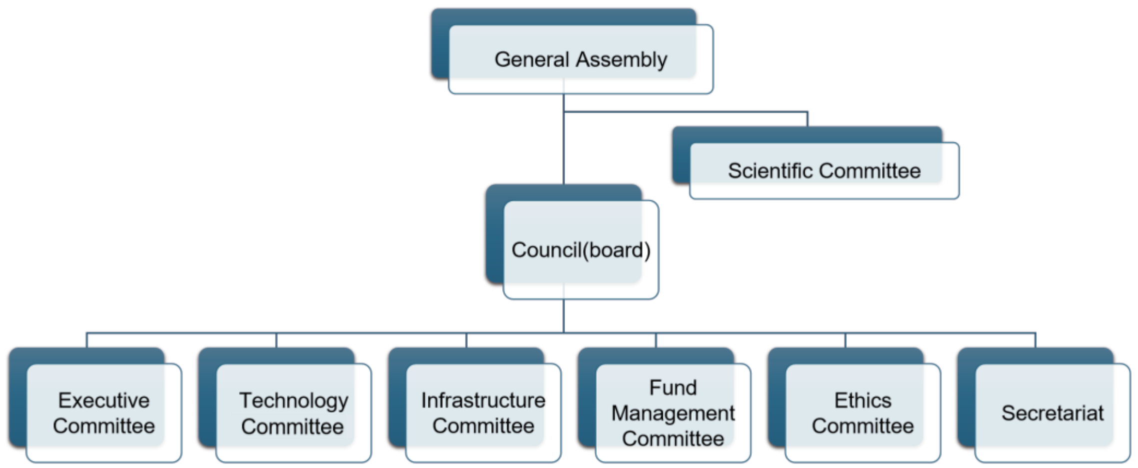
• Vision

Create the world's first complete mesoscopic atlases of primate brains, establishing a new paradigm for global neuroscience collaboration

• Mission

To systematically identify all cell types, map their spatial distributions and whole-brain connectivity, and identify specific molecular interactions in non-human primate and human brains through international collaboration

• Organization



International Institutional Partners:

ION | HNU | BGI | BSBII| SYNAPSE | KIST | OVGU |

HUN-REN IEM | Monash | IITM| CI |

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Additional institutions are welcome to participate!

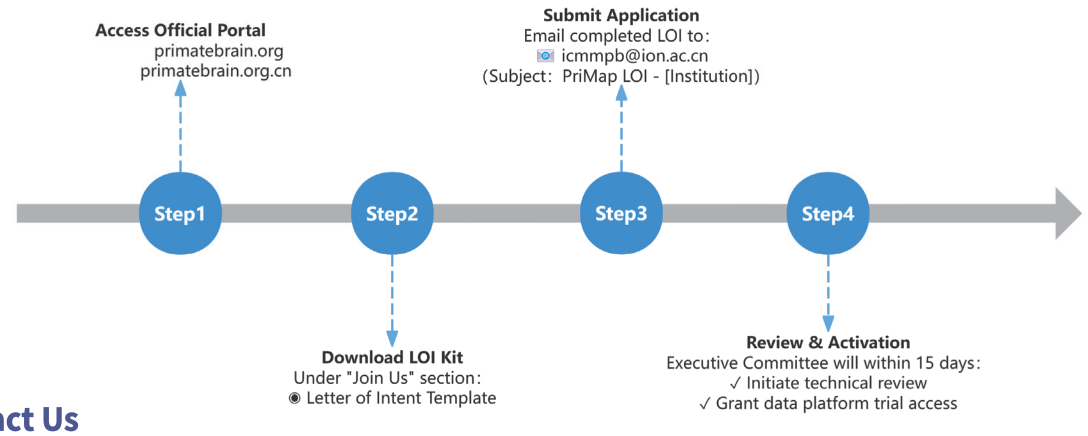
• Members

The consortium has secured endorsement from over 100 distinguished scientists representing over 55 institutions in about 25 nations at its inception, with global participation growing steadily (up to August , 2025)

• Membership Benefits & Obligation

Benefits	Obligation
1). Access to the latest technologies, core facility, and data	1). Collaboration and sharing data / resources
2). Access to new AI tools for brain mapping	2). Atlas development commitments
3). Opportunity for international collaboration	3). Ethical compliance
4). Potential for securing funding	4). Knowledge dissemination and publicity
5). Impact and recognition	

• How to Join



• Contact Us

- Email address: icmmpb@ion.ac.cn
- Website address: https://primatebrain.org/
  https: //primatebrain.org.cn/

The mesoscale is where circuits become cognition.
Join us to build the first primate brain connectome atlas!

FORUM INFORMATION

Dates: September 19-21, 2025

Venue: Hope Hotel Shanghai
(Address: 500 Zhao-Jia-Bang Rd. Xuhui Dist, Shanghai, China)

Onsite Registration and Reception:
SEP 19 Friday: 15:00-18:00 Lobby, Hope Hotel.
SEP 20 Saturday – SEP 21 Sunday: 8:00-17:00 Lobby, Hope Hotel

Meals: Please wear your badge when coming to the restaurant

Accommodation:
it is NOT included in the registration fee, please book hotel on your own.

Invoice can be acquired via website, www.brain-mapping.cn
Invoice enquiries please contact: mate@sciencemate.com

TRANSPORTATION

A | Shanghai Pudong International Airport-Hope Hotel Shanghai

Public Transport: Walk 150 meters to take Metro Line 2 (towards National Exhibition and Convention Center), get off at Century Avenue Station, transfer to Metro Line 9 (towards Shanghai Songjiang Station), get off at Zhaojiabang Road Station Exit 2, and walk 580 meters to the hotel.

Online Car-Hailing:
Approximately 45.3 kilometers, taking about 1 hour with a fare of around 160 yuan.

B | Shanghai Hongqiao International Airport-Hope Hotel Shanghai

Public Transport: Walk 140 meters to take Metro Line 10 (towards Jilong Road), get off at Shanghai Library Station Exit 3, and walk 1.9 kilometers to the hotel.

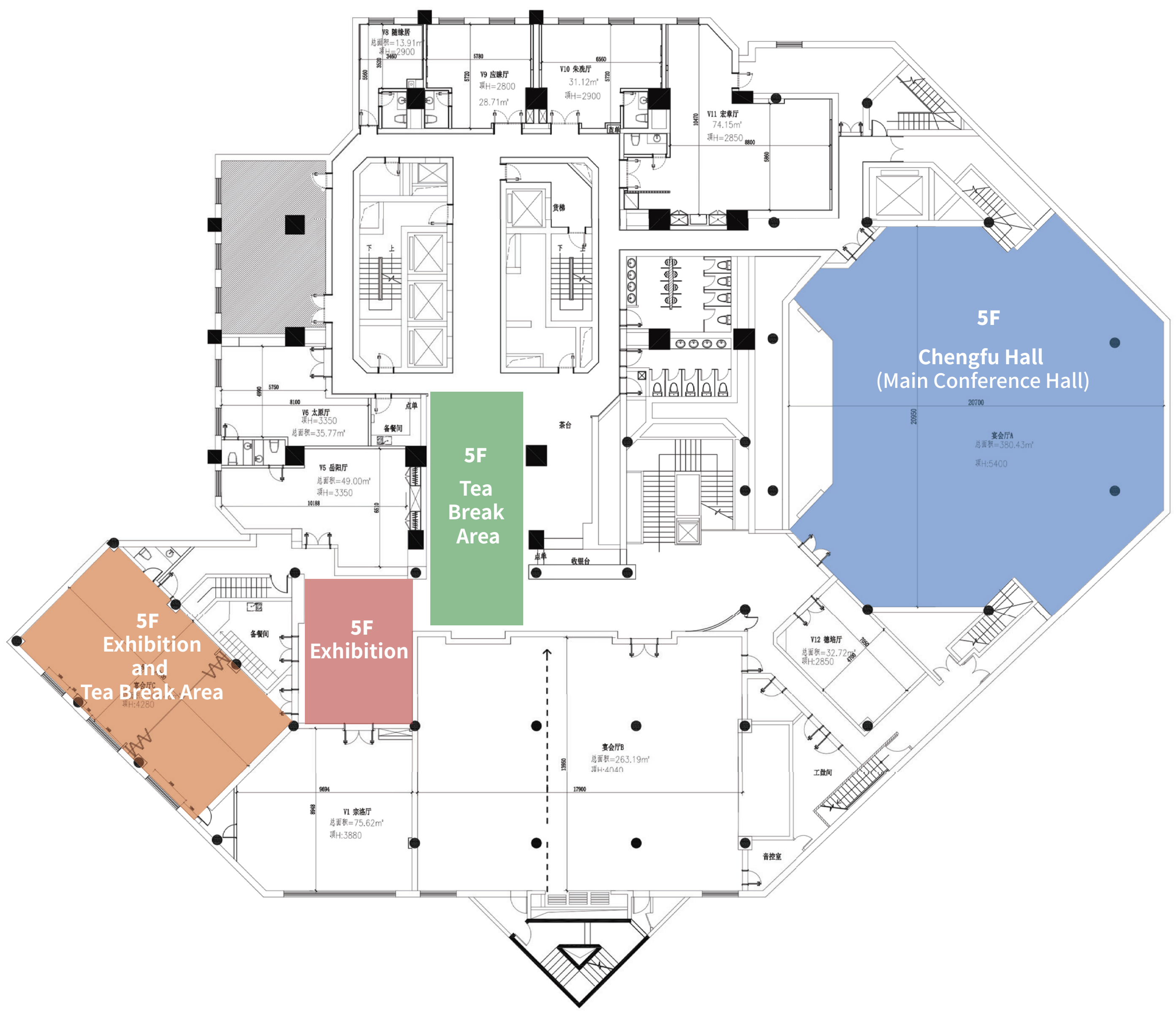
Online Car-Hailing:
Approximately 18.3 kilometers, taking about 51 minutes with a fare of around 59 yuan.

C | Shanghai South Railway Station-Hope Hotel Shanghai

Public Transport: Walk 10 meters to take Metro Line 1 (towards Fujin Road), get off at Xujiahui Station, transfer to Metro Line 9 (towards Caolu) within the station, get off at Zhaojiabang Road Station (Exit 2), and walk 570 meters to the hotel.

Online Car-Hailing:
Approximately 8.5 kilometers, taking about 30 minutes with a fare of around 30 yuan.

VENUE MAP



AGENDA

SEPTEMBER 20, Saturday, 2025 I DAY 1 Chengfu Hall 5F (Main Conference Hall)		
Event		
09:00-09:10	Openning Remarks	
09:10-09:40	Mesoscopic Mapping for Primate Brains- An International Collaborative Project	
09:40-09:45	Inauguration Ceremony	
09:45-09:50	Signing Ceremony	
09:50-09:55	Group Photo (Please remain seated)	
09:55-10:10	Tea Break (15 min)	
10:10-10:50	George Paxinos	Keynote Lecture I Abbreviations in Neuroscience: Lessons from The Periodic Table Affiliation I Australian Academy of Science, Australia
10:50-11:30	Nikos K. Logothetis	Keynote Lecture I Mapping Multistructure Dynamic Connectivity in Epochs of Synaptic and System Consolidation Affiliation I International Center for Primate Brain Research, CEBSIT, CAS, China
11:30-12:10	Qingming Luo	Keynote Lecture I A mouse brain stereotaxic topographic atlas with isotropic 1-µm resolution Affiliation I Hainan University, China
12:10-13:30	Luncheon / Buffet Restaurant 3F	

Topic 1: Connectome		
Moderators I Marcello Rosa (Monash University, Australia) Hanchuan Peng (Fudan University, China)		
13:30-13:45	Andrew Parker	Presentation I Fingerprints, precision and energy: insights and prospects for brain mapping from the visual system Affiliation I Oxford University UK & OvGU, Magdeburg, Germany
13:45-14:00	Noritaka Ichinohe	Presentation I Toward a Laminar-Aware Mesoscale Connectome of the Common Marmoset Affiliation I National Center of Neurology and Psychiatry, Japan
14:00-14:15	Guoqiang Bi	Presentation I Mesoscopic mapping with VISoR: from brain to body Affiliation I Shenzhen Institute of Advanced Technology, CAS, China
14:15-14:30	Anna Mitchell	Presentation I Thalamocortical neural circuits: working out why they matter in health and disease Affiliation I University of Canterbury, New Zealand
14:30-14:45	Ron Stoop & Jack van Honk	Presentation I Cross - Species Research of Amygdala Circuits in Fear and Social Behavior Affiliation I University of Lausanne, Swiss & Utrecht University, Netherlands
14:45-15:00	Takeshi Imai	Presentation I Multicolor mapping of neuronal circuits Affiliation I Kyushu University, Japan
15:00-15:15	Jun Yan	Presentation I Single-neuron Projectomes in Mouse and Macaque Brains Affiliation I Center for Excellence in Brain Science and Intelligence Technology (Institute of Neuroscience), CAS, China
15:15-15:30	Takuya Hayashi	Presentation I Dynamics of Brain Function and Organization from Marmoset, Macaque to Human – A Modern Cross-species Approach Affiliation I RIKEN Center for Brain Science, Japan
15:30-15:50	Break (20 min)	

AGENDA

Topic 2: Human Brain Atlas

Moderators | Jaikishan Jayakumar (Indian Institute of Technology Madras, India)

15:50-16:05	Da Mi	Presentation | Non-epithelial radial glial cells maintain the production of GABAergic inhibitory neurons and glial cells in the developing human brain Affiliation | Tsinghua University, China
16:05-16:20	Mohanasankar Sivaprakasam	Presentation | Whole brain cell-resolution imaging and 3D reconstruction Affiliation | Indian Institute of Technology Madras, India
16:20-16:35	Jiadong Chen	Presentation | Molecular Pathology of Drug-Resistant Epilepsy Affiliation | Zhejiang University, China
16:35-16:50	Wu Wei	Presentation | A Population-scale Single-cell Spatial Transcriptomic Atlas of the Human Cortex Affiliation | Lingang Laboratory, China
16:50-17:05	Jing Zhang	Presentation | The China Brain Multi-omics Atlas Project (CBMAP): Building a Population-Scale Multi-Omics Reference for Human Brain Research Affiliation | Zhejiang University, China
17:05-17:45	**Panel Discussion (40 min)** David Kleinfeld、Marcello Rosa、Pedro A. Valdes-Sosa、Tianzi Jiang Jaikishan Jayakumar、Pengcheng Zhou、Henry Evrard	Moderators Henry Kennedy (Stem Cell and Brain Research Institute in Lyon, France) Yeukuang Hwu (Shanghai Advanced Research Institute, CAS, China)

SEPTEMBER 21, Sunday, 2025 | DAY 2

Chengfu Hall 5F (Main Conference Hall)

Event

09:00-09:40	Hong-Wei Dong	Keynote Lecture | Decoding the Mouse Brain: A Decade of Neural Network Mapping Affiliation | University of California Los Angeles, USA

Topic 3: AI Tools & Data Integration

Moderators | Jianfeng Feng (Fudan University, China)

09:40-09:55	Mohammadreza Abolghasemi Dehaqani	Presentation | Mesoscopic Dynamics of Brain Networks in Primate Electrophysiology, Brain Organoids and NeuroAI Affiliation | University of Tehran, Iran
09:55-10:10	Hanchuan Peng	Presentation | Connectivity Types and Connectomes of Single Neurons at Whole Brain Scale Affiliation | Fudan University, China
10:10-10:25	Chunfeng Song	Presentation | Efficient and Friendly AI Tools for Brain Mapping Affiliation | Shanghai AI Laboratory, China
10:25-10:40	Jianhua Yao	Presentation | Enhancing Spatial Omics Data Analysis with AI Affiliation | Tencent AI for Life Sciences Lab, China
10:40-11:00	Break (20 min)	

Moderators | Chun Xu (Center for Excellence in Brain Science and Intelligence Technology (Institute of Neuroscience), CAS, China)
Junhua Li (BGI Research, China)

11:00-11:15	Ming Ni	Presentation | The Efficient and Automated DCSP Platform Supports Large-Scale Scientific Projects Affiliation | MGI Tech Company, China
11:15-11:55	**Industry Panel Discussion (40min)** **Linking Industrial Innovation to Brain Mapping** Ming Ni, Xiao liang Zhang, Brett Kennedy, Anran Xu, Zhenhuan Yuan, Yongzhong Fan, Chuyan Zhang, Leslie Wang, Jiao Yao	
11:55-13:30	Luncheon / Buffet Restaurant 3F	

AGENDA

Event		
13:30-14:10	Hongkui Zeng	Keynote Lecture | Dynamic changes of brain cell types in development and aging Affiliation | Allen Institute for Brain Science, USA

Topic 4: Cell Atlas		
Moderators | Shaojie Ma (Center for Excellence in Brain Science and Intelligence Technology (Institute of Neuroscience), CAS, China) Rosario Moratalla (Cajal Institute, Spain)		
14:10-14:25	Dong Won (Thomas) Kim	Presentation | Mesoscale Molecular and Developmental Mapping of the Hypothalamus: From 3D RNA Imaging to Translational Insights Affiliation | Aarhus University, Denmark
14:25-14:40	Zhen Liu	Presentation | Genetic engineering in macaque monkeys: from early embryos to the brain Affiliation | Center for Excellence in Brain Science and Intelligence Technology (Institute of Neuroscience), CAS, China
14:40-14:55	Jian Yang	Presentation | Spatially resolved mapping of cells associated with human complex traits Affiliation | Westlake University, China
14:55-15:10	Yeu-Kuang Hwu	Presentation | SYNAPSE: A Borderless Model for Global Collaboration in Brain Mapping Affiliation | SYNAPSE Consortium
15:10-15:25	Zhiming Shen	Presentation | Single-cell spatial transcriptome atlas and whole-brain connectivity of the macaque claustrum Affiliation | Center for Excellence in Brain Science and Intelligence Technology (Institute of Neuroscience), CAS, China
15:25-15:40	Xun Xu	Presentation | Single-cell Spatial Multi-omics Technology Research Affiliation | BGI Research, China
15:40-16:00	Break（20 min）	

Topic 5: Interactome		
Moderators | Jinhyun Kim (Korea Institute of Science and Technology, Korea)		
16:00-16:15	Gábor Tamás	Presentation | Similarities and differences of human and rodent neocortical synapses, neurons and networks Affiliation | University of Szeged, Hungary
16:15-16:30	Chao Sun	Presentation | Synaptic Machinery for Protein Quality Control Affiliation | Aarhus University, DANDRITE, Denmark
16:30-16:45	Nicola Palomero-Gallagher	Presentation | Receptors: a link between structure and function Affiliation | Heinrich Heine University, Germany
16:45-17:00	Gabriel Santpere	Presentation | Dissecting Human Cortical Evolution and Disease Risk via Primate Brain Organoids Affiliation | Hospital del Mar Research Institute (HMRI) ,Spain
17:00-17:40	Panel Discussion (40 min) Gabriel Santpere、Dong Won (Thomas) Kim、Peng Xie、 Yidi Sun、Ying Zhu、Piotr Majka	Moderators Jan Mulder (Karolinska Institute, Sweden) Xun Xu (BGI Research, China)
Closing Remarks		

Plenary Report

Topic :

Mesoscopic Mapping for Primate Brains - An International Collaborative Project

Muming Poo

Biography

Muming Poo is the Scientific Director of Institute of Neuroscience, Chinese Academy of Sciences (CAS), Paul Licht Distinguished Professor in Biology Emeritus at University of California, Berkeley. He studied physics at Tsinghua University in Taiwan and received PhD in biophysics from Johns Hopkins University in 1974. During 1976-2012, He had served on the faculty of UC Irvine, Yale, Columbia, and UCSD, and UC Berkeley. He was the founding director of Institute of Neuroscience, CAS (1999-2019), and a member of Chinese Academy of Science, Academia Sinica, and Hong Kong Academy of Science. He is also an international member of the US National Academy of Sciences, and an international member of the Russian Academy of Sciences. He was awarded Ameritec Prize, International Science & Technology Cooperation Award of P. R. China, and Gruber Neuroscience Prize. Poo' s research interest includes axon growth, synaptic plasticity, and the use non-human primates to study higher cognitive functions and human brain disorders. He is the Executive Editor-in-Chief of National Science Review and the editorial board member for many journals, including Neuron and Progress in Neurobiology.

Keynote Lecture Speaker

Topic :

Abbreviations in Neuroscience: Lessons from The Periodic Table

George Paxinos

Abstract

The raison d' être of the present work is to (a) reach beyond Terminologia Anatomica and provide a harmonious list of terms for the brain and spinal cord of humans, monkeys (rhesus and marmoset), rats, mice, and birds and across development, and (b) derive a rules-based list of non-conflicting abbreviations. While Terminologia Anatomica provides a widely accepted list of anatomical terms (though no abbreviations), it principally names major brain structures and gross subdivisions and, even then, only in humans. For example, in the amygdala, Terminologia Anatomica recognizes 13 nuclei, while Atlas of the Human Brain (Mai et al., 2015) recognizes 23 and The Rhesus Monkey Brain in Stereotaxic Coordinates recognizes 39 (Paxinos et al., 2024), each with distinct cytoarchitectonic signatures. No less important than terminology are abbreviations, being the 'signals' in text, diagrams and oral communication. Presented herein is (a) a list of 3,335 non-conflicting terms, (b) the principles for constructing abbreviations and (c) a list where homologous structures and only homologous structures have identical abbreviations across species. There is elegance and simplicity of the abbreviations in The Periodic Table that can be emulated in neuroscience. The list is available by writing to the first author (g.paxinos@neura.edu.au).

Biography

Scientia Professor George Paxinos studied psychology at The University of California at Berkeley, McGill University and Yale University before taking up a lectureship at The University of New South Wales, in Sydney. He is now an NHMRC Research Leadership Fellow at Neuroscience Research Australia and Scientia Professor at The University of New South Wales.

He identified 94 hitherto unknown regions in the brain of rats and humans and has published 60 books on the brain and spinal cord of humans and experimental animals and a novel that deals with environmental degradation. Most scientists working on the relationship between brain and emotion, motivation and thought, including neurologic or psychiatric diseases, or animal models of these diseases, use Paxinos' atlases and concepts of brain organization. His first book, The Rat Brain in Stereotaxic Coordinates, is the most cited work in neuroscience. His Atlas of the Human Brain received the American Association of Publishers Award for Excellence in Publishing in Medical Science and the British Medical Association Illustrated Book Award. In a book published in 2024, he was included in the 63 Greek medical scientists considered to have made a historic contribution to medical progress in the period 1821-2021.

He served as president of the Australian Neuroscience Society and of the IBRO World Congress of Neuroscience. He is a member of the Academy of Athens and, as of today, an honourary member of the Mediterranean Neuroscience Society.

Connecting his science with his interest in the environment, he wrote the eco-fiction book, A River Divided (published in Greek as Ο Αμαζόνιος ανάμεσα μας). Neuroscience principles were used in the formation of charters, such as those related to the mind, soul, free will and consciousness. Environmental issues are at the centre of the novel, including the question of whether the brain is the right "size" for survival. Here are the links to the free ebook and audio book in English and the ebook in Greek. If you like the novel, feel free to forward to friends.

Keynote Lecture Speaker

Topic :

Mapping Multistructure Dynamic Connectivity in Epochs of Synaptic and System Consolidation

Nikos K. Logothetis

Abstract

Advances in neuroscience were mainly driven by unimodal approaches. Initial behavioral studies in patients, later in parallel with lesion-studies in animals, offered important information about the brain's functional organization. Subsequent histological, neurochemical and electrophysiological investigations - providing important information about neurons, glia cells, microcircuits, intra- and inter-area connectivity - were also of great importance. Yet, the definition of brain-states and their self-organization process, underlying our cognitive capacities, remain elusive, given brain-properties, such as ill-defined elementary operational units, question-dependent, massive, hierarchically bidirectional and often "replicating" connectivity, small-world topology, multicompound signals and initial-condition-dependent organization procedures. The lecture will therefore concentrate on novel multidisciplinary and multiscale approaches - combining multisite neuro-physiological recordings, microstimulation and high-resolution functional MRI - aiming to improve our understanding of memory-consolidation in non-human primates.

Keynote Lecture Speaker

Topic :

A mouse brain stereotaxic topographic atlas with isotropic 1-μm resolution

Qingming Luo

Abstract

Micro-Optical Sectioning Tomography (MOST) and fluorescence MOST (fMOST) are powerful tools for whole-brain mapping with sub-micron resolution, enabling the reconstruction and visualization of neural circuits at the single-neuron level. Here we present a whole mouse brain dataset of Nissl-based cytoarchitec-ture with isotropic 1-μm resolution, achieved through continuous micro-optical sectioning tomography. By integrating multi-modal images, we constructed a three-dimensional reference atlas of the mouse brain, providing the three-dimensional topographies of 916 structures and enabling arbitrary-angle slice image generation at 1-μm resolution. We developed an informatics-based platform for visualizing and sharing of the atlas images, offering services such as brain slice registration, neuronal circuit mapping and intelligent stereo-taxic surgery planning. This atlas is interoperable with widely used stereotaxic atlases, supporting cross-atlas navigation of corresponding coronal planes in two dimensions and spatial mapping across atlas spaces in three dimensions. By facilitating the data analysis and visualization for large brain mapping projects, our atlas promises to be a versatile brainsmatics tool for studying the whole brain at the single-neuron level.

Biography

Qingming Luo, Dr. Luo is the President and professor of Hainan University, President-Elect of the Chinese Society of Biomedical Engineering (CSBME), and Chair of the MoE Steering Committee for Biomedical Engineering Teaching in Colleges and Universities. He is an elected Member of the Chinese Academy of Sciences (CAS) and the Chinese Academy of Medical Sciences (CAMS), an elected Fellow of The International Academy of Medical and Biological Engineering (IAMBE), American Institute for Medical and Biological Engineering (AIMBE), Optica (formerly OSA), Institution of Engineering and Technology (IET), International Society for Optics and Photonics (SPIE), Chinese Optical Society (COS) and CSBME.

His research interests focus on multi-scale optical bioimaging and cross-level information integration. He has been devoted to new techniques and novel applications in life sciences, including optical molecular imaging, laser speckle imaging (LSI) in combination with optical intrinsic signal imaging (ISI), small animal imaging of fluorescence diffusion optical tomography (fDOT) coregistered with micro-CT, functional near-infrared (NIR) imaging, and micro-optical sectioning tomography (MOST).

He invented MOST and several generations of fluorescence MOST (fMOST), which may obtain three-dimen-sional whole mouse brains with sub-micron voxel resolution by innovatively combining microscopic optical imaging and physical sectioning strategies.

Keynote Lecture Speaker

Topic :

Decoding the Mouse Brain: A Decade of Neural Network Mapping

Hong-Wei Dong

Abstract

Understanding the mechanisms of brain function requires a foundational knowledge of the brain' s structural framework and information-processing networks. While complete connectomes have been achieved in C. elegans and Drosophila, a full wiring diagram for any mammalian brain remains unfinished. As part of the BRAIN Initiative, our Mouse Connectome Project (MCP), launched in 2010, set the ambitious goal of mapping the connections of all defined gray matter regions of the C57BL/6 mouse brain across multiple scales to: (1) generate a comprehensive, granular, and reliable connectome, and (2) develop testable hypotheses that relate network architecture to functional outcomes. In this presentation, I will review our step-by-step strategy and progress in assembling the neural networks of the mouse brain, with a focus on two major systems: the cortico-basal ganglia-thalamic/motor system and the classic limbic system. This work not only advances our understanding of mammalian brain architecture but also establishes a robust foundation for constructing a full-brain connectome atlas in primate species.

Biography

Dr. Hong-Wei Dong, M.D., Ph.D., is a world-renowned neuroanatomist and Professor of Neurobiology at University of California Los Angeles (UCLA). He created the original Allen Reference Atlas (ARA, Wiley, 2007), which became the informatics foundation for the Allen Brain Atlas (ABA)—the first comprehensive whole-brain gene expression mapping project. Dr. Dong is the founder of the Mouse Connectome Project (MCP), one of the pioneering efforts to map the mesoscale connectome of the mouse brain. He also co-leads the Brain Initiative Cell Census Network (BICCN) Anatomy & Morphology Working Group, an international collaborative effort to assemble a comprehensive mouse cell atlas and mesoscale connectome. His laboratory has been a leader in constructing the whole-mouse-brain mesoscale connectome, generating one of the largest connectivity datasets worldwide and publishing extensively in Cell, Nature, Nature Neuroscience, Nature Communications, and other high-impact journals.

Keynote Lecture Speaker

Topic :

Dynamic changes of brain cell types in development and aging

Hongkui Zeng

Abstract

To understand the function of the brain and how its dysfunction leads to brain diseases, it is essential to uncover the cell type composition of the brain, how the cell types are connected with each other and what their roles are in circuit function. My team at the Allen Institute has generated a comprehensive and high-resolution transcriptomic and spatial cell type atlas for the whole adult mouse brain. Extending from this foundational reference atlas, we have investigated the dynamic changes of transcriptomic profiles of specific cell types in the developing and aging brain. We generated a transcriptomic and epigenomic cell type atlas of the developing mouse visual cortex. We reconstructed a transcriptomic developmental trajectory map of all excitatory, inhibitory, and non-neuronal cell types in the visual cortex, which reveals continuous cell type diversification throughout the pre- and postnatal stages of cortical development. In the aging mouse brain, through brain-wide single-cell transcriptomic profiling, we uncovered cell-type specific transcriptomic signatures of decreased neuronal structure and function and increased immune response and inflammation. We further identified a potential hotspot for aging involving specific hypothalamic cell types regulating energy homeostasis that exhibit both decreased neuronal function and increased immune response, suggesting a connection among metabolism, neuroinflammation, and aging.

Biography

Hongkui Zeng is Executive Vice President and Director of Allen Institute for Brain Science. Since joining the Allen Institute in 2006, she has led several efforts to develop and operate high-throughput pipelines to generate large-scale, open-access datasets and tools to accelerate neuroscience discovery. Her research interests are in understanding neuronal diversity and connectivity in the mouse and human brain-wide circuits and how different cell types work together to process and transform information. She has built several research programs using transcriptomic, connectomic and multimodal approaches to characterize and classify the wide variety of cell types that constitute the mammalian brain, laying the foundation for unraveling the cell type basis of brain function and disease. Her work has led to widely adopted community resources and standards, including transgenic mouse lines, Allen Mouse Brain Connectivity Atlas, the Common Coordinate Framework (CCF), and the brain-wide transcriptomic cell type taxonomy and atlas. Zeng has received many honors, including the 2018 Gill Transformative Investigator Award, the 2023 Pradel Research Award from the National Academy of Sciences, and the 2024 Asian American Engineer of the Year (AAEOY) Award. She is an elected member of the National Academy of Sciences and the National Academy of Medicine.

Speaker

Topic :

Fingerprints, precision and energy: insights and prospects for brain mapping from the visual system

Andrew Parker

Abstract

Recent advancements in spatial omics have greatly enhanced our understanding of complex organism spatial biology, particularly in areas such as tumor microenvironment, normal tissue homeostasis, and disease development. However, the rapid generation of large and diverse datasets necessitates the development of computational methods for their analysis. In recent years, artificial intelligence (AI) technologies have made significant breakthroughs, offering tools such as unsupervised learning, transfer learning, and large language models. This presentation will showcase several ongoing projects conducted at Tencent AI for Life Sciences Lab, focusing on the application of advanced AI technologies for spatial omics data analysis. These projects encompass various aspects, including cell annotation, tissue atlas building, microenvironment modeling, and database construction.

Biography

Andrew Parker is currently Senior Professor at the Sensory Physiology group at the Institute of Biology Otto-von-Guericke University in Magdeburg, Germany. He studied at University of Cambridge UK, where he graduated in Natural Sciences in 1976 and obtained a doctorate in 1980. He then transferred to the Physiology department at Oxford where he held independent research fellowships. After a year as a Visiting Scientist at the MIT Artificial Intelligence Laboratory, he was appointed in 1985 to a faculty position in Physiology at Oxford and was awarded the title of Full Professor in 1996. Andrew's research interests cover a wide range of topics in vision, with a particular emphasis on linking neuronal activity to perceptual judgments. His group has made significant advances in the understanding of the physiology of binocular depth and its relationship with other sources of information about three-dimensional shape. This work has probed the cortical stages of binocular processing with a variety of perceptual tasks and techniques, including single-unit in vivo physiology, visual psychophysics, immersive virtual reality, functional brain imaging, human electrophysiology and computational modelling. He was awarded a Leverhulme Senior Research Fellowship (2004-5) and a Wolfson Research Merit Award by the Royal Society. He has been a Presidential International Fellowship at the Chinese Academy of Sciences in Shanghai and in 2017/18 delivered the GL Brown Prize Lectures of the UK Physiological Society. Andrew now holds an Emeritus Professorship at the University of Oxford.

Speaker

Topic :

Toward a Laminar-Aware Mesoscale Connectome of the Common Marmoset

Noritaka Ichinohe

Abstract

In this talk, I will present our efforts toward a laminar-aware mesoscale connectome of the common marmoset. Building on the Brain/MINDS 3D Marmoset Brain Atlas 2.0 (BMA2.0; Rui et al., in preparation), which integrates population-average myelin and Nissl templates from 10 histological brains with an ex vivo MRI space, we are developing methods to link these structural references to mesoscale connectivity data. While BMA2.0 provides a useful population-level reference, it is only an initial approximation. Our primary goal is to capture individual-specific laminar organization by extracting the myelin-defined middle band in each brain and analyzing how laminar boundaries vary across individuals due to multiple factors, including cortical curvature, area-specific differences, and genetic influences. This approach allows mesoscale connectivity to be interpreted within the unique laminar architecture of each animal, providing a biologically grounded framework beyond population averages. These individual laminar maps are now being integrated with 103 anterograde tracer datasets acquired using serial two-photon tomography, with injections across many cortical areas. This integration enables layer-specific analysis of mesoscale connectivity across the entire cortex. The combination of broad tracer coverage and individual-specific laminar mapping provides a powerful framework to link microstructural organization with large-scale connection patterns in the marmoset brain.

Biography

Dr. Noritaka Ichinohe is Director of the Department of Ultrastructural Research at the National Center of Neurology and Psychiatry (NCNP), Tokyo, Japan (2010–present), and Visiting Senior Scientist at the RIKEN Center for Brain Science (CBS). His expertise lies in primate neuroanatomy, laminar-specific connectivity, and mesoscale connectomics, with a focus on laminar-aware mapping in the common marmoset and translational studies bridging the human brain. He also conducts translational research using an autism model marmoset. From 2000 to 2010, he served as Deputy Team Leader in Kathy Rockland' s Laboratory at the former RIKEN Brain Science Institute (BSI). Building on Dr. Rockland' s earlier seminal work on feedforward and feedback cortical pathways, the lab in Japan focused on primate cortical organization, where he investigated connectivity in macaque brains. As a core member of the Brain/MINDS project, he has contributed to mesoscale mapping of the marmoset brain, the development of a laminar-aware brain atlas, integration of serial two-photon tracer data, and AI-driven image analysis, helping to establish a framework linking microstructural and whole-brain connectivity. Key publications include Watanabe et al. (Nat Commun, 2021; an autism-model marmoset), Hata et al. (Sci Data; marmoset MRI resources), and Watakabe et al. (Neuron, 2023; marmoset prefrontal cortex connectome).

Speaker

Topic :

Mesoscopic mapping with VISoR: from brain to body

Guo-Qiang Bi

Abstract

The nervous system consists of myriad interconnected neurons that form intricate networks spanning the entire brain and the whole organism. The ultimate understanding of cognition and physiological regulation and related diseases requires mapping of its system-wide network architecture at cellular resolution. Toward this goal, we have developed an ultrafast volumetric fluorescence microscopy technique, VISoR, that is capable of imaging a whole mouse brain at micron resolution within half an hour and a whole rhesus monkey brain within 100 hours. In this talk, I will present our recent progress in VISoR mapping of the primate brain, as well as technical development in a FISH-based method for transcriptionally-defined cell type-specific projectome mapping, and a blockface imaging method for whole-body mapping of the peripheral nervous system.

Biography

Guo-Qiang Bi is a Xinchuang Professor of Neurobiology and Biophysics at the University of Science and Technology of China (USTC), and Founding Director of Interdisciplinary Center for Brain Information at Shenzhen Institute of Advanced Technology (SIAT), Chinese Academy of Sciences. He received his BS in physics at Peking University, PhD in biophysics at UC Berkeley and postdoctoral training in neurobiology at UCSD. Before joining USTC, he was a tenured Associate Professor of Neurobiology at the University of Pittsburgh School of Medicine. His research interest is in the cross-scale architecture and dynamics of neuronal systems, especially those related to plasticity and learning. In recent years, his team has combined cryogenic electron tomography with correlative photonic techniques to investigate in situ organization and operation of molecular machinery inside neuronal synapses, and developed new mesoscopic imaging approaches to map system-wide architecture and cross-regional activity of neurons and networks from brain to body.

Speaker

Topic :

Thalamocortical neural circuits: working out why they matter in health and disease

Anna S Mitchell

Abstract

Thalamocortical circuits connect all parts of the thalamus with the cortex. These interconnected circuits form early in neural development and establish functional, dynamic partnerships for neural communication. We know these circuits are critical for integrating sensory information, coordinating voluntary movements, and enabling effective cognitive functioning within the cortex. Furthermore, disruptions to these circuits cause deficits in cognition, and sensory and motor impairments observed in many neurodevelopment (e.g., schizophrenia and attention-deficit-hyperactivity disorder) and neurodegenerative (like Alzheimer’ s and Parkinson’ s Disease) disorders and diseases. Recent evidence shows mental health conditions (e.g. addiction, anxiety and depression) are linked to changes in thalamocortical circuitry. In our lab, we use animal models and humans to identify the influence of thalamocortical circuits for cognitive abilities, like learning and memory, and decision-making in health and disease. This causal, fundamental evidence, in combination with documenting the neuropathology and immunohistochemical changes to brain cells can better inform our understanding of how and when thalamocortical circuits contribute to cognitive functioning.

Biography

Anna Mitchell is an Associate Professor in Behavioural Neuroscience at University of Canterbury, Christchurch, New Zealand. Prior to her move back to New Zealand in August 2022, she was an Associate Professor, Wellcome Trust Senior Research Fellow, and Head of the Thalamus, Cortex, and Cognition Laboratory in the Department of Experimental Psychology at Oxford University (2009-2022). She completed her postdoctoral training (2004-2008) at Oxford University (supervisor: Professor David Gaffan) and was awarded her PhD in Psychology at University of Canterbury, New Zealand (2004). Her lab investigate contributions of midline limbic thalamus and interconnected structures in health and neurological conditions using animal models (rats and monkeys) and humans with a focus on the neurobiology of learning and memory, spatial navigation and cognitive flexibility. Her lab use several techniques including brain manipulations, neurophysiology, neuroimaging, neuroanatomy, and cognitive, physiological and behavioural assessments. Additionally, Anna advocates for the appropriate use of animals in neuroscience and science education. She organises science engagement events and publications that help inform the public and policy makers about biomedical research experiments involving animal models. Anna is Editor-in-Chief of Current Research in Neurobiology and an invited member of the Society for Neuroscience Committee on Animals in Research.

Speaker

Topic :

Cross - Species Research of Amygdala Circuits in Fear and Social Behavior

Ron Stoop & Jack van Honk

Abstract

The International Consortium for Mesoscopic Mapping of Primate Brains (ICMMPB) provides a unique platform to integrate human “experiments of nature” with experimental circuit dissection in animal models. In this joint presentation, we highlight the basolateral and central amygdala as conserved hubs for socio - emotional processing. Jack van Honk will discuss Urbach - Wiethe disease, a rare ECM1 mutation in South African patients that produces the most selective natural lesion known in humans: bilateral damage restricted to the basolateral amygdala. This “Rosetta Stone” lesion model reveals the amygdala’ s causal role in fear, emotion, and social decision - making. Ron Stoop will present rodent studies showing how the presence of a social companion buffers fear responses, an effect requiring oxytocin signaling in the central amygdala. Blocking this pathway abolishes both the immediate and lasting protective effects of social buffering. Together, these complementary approaches demonstrate how natural human models and experimental manipulations in animals converge on amygdala circuits, directly advancing ICMMPB’ s mission to build a functional mesoscopic atlas of primate brain organization relevant to mental health.

Biography

Ron Stoop is Professor of Neuroscience at the University of Lausanne and Head of the Laboratory of Neurophysiology at the Centre for Psychiatric Neuroscience (CHUV). His research focuses on neural circuits of emotion and stress regulation, with particular emphasis on the role of oxytocin in the amygdala. His group has shown that oxytocin signaling in the central amygdala underlies social buffering of fear, whereby the presence of a companion reduces stress responses and protects against trauma.

Jack van Honk is Professor of Social, Cognitive and Affective Neuroscience at Utrecht University and the University of Cape Town. His work integrates neurogenetics, brain imaging, and hormonal manipulations to study human emotion and social behavior. A central focus is Urbach - Wiethe disease in South Africa, caused by a rare ECM1 mutation leading to highly selective bilateral lesions of the basolateral amygdala. This unique “Rosetta Stone” lesion model provides causal insights into the amygdala’ s role in fear, social cognition, and psychopathology.

Together, their work combines human lesion models and animal circuit studies to reveal conserved amygdala functions, directly supporting ICMMPB’ s mission to link mesoscopic mapping to cognition, behavior, and disease.

Speaker

Topic :

Multicolor mapping of neuronal circuits

Takeshi Imai

Abstract

Fluorescence imaging combined with tissue clearing is a powerful method for studying neuronal connectivity. Here, we present two new strategies for light microscopy-based circuit mapping. First, we developed “fluorescent barcode” AAVs carrying two out of seven fluorescent proteins. Using 21 distinct color combinations, we achieved highly multiplexed labeling and imaging of the neuronal populations at the whole-brain scale. These color combinations were accurately identified by channel unmixing and our machine-learning-based “barcode reader” program. For example, we could dissect the highly intermingled corticothalamic projection in a single animal. We also demonstrated the utility of this approach for mesoscopic mapping of the marmoset brain. Second, we developed a light microscopy-based, synaptic-resolution connectomics tool. Neurons were sparsely labeled with AAV vectors expressing jGCaMP8m (for functional imaging), Syp-mAmetrine (a presynaptic marker), dPSD95-mNeonGreen (a postsynaptic marker), and tdTomato (a filler marker). After functional calcium imaging of mouse V1 in vivo, brain sections were imaged with spinning disc confocal microscopy. The resolution (150 nm in xy and 300 nm in z) was sufficient for reliably reconstructing neurites and identifying synapses among labeled neurons. These new strategies facilitate the mapping of neuronal connectivity at a lower cost.

Biography

Takeshi Imai completed his Ph.D. in 2006 at the University of Tokyo under the supervision of Prof. Hitoshi Sakano. After spending four years as a postdoctoral fellow in the same laboratory, he started his own laboratory at RIKEN Center for Developmental Biology in Kobe as a team leader. In 2017, he was appointed professor at Graduate School of Medical Sciences at Kyushu University. His lab has developed tissue clearing techniques (SeeDB, SeeDB2, and SeeDB-Live) and multicolor labeling tools (e.g., Tetbow) for light microscopy-based circuit mapping. The lab also studies the function and development of neuronal circuits in the olfactory bulb and cerebral cortex. He heads the research consortium "Emergence of Brain Functions from the Dynamic Connectome (FY2024-2028)," which is supported by the Grant-in-Aid for Transformative Research Areas (JSPS, Japan).

Speaker

Topic :

Single-neuron Projectomes in Mouse and Macaque Brains

Jun Yan

Abstract

Whole-brain single-neuron projectome is crucial for unraveling the organization principles of the brain. However, imaging data generated by state-of-the-art light microscopy for a single mouse brain exceed terabytes, while the data for a single macaque brain approach petabytes (PB). Large-scale neuron reconstruction from such large datasets is a daunting task. In this talk, I will describe our approach to reconstruct and analyze the single-neuron projectomes in mouse and macaque brains. In the past, we developed a highly efficient neuron tracing tool, Fast Neurite Tracer (FNT), by which the largest datasets of single-neuron projectomes in mouse brains have been mapped. We recently developed 'Gapr' combining deep learning-based automatic reconstruction and high-throughput collaborative proof-reading. Furthermore, Gapr can readily handle the data size of petabyte scale, paving the way for the mapping of single-neuron projectomes of primate brains. Finally, we will use prefrontal cortex (PFC) as an example to demonstrate how cross-species comparison of single-neuron projectomes between mouse and macaque reveal the primate-specific organization principles of the brain.

Biography

Jun Yan received his PhD in Physics from New York University in 2003. He started his own group in 2006 as a Principal Investigator and a Max-Planck Group Leader at CAS-MPG Partner Institute for Computational Biology in Shanghai. In 2015, he moved to Institute of Neuroscience, Chinese Academy of Science. Jun Yan' s research interests include circadian clock and whole-brain connectome. In the recent years, Jun Yan' s lab reconstructed the single-cell transcriptomic atlas of mouse suprachiasmatic nucleus (SCN) (Wen et al. Nature Neuroscience, 2020), leading to the discovery of the important role of SCN CCK neurons in the neural circuit of circadian clock (Xie et al. Neuron, 2023). His lab developed a highly efficient neuron tracing platform, Fast Neurite Tracer (FNT), by which the largest single-neuron projectomes of mouse prefrontal cortex have been mapped (Gao et al. Nature Neuroscience, 2022, 2023). His lab developed a new generation of single-neuron reconstruction platform, Gapr, combining deep learning-based automatic reconstruction and high-throughput collaborative proofreading (Gou et al. Nature Methods, 2024). Using Gapr, his team has recently reconstructed single-neuron projectomes of macaque prefrontal cortex (Gou et al. Cell, 2025).

Speaker

Topic :

Dynamics of Brain Function and Organization from Marmoset, Macaque to Human – A Modern Cross-species Approach

Takuya Hayashi

Abstract

The human brain underlies highly complex cognitive processes, including consciousness. Cross-species research has provided crucial insights into the evolution of human brain function and organization over the past century. I present a systematically harmonized, cutting-edge approach using non-invasive high-resolution imaging to investigate brain function and organization across humans, macaques, and marmosets. Our comparative analysis reveals that cortical and subcortical microstructural organization, as well as resting-state spontaneous functional networks, are remarkably conserved across these three primate species. Multi-modal microstructural registration allowed us to identify structural correspondence, while functional organization, including default-mode networks, showed dramatic differences across species. These findings demonstrate the potential for quantitative cross-species comparisons and suggest promising avenues for expanding our understanding of primate brain evolution.

Biography

Takuya Hayashi, MD, PhD, is currently Team Director of the Laboratory of Brain Connectomics Imaging at RIKEN Center for Biosystems Dynamics Research. He graduated from Kyoto University Faculty of Medicine in 1992, specialized in neurology and radiology, and obtained his PhD from Kyoto University Graduate School of Medicine in 2002. His research focuses on non-invasive high-resolution neuroimaging, advanced analysis methods, and understanding brain systems across humans and non-human primates. He currently plays a crucial role in establishing neuroimaging protocols and analytical frameworks for national research project involving thousands of human subjects and hundreds of non-human primates in Japan's AMED Brain/-MINDS-beyond and Brain/MINDS 2.0 projects, as well as the international NIH BICAN projects spanning the USA, Europe, and Japan.

Speaker

Topic :

Non-epithelial radial glial cells maintain the production of GABAergic inhibitory neurons and glial cells in the developing human brain

Da Mi

Abstract

The human cerebrum has an extensive and diverse complement of inhibitory neurons (INs), which may contribute to the heightened cognitive capability of our species. However, the mechanisms underlying the generation of the vast repertoire of human INs remain elusive. We performed spatial and single-cell transcriptomics of human medial ganglionic eminence (hMGE), a pivotal source of INs destined for the cerebral cortex and subpallium, to build the developmental trajectories of MGE-derived cells throughout pregnancy. We identified spatiotemporally and molecularly segregated progenitor cell populations fated to produce distinct types of INs. Notably, we found a novel progenitor cell type in the hMGE subventricular zone (SVZ RGCs) with unique molecular and cellular features. We demonstrated that SVZ RGCs maintained the production of INs and glial cells throughout human brain development. Our findings reveal evolutionarily distinct features of IN generation and shed light on the unique mechanisms underlying human brain development.

Biography

Dr. Da Mi is an expert in developmental neuroscience. He has been appointed as an Associate Professor in the School of Life Sciences, Tsinghua University and a group leader at the IDG/McGovern Institute for Brain Research at Tsinghua University. His research group is interested in how a small pool of neural progenitors generates the vast diversity of neuronal cell types during brain development, with a focus on mechanisms regulating initial cell fate decisions and neuronal diversification in the developing cerebral cortex. His team combines large-scale single-cell multi-omics techniques with a range of neuroanatomical, cell biological, molecular biological, genetic and transgenic methods to gain systematic understanding of the cellular and molecular mechanisms regulating the emergence of neuronal diversity in the developing cerebral cortex in rodents and primates and the role of cellular heterogeneity in neurodevelopmental disorders.

Speaker

Topic :

Whole brain cell-resolution imaging and 3D reconstruction

Mohanasankar Sivaprakasam

Abstract

This talk will describe IITM Brain Centre’ s high-throughput brain imaging pipeline that processes whole human brains into cell-resolution petabyte-scale digital volumes and how the various challenges were overcome in developing this platform. The talk will further describe the computational methods used to reconstruct the 3D view of the brain and morphometry analyses of the first set of developing human brains. We will also discuss the gaps and limitations of this platform, and some open-ended problems

Biography

Dr. Mohanasankar Sivaprakasam is a Professor in Department of Electrical Engineering and heads IITM's Healthcare Technology Innovation Centre and Brain Centre. After his PhD and postdoc stint in US, he returned to India in late 2008 with the goal of developing indigenous medical technologies and set up HTIC in 2011. Since then, HTIC has grown into a unique and leading med-tech innovation ecosystem in the country bringing together around 40 medical institutions, industries, government agencies in developing and deploying affordable healthcare technologies. His group’ s technologies have resulted in 12 commercially successful products impacting over 13 million patients in India and abroad.

Since 2020, he has been driving a large-scale multi-disciplinary effort at IITM combining neuroscience, engineering, medicine, and technology, culminating in the setting up of IITM’ s Sudha Gopalakrishnan Brain Centre. The Centre has developed a world-class high-throughput brain imaging pipeline that processes whole human brains into high-resolution digital images at petabyte-scale and recently released the most advanced atlas of the developing human brain in second trimester, the first time such a global human brain resource has come out of India.

Speaker

Topic :

Molecular Pathology of Drug-Resistant Epilepsy

Jiadong Chen

Abstract

The histopathological neurons in the brain tissue of drug-resistant epilepsy exhibit aberrant cytoarchitecture and imbalanced synaptic circuit function. However, the gene expression changes of these neurons remain unknown, making it difficult for the diagnosis or to dissect the mechanism of drug-resistant epilepsy. By integrating whole-cell patch clamp recording and single-cell RNA sequencing approaches, we identified a transcriptionally distinct subset of cortical pyramidal neurons. These neurons highly expressed genes CDKN1A (P21), CCL2 and NFKBIA that associated with mTOR pathway, inflammatory response and cellular senescence. We confirmed the expression of senescent marker genes in a subpopulation of cortical pyramidal neurons with enlarged soma size in the brain tissue of drug-resistant epilepsy. We further revealed the expression of senescent cell markers P21, P53, COX2, γ-H2AX, β-Gal and reduction of nuclear integrity marker Lamin B1 in histopathological neurons in the brain tissue of drug-resistant epilepsy patients with different pathologies, but not in control brain tissue with no history of epilepsy. Additionally, chronic, but not acute, epileptic seizures induced senescent markers expression in cortical neurons in mouse models of drug-resistant epilepsy. These results provide important molecular markers for histopathological neurons and new insights into the pathophysiological mechanisms of drug-resistant epilepsy.

Biography

Dr. Jiadong Chen is an Associate Professor at the School of Medicine, Zhejiang University. He received his Ph.D. from the Institute of Neuroscience, Chinese Academy of Sciences (Shanghai, China), and performed his postdoctoral training at the University of California, San Francisco (US). His research focuses on elucidating the molecular and circuit mechanisms underlying neurodevelopmental and neurodegenerative disorders, employing approaches such as next generation sequencing, optogenetic circuit manipulation, in vitro and in vivo electrophysiological recordings, molecular imaging, and behavioral assays. Recent work from his laboratory has revealed (1) the morphological, electrophysiological and molecular signatures of pathological neurons in drug-resistant epilepsy (Journal of Clinical Investigation 2025); (2) the behavioral functions of transcriptomic GABAergic projection neuron subtypes in the zona incerta (Nature Communications 2025); (3) an excitatory circuit in the posterior basolateral amygdala critical for seizure genesis in temporal lobe epilepsy (Advanced Science 2024).

Speaker

Topic :

A Population-scale Single-cell Spatial Transcriptomic Atlas of the Human Cortex

Wu Wei

Abstract

The spatial organization of diverse cell types of human cerebral cortex remains to be fully characterized. Here, we report population-scale high-resolution spatial transcriptomic atlases of four human cortical regions from 71 donors of different ages. Single nuclear RNA sequencing, single-cell spatial transcriptome, and whole-genome sequencing of cortical tissues enabled high-resolution annotation of over 3.4 million spatially resolved cells. We identified 906 genes showing cortical layer-selective expression and 1,814 genes showing age-dependent expression. The latter exhibited 9 transcriptomic modules linked to neuronal vulnerability and glial activation. Notably, the expression of brain disease-associated genes exhibited higher cell-type and layer-dependent variability, and the laminar- and cell type-specific regulatory variants were further revealed by spatial cis-quantitative trait locus analysis. Comparative analysis with macaque and mouse revealed conserved and species-specific laminar expression patterns, alongside glial expansion in the human cortex. Together, our study offers a comprehensive molecular and spatial framework for the human cortex, providing an essential resource for investigating aging, evolution, and disease-related regulation.

Biography

Wu Wei, Ph.D, PI at Lingang Laboratory, China. Dr. Wei holds a PhD in Bioinformatics from the Shanghai Institutes for Biological Sciences, Chinese Academy of Sciences. He served as a postdoctoral fellow at the European Molecular Biology Laboratory (EMBL) before working at the Stanford Genome Technology Center at Stanford University. He returned to China and worked for five years at the CAS-MPG Partner Institute for Computational Biology before joining the Lingang Laboratory. He works on genomics and bioinformatics, with his main research interests including the development and application of new high-throughput sequencing technologies, multi-omics data mining in clinical cohorts, and AI-based drug target discovery. His research focuses on analyzing the molecular regulatory mechanisms, single-cell gene expression dynamics, and spatial microenvironmental characteristics of disease progression, constructing cellular disease maps, and developing virtual cell models and virtual screening technologies to facilitate the discovery of innovative drug targets.

Speaker

Topic :

The China Brain Multi-omics Atlas Project (CBMAP): Building a Population-Scale Multi-Omics Reference for Human Brain Research

Jing Zhang

Abstract

Neurological and psychiatric disorders are closely tied to molecular processes within brain tissues, which display highly specific transcriptional and proteomic profiles shaped by post-translational modifications (PTMs). Existing large-scale resources such as GTEx, ROSMAP, PsychENCODE, and MSBB have advanced brain research but remain limited by small sample sizes, restricted omics coverage, and underrepresentation of Asian populations—hindering comprehensive insights into regulatory diversity and disease mechanisms.

To address this, we launched the China Brain Multi-omics Atlas Project (CBMAP), a national initiative led by the China Human Brain Bank Consortium as part of the China Brain Project. In Phase I, CBMAP collected brain tissues from over 1,000 Chinese donors, generating an unprecedented atlas that integrates genomic, epigenomic, transcriptomic, proteomic, metabolomic, spatial omics, PTMs, and single-nucleus 3D chromatin data.

By combining population-scale sampling with deep multi-omics profiling, CBMAP provides a powerful reference for uncovering novel mechanisms of cognition, aging, and brain disorders, and will accelerate progress toward precision medicine.

Biography

Prof. Jing Zhang is an endowed professor at Zhejiang University, where he directs the Pathology Centre and the Department of Pathology at the First Affiliated Hospital of Zhejiang University School of Medicine. He also leads the National Health and Disease Human Brain Tissue Resource Center.

Prof. Zhang's research focuses on translational medicine for neurodegenerative diseases, particularly the early diagnosis and monitoring of Parkinson's and Alzheimer's disease through molecular biomarkers. He pioneered the capture of brain-derived exosomes from body fluids, enabling non-invasive detection of brain-specific molecules in blood. More recently, his work has expanded into large-scale human brain mapping and multi-omics integration.

He has published over 250 peer-reviewed papers, with more than 26,000 citations and an h-index of 89, and serves on editorial boards of several international journals.

In addition, Prof. Zhang is advancing the integration of artificial intelligence into pathology. Since 2020, he has co-led an interdisciplinary team with Prof. Song and Prof Sheng from Zhejiang University's School of Computer Science, culminating in the launch of clinically validated foundation model system for human–computer dialogue in pathology. His long-term vision is to integrate AI with brain omics and blood-based diagnostics to transform precision medicine for brain diseases.

Speaker

Topic :

Mesoscopic Dynamics of Brain Networks in Primate Electrophysiology, Brain Organoids and NeuroAI

Mohammad-Reza Abolghasemi-Dehaqani

Abstract

Recent work from our group exploring the mesoscopic dynamics of brain networks across three complementary domains will be presented. First, electrophysiology in non-human primates is used to examine how frontotemporal circuits coordinate activity to support representation and memory. Second, human brain organoids are studied with multielectrode array recordings and advanced stimulation paradigms, revealing emergent patterns of connectivity and network dynamics in vitro. Finally, these biological findings are translated into computational models, including artificial neural networks and NeuroAI frameworks, to capture principles of coordination and coding at the mesoscale. By integrating primate studies, organoid systems, and AI-inspired modeling, this work seeks to uncover general rules of brain organization and identify new pathways toward brain-inspired intelligence.

Biography

Mohammad-Reza Abolghasemi-Dehaqani holds a Ph.D. in computational neuroscience with a background in computer science. He is currently a faculty member at the University of Tehran, Head of the Artificial Intelligence Group, and an adjunct researcher at the Iran Primate Center (Prima), Royan Institute. His research focuses on applying artificial intelligence and machine learning to understand brain mechanisms and computations. He leads a primate electrophysiology laboratory, where his team investigates feedback in visual processing through frontotemporal network recordings in non-human primates. In parallel, he develops AI models inspired by brain computations, integrating EEG and single-unit recordings to study latent representational spaces shared between neural data and AI encoding models in vision and language. His work also extends to investigating neural mechanisms of learning with brain organoids, combining NeuroAI approaches, genetic engineering, and real-time analysis. Through this multidisciplinary research, Dr. Abolghasemi-Dehaqani aims to bridge biological and artificial intelligence, advancing both neuroscience and next-generation AI systems.

Speaker

Topic :

Connectivity Types and Connectomes of Single Neurons at Whole Brain Scale

Hanchuan Peng

Abstract

In this presentation, I will first introduce our recent work on quantifying neuronal connectivity, which enables us to define precise connectivity types, or c-types, of neurons. We demonstrate that c-types complement morphological types (m-types) in identifying intrinsic clusters, and in many cases provide a more accurate indicator of cell identity. I will then present a scalable framework for reconstructing statistically robust single-neuron connectomes at whole-brain scale by integrating two independently derived networks: an arbor-net and a bouton-net. These networks are highly consistent with each other, suggesting that this approach can generate a reliable and cost-effective blueprint of brain-wide connectivity with high fidelity.

Biography

Prof. Dr. Hanchuan Peng is a globally renowned leader in brain informatics, bioimage informatics, Big Data oriented machine learning/AI, data visualization and data mining, etc. Dr. Peng made pioneering contributions to digital atlasing and modeling of brains of a series of model animals at the single cell resolution, advanced intelligent algorithms and imaging systems, neuron morphometry, and the development of large-scale neuronal databases. He has developed a number of groundbreaking technologies to generate, manage, visualize, analyze, and interpret massive-scale structural and functional data related to the brain and other biomedical applications. He is the inventer of widely used systems including Vaa3D, TeraFly, TeraVR, APP1/APP2, Virtual Fingers, etc, and new technologies such as ACTomography. He also proposed and studied the first precise definition of neurons' connectivity types (c-types). Before shifting his focus to these emerging areas, Dr. Peng conducted research on artificial neural networks and Bayesian graph networks from 1993 to 2004. During that time, he proposed the first mathematical definition of multivariate mutual information; developed the widely used and highly cited minimum redundancy feature selection algorithm (mRMR) in machine learning and data mining; and created the first Bayesian brain morphometry algorithm. Dr. Peng also proposed and led the "BigNeuron Initiative" and contributed to the establishment of the "BioImage Informatics" research field. Currently Dr. Peng is actively working on building a detailed model of digital human brains.

Speaker

Topic :

Efficient and Friendly AI Tools for Brain Mapping

Chunfeng Song

Abstract

In the field of neuroscience research, 3D neuronal reconstruction for brain mapping serves as a critical methodology for understanding the organization and function of neural systems. Due to their ultra-high resolution capabilities, both optical microscopy and electron microscopy have emerged as pivotal tools for reconstructing dense neuronal connectivity (connectomics) . However, the huge data volumes brings significant challenges in terms of storage and sharing costs, while substantially increasing the workload of manual annotation. This report will first present our recently proposed UniSPAC method integrating the friendly interactive model featuring 'segmentation-proofreading-annotation' workflow, then introduce a near-lossless compression model achieving 1,000x compression ratio for optical microscopy neural imaging data.

Biography

Chunfeng Song is currently a Research Scientist at Shanghai AI Laboratory. He received the PhD degree from Institute of Automation of the Chinese Academy of Sciences (CASIA) , and the University of Chinese Academy of Sciences (UCAS) in 2020. He has published more than 40 papers on top-tier AI conferences and journals such as IEEE TPAMI, IJCV, CVPR, AAAI, ICML. His current research focuses on AI for science, especially Neuroscience and Brain science.

Speaker

Topic :

Enhancing Spatial Omics Data Analysis with AI

Jianhua Yao

Abstract

Recent advancements in spatial omics have greatly enhanced our understanding of complex organism spatial biology, particularly in areas such as tumor microenvironment, normal tissue homeostasis, and disease development. However, the rapid generation of large and diverse datasets necessitates the development of computational methods for their analysis. In recent years, artificial intelligence (AI) technologies have made significant breakthroughs, offering tools such as unsupervised learning, transfer learning, and large language models. This presentation will showcase several ongoing projects conducted at Tencent AI for Life Sciences Lab, focusing on the application of advanced AI technologies for spatial omics data analysis. These projects encompass various aspects, including cell annotation, tissue atlas building, microenvironment modeling, and database construction.

Biography

Dr. Jianhua Yao currently serves as the Chief Scientist at Tencent AI for Life Sciences Lab. His research interests include computational genomics, medical imaging and surgical navigation. His papers were cited more than 24,000 times according to Google Scholar, with a h-index of 64. He holds a PhD degree in Computer Science from the Johns Hopkins University. Dr. Yao is a fellow of Institute of Electrical and Electronics Engineers (IEEE) and a fellow of American Institutes of Medical and Biological Engineering (AIMBE).

Speaker

Topic :

The Efficient and Automated DCSP Platform Supports Large-Scale Scientific Projects

Ming Ni

Abstract

To investigate large-scale scientific initiatives such as the construction and interpretation of mesoscopic brain maps, robust engineering systems and advanced automation are essential. This report highlights recent advancements by BGI/MGI Tech in the development of efficient, cost-effective, and automated multi-omics tools for DCSP, offering comprehensive end-to-end solutions for major scientific projects. The portfolio features high-throughput DNA sequencers, streamlined single-cell omics library preparation kits with accompanying automation, high-resolution spatial omics technologies, and integrated proteomics platforms. Collectively, these innovations establish a standardized and holistic framework that facilitates cutting-edge multi-omics research within life sciences.

Biography

Dr. Ming Ni, PhD in Peking University, Post-doc in Paris Descartes University. Currently he is senior vice president of MGI, responsible for developing high-throughput DNA sequencing technologies and products, also as member of National Technical Committee 526 on Laboratory Instruments and Equipment Standardization Administration of China(SAC/TC526). He had been leading or participating in many national funded projects, and has published 18 papers on journals such as Plos Genetics, CELL, and Nature Machine Intelligence, also he has applied more than 53 granted patents. He has won the China Patent Excellence Award, the first prize of Shenzhen Science and Technology Progress Award, the second prize of Hubei Provincial Science and Technology Progress Award, and was awarded the 2019-2021 Qingdao West Coast New Area Labor Model Person.

Speaker

Topic :

Abstract Title: Mesoscale Molecular and Developmental Mapping of the Hypothalamus: From 3D RNA Imaging to Translational Insights

Dong Won Thomas Kim

Abstract

The hypothalamus integrates sensory, metabolic, and emotional cues to maintain organismal homeostasis, yet its mesoscale organization and gene-circuit relationships remain poorly understood. In this presentation, I will highlight recent efforts from my group to systematically map hypothalamic and prethalamic development using integrated single-cell RNA sequencing, ATAC-Seq, and high-resolution three-dimensional in situ imaging across embryonic and postnatal stages. These studies reveal dynamic gene regulatory programs controlling regionalization, neurogenesis, and neuronal subtype specification, as well as cross-repressive mechanisms that shape circuit identity. We further link these developmental trajectories to human GWAS datasets, uncovering transcriptional regulators associated with metabolic and cognitive traits. In parallel, we have developed CLEAR-MAP, a rapid and cost-effective platform for multiplexed whole-brain RNA imaging, enabling spatially resolved gene expression mapping at mesoscopic scale in both mouse and human tissues. Finally, I will discuss how applying spatially resolved molecular mapping at this scale allows us to bridge cellular resolution with systems-level understanding, offering new insights into selective vulnerability in Alzheimer’ s disease. Together, these approaches illustrate how developmental brain maps can be harnessed to inform both fundamental neurobiology and translational neuroscience.

Biography

Dong Won Thomas Kim is a Group Leader at DANDRITE, the Nordic EMBL Partnership for Molecular Medicine, and Associate Professor in the Department of Biomedicine at Aarhus University, Denmark. He received his Ph.D. in Developmental Neuroscience from the University of Otago, New Zealand, and completed postdoctoral training at Johns Hopkins University under Seth Blackshaw. His research investigates the developmental logic and regulatory networks that establish hypothalamic and prethalamic circuits, and how these pathways influence metabolic and cognitive health. By integrating large-scale single-cell multi-omics, spatial transcriptomics, and advanced 3D imaging methods such as EZ-HCR, his group has uncovered transcriptional activators and repressors that regulate neuronal fate decisions, circuit formation, and microglial states. These developmental insights are applied to models of Alzheimer’ s disease and stress-related disorders to examine selective neuronal vulnerability and neuroimmune interactions. Prof. Kim has authored more than 40 peer-reviewed publications, with research supported by the Lundbeck Foundation and Novo Nordisk Foundation.

Speaker

Topic :

Genetic engineering in macaque monkeys: from early embryos to the brain

Zhen Liu

Abstract

Genetic engineering largely facilitates the brain disease and brain function study. However, this approach in primate species is lagging far behind that of in rodent species. In this report, I will introduce our recent progress in primate genetic engineering, especially in the precise access of different cell type in monkey brain. Using single-cell RNA and ATAC sequencing of macaque brains combined with in vivo screening, we identified a large set of enhancers capable of driving targeted gene expression in specific cell types. AAV vectors driven by these enhancers successfully targeted layer-specific glutamatergic neurons, GABAergic interneuron subtypes, astrocytes, and oligodendrocytes with high specificity. Cross-species comparison revealed that some macaque enhancers are conserved and functional across species, but enhancers with layer-specific targeting in macaques did not label neurons in mice, highlighting evolutionary differences in cortical CREs. Targeting precision was further improved using a FLPo-dependent intersectional approach with two enhancers. These enhancer-AAVs were validated by monitoring and manipulating activity in macaque visual cortex, providing valuable tools to dissect primate neural circuit functions.

Biography

Dr. Liu is a Principal Investigator of Institute of Neuroscience (ION), Center for Excellence in Brain Science and Intelligence Technology, Chinese Academy of Sciences. He obtained his Ph.D degree in ION in 2017, and trained as a postdoc in ION from 2017-2018. Since 2018, he established independent laboratory in ION. His research group focuses on primate genetic engineering and model generation. He has developed a series of gene-modification methods in macaque monkey, including monkey cloning by somatic cell nuclear transfer (Cell, 2018), chimeric monkey generation using embryonic stem cell (Cell, 2023), enhancer virus toolkit for specific cell labeling in monkey brain (Cell, 2025). All these efforts are aiming to make macaque monkey to be better model in understanding brain function and disease.

Speaker

Topic :

Spatially resolved mapping of cells associated with human complex traits

Jian Yang

Abstract

Depicting spatial distributions of disease-relevant cells is crucial for understanding disease pathology. In this talk, I will present gsMap, a method that integrates spatial transcriptomics data with summary statistics from genome-wide association studies to map cells to human complex traits, including diseases, in a spatially resolved manner. Using embryonic spatial transcriptomics datasets covering 25 organs, we benchmarked gsMap through simulation and by corroborating known trait-associated cells or regions in various organs. Applying gsMap to brain spatial transcriptomics data, we reveal that the spatial distribution of glutamatergic neurons associated with schizophrenia more closely resembles that for cognitive traits than that for mood traits such as depression. The schizophrenia-associated glutamatergic neurons were distributed near the dorsal hippocampus, with upregulated expression of calcium signalling and regulation genes, whereas depression-associated glutamatergic neurons were distributed near the deep medial prefrontal cortex, with upregulated expression of neuroplasticity and psychiatric drug target genes. This study provides a method for spatially resolved mapping of trait-associated cells and demonstrates the gain of biological insights (such as the spatial distribution of trait-relevant cells and related signature genes) through these maps.

Biography

Jian Yang is a Professor of Statistical Genetics and Associate Dean at the School of Life Sciences, Westlake University, China. He received his PhD in 2008 from Zhejiang University, China, before undertaking postdoctoral research at the QIMR Berghofer Medical Research Institute in Australia (2008-2011). He joined The University of Queensland (UQ), Australia, in 2012 and was promoted to Professor in 2017 before joining Westlake University in 2020. His primary research interests focus on understanding the genomic variations among individuals and the associations of DNA variations with phenotypes and diseases. He was the 2012 recipient of the Centenary Institute Lawrence Creative Prize for his contribution to solving the 'missing heritability' paradox. He was also awarded the Australian Academy of Science Ruth Stephens Gani Medal for distinguished research in human genetics (2015) and the Prime Minister' s Prize for Sciences - Frank Fenner Prize for Life Scientist of the Year (2017). He has published over 240 papers, which have received >115,000 citations (Google Scholar, Aug 2025).

Speaker

Topic :

Single-cell spatial transcriptome atlas and whole-brain connectivity of the macaque claustrum

Zhiming Shen

Abstract

Claustrum orchestrates brain functions via its connections with numerous brain regions, but its molecular and cellular organization remains unresolved. Single-nucleus RNA sequencing of 227,750 macaque claustral cells identified 48 transcriptome-defined cell types, with most glutamatergic neurons similar to deep-layer insular neurons. Comparison of macaque, marmoset, and mouse transcriptomes revealed macaque-specific cell types. Retrograde tracer injections at 67 cortical and 7 subcortical regions defined four distinct distribution zones of retrogradely labeled claustral neurons. Joint analysis of whole-brain connectivity and single-cell spatial transcriptome showed that these four zones containing distinct compositions of glutamatergic (but not GABAergic) cell types preferentially connected to specific brain regions with a strong ipsilateral bias. Several macaque-specific glutamatergic cell types in ventral vs. dorsal claustral zones selectively co-projected to two functionally related areas-entorhinal cortex and hippocampus vs. motor cortex and putamen, respectively. These data provide the basis for elucidating the neuronal organization underlying diverse claustral functions.

Biography

Dr. Zhiming Shen is a Principal Investigator at the Center for Excellence in Brain Science and Intelligence Technology, Chinese Academy of Sciences. He received his B.S. from Nanjing University in 2001 and his Ph.D. from the Shanghai Institute of Biological Sciences, CAS, in 2007. He completed his postdoctoral training at the Medical University of South Carolina in 2012 and subsequently worked as a Research Associate at Stanford University. Dr. Shen' s research focuses on mesoscale primate brain mapping. He has made significant contributions to the field, with co-authored publications in top-tier journals including Cell and Science.

Speaker

Topic :

Single-cell Spatial Multi-omics Technology Research

Xun Xu

Abstract

Advancements in multi-omics are revolutionizing our understanding of complex biological systems through comprehensive analysis of DNA, RNA, and proteins in their spatial contexts. This talk highlights the integration of Stereo-omics with emerging genomic technologies, opening new avenues for discovery. We'll discuss innovations like Stereo-seq V2 for high-resolution total RNA profiling from FFPE samples, enhancing studies of host-microorganism interactions and expanding spatial transcriptomics. Additionally, we'll explore Stereo-cell technology, a versatile and scalable platform that revolutionizes single-cell transcriptomics by enabling in-situ analysis of cell interactions and microenvironments. These developments promise to unravel biological complexities, driving significant progress in developmental biology, evolution, disease research, and systems biology.

Biography

Xun Xu , PhD, BGI Chief Scientist, Director of State Key Laboratory of Genome and Multi-omics Technologies, PhD Supervisor of UCAS and Wuhan University. He serves as the convenor of WG6 for Biotechnology Committee (ISO/TC276), and member of SAC TC559.

His research interests focus on developing sequencing, single-cell and stereo omics technologies. He designed and developed the first BGI sequencers, as well as the DNBelab C4, stereo-seq and stereo-cell technologies. He also made his efforts in applying these technologies in understanding biodiversity and applications in agriculture and disease research. Dr. Xu published 200+ scientific peer-reviewed papers with 70,000+ citations in last five years and selected nine times as the “Clarivate Highly Cited Scientist”.

Speaker

Topic :

Similarities and differences of human and rodent neocortical synapses, neurons and networks

Gábor Tamás

Abstract

Experiments on animal models showed that the efficacy of chemical transmission between neurons depends on several factors including the number, spatial distribution and size of synapses, presynaptic release mechanisms, postsynaptic membrane properties and synaptic plasticity. Recordings from human synaptic connections indicated species related differences in synaptic properties leading to altered signal propagation in human cortical microcircuits compared to animal models. The presentation will elucidate quantal and structural differences of human and rat neocortical synapses mechanistically explaining why single neurons of the human neocortex can trigger high and low frequency rhythmic activity in local networks. In turn, experiments will be presented from freely behaving animals detecting rhythmic network episodes at various frequencies and the corresponding firing of identified interneurons and pyramidal cells during defined epochs of slow wave sleep. The suggestion that evolutionally conserved network episodes could be differentially recruited in mammalian species will be discussed.

Biography

Gábor Tamás is Professor of Neuroscience at the University of Szeged, Hungary. He started his neuroscience studies in the laboratory of Profs. Peter Somogyi and Eberhard Buhl at the University of Oxford and defined the effect, number and location of synapses between neocortical neurons.This work also revealed that certain types of cortical neurons could control themselves by establishing autapses between their axons and the parent soma/dendrites. When establishing a laboratory in Szeged, he developed a combined electrophysiological and neuroanatomical approach to study the interactions between neurons of the cerebral cortex and identified an intercellular mechanism capable of synchronizing neurons at gamma frequency. He received training from Prof. Rafael Yuste at Columbia University in two photon and high speed confocal imaging and the collaboration revealed that dendrites of interneurons consist of Ca^{2+} microdomains separating individual synapses. He applied standardized procedures in his laboratory in order to develop a library of specimens currently containing >15000 functionally connected pairs of neocortical neurons recorded and archived for correlated light and electron microscopy. This dataset allows the analysis of rare cell types or connections in the cortex and was essential in discovering the first type of interneuron, the so-called neurogliaform cell, capable of eliciting slow, GABAB receptor mediated inhibition in the cerebral cortex. Moreover, his group demonstrated that axo-axonic cells, which were considered as the most specific inhibitory neurons, are not only inhibitory but also function as the most powerful excitatory neurons of the cerebral cortex. This was the first study for which the group successfully performed multiple patch clamp recordings in slices taken from the human cerebral cortex in collaboration with Prof. Pál Barzó (University of Szeged). His current experiments focus on identified microcircuits in behaving humans. Gabor Tamas is a member of the Academia Europaea and the Hungarian Academy of Sciences.

Speaker

Topic :

Synaptic Machinery for Protein Quality Control

Chao Sun

Abstract

The synapse contains many risk proteins associated with major brain disorders. Bombarded by information input, synapses expose these proteins to constant risks of oxidative damage from local mitochondrial respiration and oxidase activity. This risk is exacerbated by the long lifetimes of many neuronal proteins, which prolong their exposure to environmental assaults. Considering the limited protein copies at a synapse, it is imperative to mitigate local damage. However, it is unclear how damaged proteins are detected and cleared by quality control at synapses— a vital process for brain waste clearance and synaptic homeostasis e.g. during sleep. My talk will address some of the most basic questions in protein degradation and its signaling machinery at neuronal synapses.

Biography

Dr. Chao Sun is now Group Leader of the Danish Research Institute of Translational Neuroscience (DANDRITE)-Nordic EMBL partnership in molecular medicine, and Associate Professor at the Department of Molecular Biology and Genetics, Aarhus University, Denmark. He was trained as a chemist at Cornell University and switched to neuroscience during his postdoc with Erin M. Schuman, Director of Max Planck Institute for Brain Research, where he became fascinated by proteostasis at neuronal synapses. As an alumnus of the Marine Biological Laboratory at Woods Hole, Dr. Sun has served as instructor of advanced neuroimaging summer schools at the Cajal course, Max Planck, and Cold Spring Harbor Asia. Dr. Sun received many prestigious grants and recognitions such as the 2025 ERC starting grant, Independent Research Fund Denmark Sapere Aude starting grant, HFSP postdoc fellowship, EMBO long-term fellowship etc.

Speaker

Topic :

Receptors:
a link between structure and function

Nicola Palomero-Gallagher

Abstract

Neurotransmitter receptors play a crucial role in neuronal communication, where they serve as molecular gatekeepers that enable signal transmission across synapses. Analysis of their distribution patterns provides valuable insights into the brain' s structural and functional organization — from basic sensory processing to higher-order cognitive functions. Receptor patterns differentiate phylogenetically older from more recently evolved regions, and demarcate unimodal, multimodal, and association areas. In addition, receptor architecture not only separates functional networks but also mirrors the hierarchical levels of processing within each system. In summary, while cytoarchitecture (the arrangement of neurons) and myeloarchitecture (the pattern of myelinated fibers) define the brain' s structural framework, it is the receptors that bridge this framework with the brain' s functional capacities.

Biography

Nicola Palomero-Gallagher obtained her Master' s degree in Biology from the Sciences Faculty of the Universidad Autónoma of Madrid, Spain and went on to do her PhD at the C. & O. Vogt-Brain Research Institute of the Heinrich-Heine University Düsseldorf, Germany. She is currently positioned as a Senior Researcher and Leader of the "Receptors" research group at the Institute of Neuroscience and Medicine (INM-1), Research Center Jülich, Germany, and also holds an associate professorship at the C. & O. Vogt-Brain Research Institute. In addition to her primary roles, Nicola serves as a senior editor of Brain Structure and Function. Her research is centered on the structural (cyto- and fiber-architecture) and molecular (receptor-architecture) organization of the human, non-human primate and rodent cerebral cortex. With a specific emphasis on understanding the relationship between structure and function, she seeks to provide insights into the complexities of the brain's organization.

Speaker

Topic :

Dissecting Human Cortical Evolution and Disease Risk via Primate Brain Organoids

Gabriel Santpere

Abstract

Identifying the molecular innovations that distinguish the human brain and their relationship to neuropsychiatric disease remains a major challenge. We investigate human-specific features of neural development by generating single-cell multi-omics atlases from brain organoids derived from human, chimpanzee, gorilla, and orangutan iPSCs. By integrating RNA-seq, ATAC-seq, ChIP-seq, and CUT&Tag data, we reconstruct cell-type–specific gene regulatory networks and map lineage-specific programs across species. Focusing on early human corticogenesis, we analyzed the expression dynamics of cortical and neuropsychiatric disorder-associated genes across multiple neural stem cell (NSC) populations, both in vitro and in vivo. We found that many risk genes traditionally linked to neuronal function are also active in early NSCs and brain organizers. By constructing disease-specific regulatory networks and simulating transcription factor depletion, we revealed critical developmental windows when NSCs are particularly vulnerable to dysfunction. Our research aims to highlight how both evolutionary divergence and early regulatory disruption may shape trajectories underlying cortical disorders.

Biography

Dr. Gabriel Santpere is a Miguel Servet Group Leader at the Hospital del Mar Research Institute (HMRI) in Barcelona, where he leads the Neurogenomics group within the Research Programme on Biomedical Informatics (GRIB). He teaches at Universitat Pompeu Fabra (UPF), where he coordinates the MSc course Principles of Genome Bioinformatics. Dr. Santpere obtained his PhD in Biology from the University of Barcelona and an MSc in Bioinformatics from UPF. He completed postdoctoral training at the Institute of Evolutionary Biology in Barcelona and later at Yale University, where he was appointed Associate Research Scientist. In 2019, he was awarded a La Caixa Junior Leader Incoming Fellowship to return to Spain, and in 2021, he secured a competitive Miguel Servet position to establish his independent research group at HMRI. His lab integrates neuroscience, genomics, and evolutionary biology to investigate gene regulation in human brain development and its disruption in neuropsychiatric disorders.

Center for Excellence in Brain Science and Intelligence Technology (Institute of Neuroscience), CAS

As part of a major drive for excellence in basic research in the new millennium, the Chinese Academy of Sciences (CAS) founded the Institute of Neuroscience (ION) on November 27, 1999. The institute is devoted to research in all areas of basic neuroscience, including molecular, cellular and developmental neurobiology, and systems and cognitive neuroscience. At its inception, the Institute aims to establish the infrastructure of a modern research institute that provides an environment for rigorous scientific pursuit and fruitful interactions, a merit-based system for promotion and funding, and a high-quality training program for graduate students and postdoctoral fellows. In 2014, within the framework of institutional restructuring, ION became the core unit of CAS Center for Excellence in Brain Science and Intelligence Technology (abbreviated "Brain Intelligence Center", see website http://english.cebsit.cas.cn/). The goal of the new Center is to help integrating research activity within and outside CAS and to promote team work and interdisciplinary collaboration, in order to address major problems in the frontier of brain science and brain-inspired intelligence technology.

There are currently 50 ION laboratories in various areas of molecular, cellular, systems and cognitive neuroscience. We are recruiting new laboratory heads at a rate of 3-4 per year, with a goal of reaching a steady state of 60 laboratories by 2025. Each laboratory consists of up to five permanent staff members and a variable number of graduate students and postdoctoral fellows. Many laboratories have ongoing collaborations with other research groups in China and abroad. Long-term collaborators are appointed as Guest Investigators of ION. Funding from the CAS, Ministry of Science and Technology, and Natural Science Foundation of China have provided research supports and facilities to our researchers at a level close to that of major international institutions in the frontier of neuroscience. An International Advisory Board consisting of a group of distinguished neuroscientists has offered critical inputs into ION's evolving organization and research activity. Academic review of individual ION laboratories by an international review committees is carried out on a regular basis, in order to ensure the quality of ION research programs.

The structure and function of the brain pose the ultimate challenge to human understanding of nature. Despite the spectacular progress in molecular and cellular biology over the last few decades, mysteries of the brain remain largely unsolved. Solution of these mysteries requires integration of experimental approaches from diverse disciplines and new conceptual frameworks that bridge understandings at different levels. The goal and agenda of neuroscience in the coming decades epitomize those of modern science - to understand nature is to understand how a natural phenomenon emerges from the properties of its constituent parts, and any description of a neural phenomenon, whether it is at the cognitive, circuit, cellular, or molecular level, is incomplete and unsatisfactory without addressing its causal links to the phenomena at a higher or lower level. To understanding the cognitive functions at the behavioral level, we need to know their underlying neural circuits, the neuronal types and synaptic connections comprising the circuits, the neuronal and synaptic properties giving rise to the circuit functions, and the genetic and molecular mechanisms responsible for the development, function, and plasticity of individual neurons and synapses.

The founding of ION in Shanghai provides a new opportunity for Chinese neuroscientists to flourish on their own soil and to contribute on a par with their peers in the international community. Visitors to ION are likely to agree with me that the vitality and enthusiasm of ION faculty and students point to a bright future for Chinese neuroscience. In the coming decades, we are looking forward to ever-lasting contributions by Chinese neuroscientists no less impressive than those bronze vessels in the Shanghai museum.

Hainan University (HNU)

Hainan University (HNU) was a merger with the former South China University of Tropical Agriculture in August 2007. It is a comprehensive key university jointly constructed by the Ministry of Education (MOE) and the Hainan Provincial People's Government.

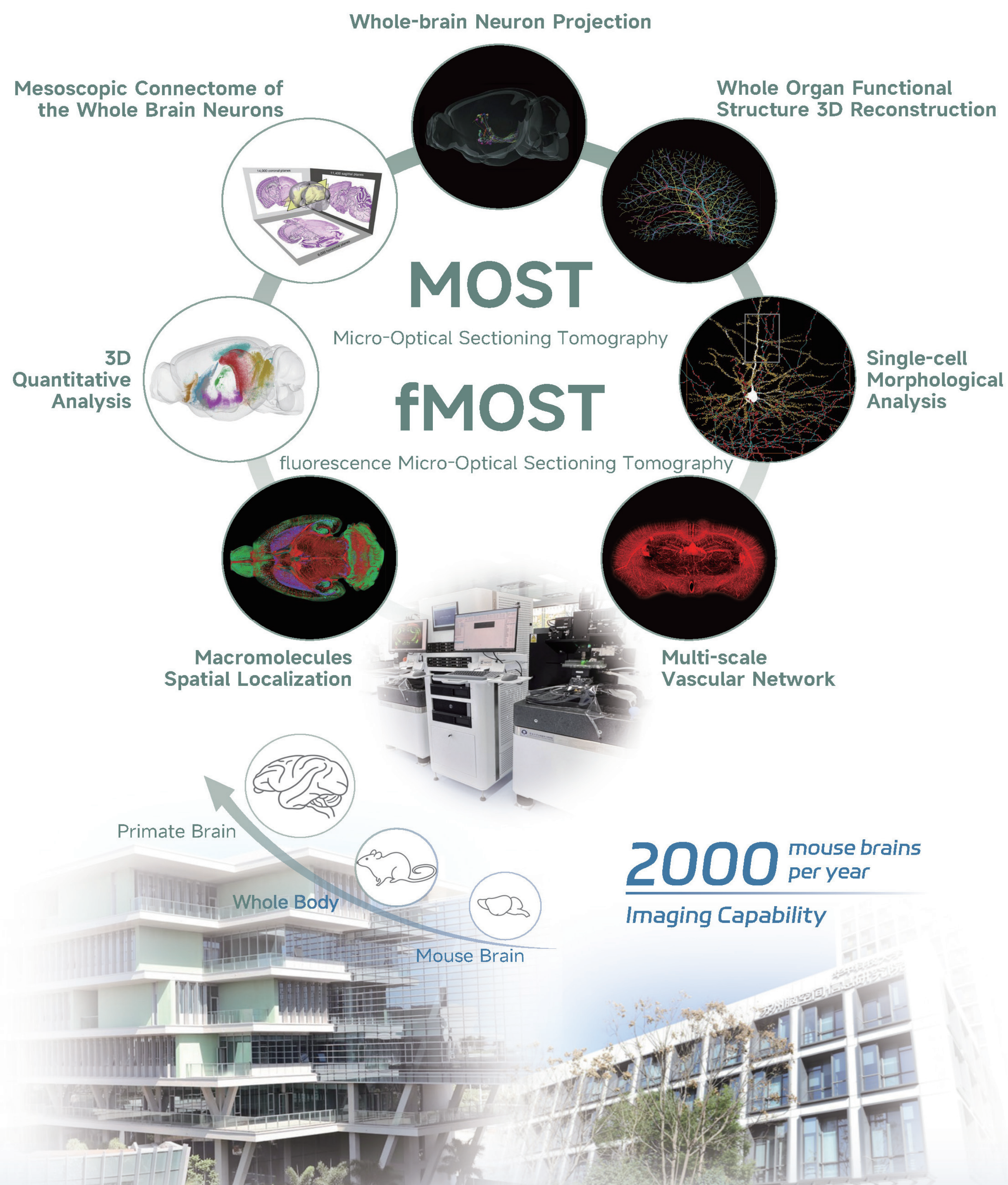
The campuses of the University cover an area of 4.12 million square meters. HNU has 44,000 full-time students, 30 secondary schools, 16 residential colleges, 16 first-level discipline doctorate programs, 2 professional doctorate programs, 37 first-level discipline master's programs, 28 professional master's degree programs, 76 undergraduate programs, 10 centers for post-doctoral studies, 45 state-level first-class undergraduate programs, 12 state-level first-class undergraduate courses, 2 state-level excellent courses, 1 state-level excellent online open course, and 2 designated as exemplary ideological and political education courses by the MOE. The disciplines offered by the University cover major fields such as philosophy, economics, law, humanities, science, medicine, agriculture, engineering, management, and art. Crop Science has been selected as a world-class discipline for two consecutive rounds, and 9 disciplines, Plant and Animal Science, Chemistry, Materials Science and Engineering, Agricultural Sciences, Engineering Science, Environmental Science and Ecology, Biology and biochemistry, General Social Science, as well as Computer Science are ranked among the top 1% worldwide according to ESI (Essential Science Indicators). The University employs more than 3100 full-time teachers.

In terms of research platforms, the University has established the State Key Laboratory of Tropical Crops Breeding, the State Key Laboratory of Digital Medical Engineering, the State Key Laboratory of Marine Resource Utilization in the South China Sea (co-sponsored by Hainan Province and the MOE), the Cultivation Base of the State Key Laboratory for Sustainable Utilization of Tropical Bioresources (co-sponsored by Hainan Province and the Ministry of Science and Technology), and the National Center of Technology Innovation for Saline-Alkali Tolerant Rice. Moreover, it has four Higher Education Discipline Innovation Projects funded by the Ministry of Science and Technology, three collaborative innovation centers jointly sponsored by Hainan Province and the MOE, 21 provincial/ministerial level key laboratories, 17 provincial/ministerial level engineering research centers, 15 academician workstations, two MOE International and Regional Study Centers, two provincial-level key think tanks, and 11 provincial-level key research bases in humanities, philosophy, and social sciences. Additionally, the University has built Hainan Research and Communication Center for Dongpo Culture to contribute to the cultural development of the Hainan Free Trade Port (FTP). Notably, the HNU Belt and Road Research Institute was included in the 2022 "Chinese Think Tank Index (CTTI) Top 100 University List" and rated as an A-level think tank.

HNU is committed to openness in education. Leveraging the advantages of Hainan FTP's opening-up to the outside world, the University has realized the rapid development of international cooperation and exchanges and gradually formed a pattern of open education that focuses on serving the BRI's educational cooperation and exchanges, and features education cooperation with tropical countries and regions. The University launched the "One HNU School, One Global University" Initiative and has established partnerships with 272 overseas universities or institutions from 52 countries and regions. HNU also launched the League of Tropical Universities (LTU) along with seven other renowned universities and research institutes in tropical regions, with a common commitment to advancing higher education and socio-economic development in tropical regions. The LTU has been joined by a total of 101 universities and research institutes from 41 countries and regions, including Malaysia, Brazil, Papua New Guinea, and Ethiopia. The number of student enrollments for China-foreign cooperative educational programs approved by the MOE has reached 4,030. Through arduous efforts, HNU was listed in the second batch of model universities for studying in China by the MOE, offering a complete range of higher education programs (from bachelor's to doctoral degrees) to international students.

The University is committed to pursuing national development strategies and meeting the needs of Hainan Province's economic and social development. Adopting the approach to "solving real problems and providing effective solutions," the University establishes seven collaborative innovation centers, focusing on key research fields including free trade port development and institutional innovation, ecological civilization, culture and tourism, seed breeding and tropical high-efficiency agriculture, marine technology, one health, and information technology. Such an endeavor would support and guide the University's relevant fields or disciplines to "meet the urgent development needs of Hainan Province and become top-rated national-level ones", and render strong support for achieving great self-reliance and strength in science and technology.

The School of Biomedical Engineering of HNU was established in January 2020. Located in Sanya Yazhou Bay Science and Technology City, the school has established State Key Laboratory of Digital Medical Engineering, Key Laboratory of Biomedical Engineering of Hainan Province, and several university-industry joint laboratories. The school fully leverages its strength in interdisciplinary integration to cultivate biomedical engineering professionals in five key areas: Brainsmatics and Digital Life, Molecular Diagnostics and Health Medical Engineering, Medical Theranostic Technology and Instrumentation, Brain-Computer Interface and Rehabilitation Medical Engineering, and Medical Information Engineering. It currently has established facilities including Bioimaging Platform, Digital Life and Biomedical Health Data Center, Biosensing and Wearable Medical Device Platform, Organoid Research Platform, Teaching and Training Center, Technology Transfer Platform, and Non-Human Primate Research Base, based on a total building area of 55,000 square meters. Dedicated to establishing a world-class discipline in Biomedical Engineering, the school contributes to both the development of HNU into a world-class university and the construction of the Hainan FTP.



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Shanghai Center for Brain Science and Brain-inspired Technology

上海脑科学与类脑研究中心
Shanghai Center for Brain Science and Brain-Inspired Technology

Shanghai Center for Brain Science and Brain-Inspired Technology (Shanghai Brain) was established in August 2018 as a strategic scientific initiative of Shanghai. Focusing on national strategic needs in fundamental principle of brain, brain disease and brain-inspired technology, Shanghai Brain builds R&D public service platform, innovates management system and mechanism. Shanghai Brain aims to,

1. Establishes groups of brain science and brain-inspired technology, and organizes major research tasks of Shanghai, the nation and international science project.

2. Gathers and cultivates outstanding talents, promotes interdisciplinary collaborative innovation in brain science and brain-inspired field.

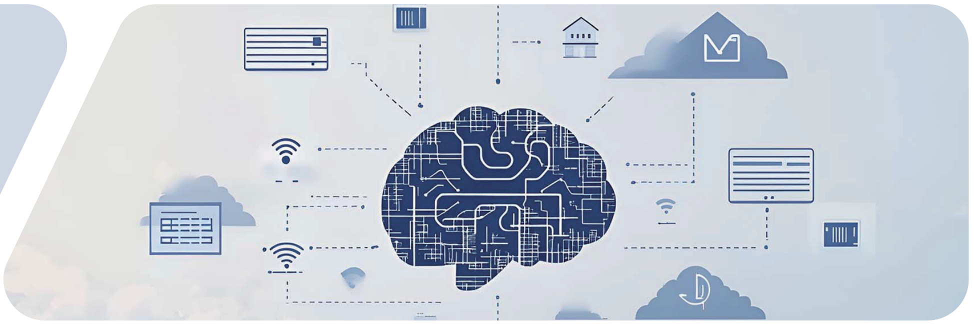
3. Achieves breakthroughs of major frontier scientific issues and key technologies, promotes the development industry in the brain science and brain-inspired field, and contributes to the construction of the Shanghai Science and Technology Innovation Center.

BGI Research

As the core R&D institution of BGI, BGI-Research is dedicated to studying life sciences, promoting the development of biotechnology, and improving public health. We focus closely on core genomic technologies and cutting-edge scientific issues, with genomics as our foundation. Centered on genomics, we concentrate on the forefront and key issues in the field of basic life sciences research and are deeply engaged in six areas: multi-omics technology and equipment R&D; biological big data mining and intelligent analysis; disease multi-omics and personal genome research; multi-omics and new technology research for agricultural species; microbial genome editing and transformation applications; and comparative genomics and evolutionary research. We work to become a world-class life science research institute. For years, BGI-Research has focused on meeting the strategic needs of the country, concentrating on basic research and application transformation in genomics. We have achieved world-leading core technological breakthroughs with independent intellectual property rights, such as low-cost, scalable sequencing platforms and new synthesis systems, rapidly developing into a leading genomics research center worldwide.

Since its establishment, BGI-Research has always adhered to BGI's academic traditions and persisted in the linkage of scientific discoveries, technological inventions, and industrial development. By constructing a full-cycle, high-throughput, low-cost core algorithm and omics platform, we support research on medical health, agricultural breeding, and other related fields, plan and implement large scientific projects, and contribute to the formation of industry standards by setting up scientific landmark achievements. BGI-Research actively promotes international scientific cooperation and exchanges by building advanced scientific research platforms, launching and participating in cutting-edge large scientific projects and programs, and fostering talent development and project cooperation with well-known universities and research institutions at home and abroad. This has further enhanced our research platform capabilities, research and development abilities, international cooperation networks, and high-end talent teams. BGI-Research aims to continuously enhance China's international influence in the field of life sciences and ultimately strive to build a new integrated life science research institution that is based on multi-omics big data and is internationally leading in industry-academia-research cooperation.

As of now, the Nature Index 2025 Annual Tables have been officially released. BGI Group has retained its position as the top life sciences industry institution in the Asia-Pacific region for ten consecutive years and stands as the only Chinese institution among the global top 10. BGI Research has 6 disciplines ranked in the top 1% globally by ESI, with Clinical Medicine, and Plant & Animal Science achieving this milestone in just three years.



State Key Laboratory of Brain Cognition and Brain-inspired Intelligence Technology

INTRODUCTION

The **State Key Laboratory of Brain Cognition and Brain-inspired Intelligence Technology** is a national research center designated by the Ministry of Science and Technology of China focusing on neural mechanism of brain cognition and development of brain-inspired artificial intelligence. In January 2025, the Ministry of Science and Technology (MOST) approved the establishment of the State Key Laboratory of Brain Cognition and Brain-inspired Intelligence Technology.

MISSION

- Decode neural mechanisms for high-order cognition
- Develop general-purpose brain-inspired intelligence system

RESEARCH FOCUS

BIOLOGICAL INTELLIGENCE

INSPIRED

ARTIFICIAL INTELLIGENCE

1. The neural mechanism of multidimensional integration in temporal and spatial cognition
2. The neural mechanism of reasoning and decision-making
3. Artificial intelligence inspired by the principle of brain cognition

CORE OBJECTIVES

The neural mechanism of multidimensional integration in temporal and spatial cognition

- The neural mechanism underlying objective and individual concepts
- The neural mechanism of temporal perception
- The neural mechanism of spatial navigation and cognitive maps

The neural mechanism of reasoning and decision-making

- The neural mechanism of prior knowledge-based reasoning
- The neural mechanism of conception and the rule generalization
- Neural and computational mechanisms for flexible decision-making

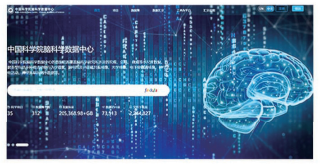
Artificial intelligence inspired by the principle of brain cognition

- Brain-inspired general cognitive intelligence theory and models
- Biologically plausible yet computationally efficient brain-Inspired computing architectures
- Brain-machine Integration theories and methods for cognitive Intelligence

CROSS-INSTITUTIONAL RESEARCH FACILITIES

- CAS Brain Science Data Center
- Cognition and Behaviour Research Platform
- Ultra-High Field Animal Magnetic Resonance Platform
- Electrical/Magnetic Individualized Precision Closed-Loop Regulation Platform
- The Transdisciplinary Platform of Brain Functional Connectomeand Brain- inspired Intelligence
- Nanofabrication Core Facility for Advanced Brain Science at CEBSIT

◀ Shenzhen Brain Science Infrastructure



◀ CAS Brain Science Data Center

◀ Brain Imaging Center

Supporting Institute:
Center for Excellence in Brain Science and Intelligence Technology, Chinese Academy of Sciences

Jointly established by:
Institute of Automation, Chinese Academy of Sciences
Shenzhen Institute of Advanced Technology, Chinese Academy of Sciences

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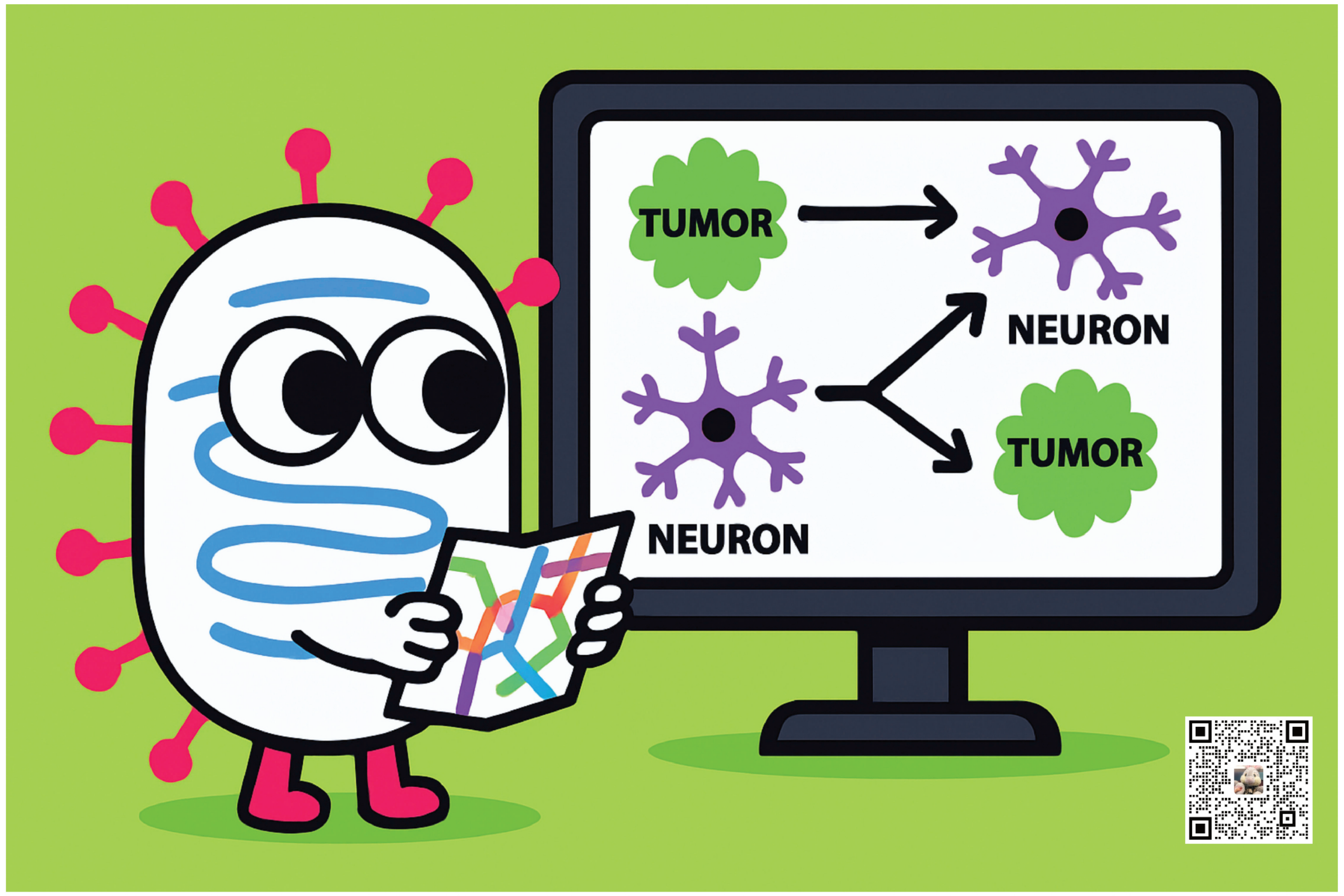
WeChat Official Account

狂犬病毒 RABIES VIRUS
肿瘤与神经元的交互

VIRUCO 基焕生物



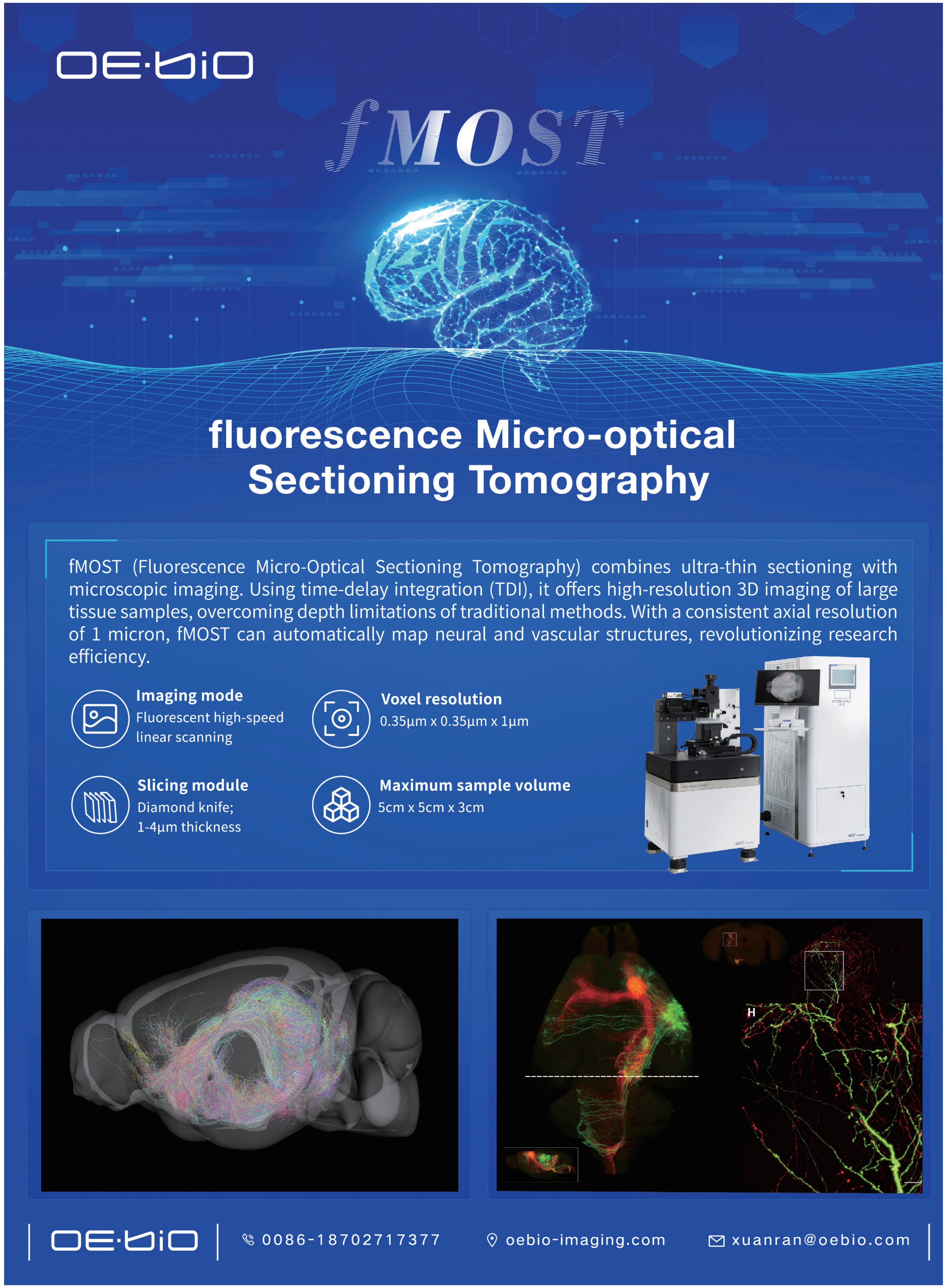
RETROGRADE MONOSYNAPIC TRACING

NEURON-TUMOR NETWORKS

LONG-TERM LABELING AND IMAGING OF SYNAPIC NEURAL NETWROKS

类型	名称	核心功能	文库	基因指标
CVS-N2c	*N2c-ΔG-EGFP/mCherry(EnvA)	逆向跨单突触标记	有	ΔG
CVS-N2c	N2c-ΔG-EGFP/mCherry	逆向不跨突触	有	ΔG
RV	*RV-ΔG-EGFP/mCherry(EnvA)	逆向跨单突触标记	有	ΔG
RV	RV-ΔG-EGFP/mCherry	逆向不跨突触	有	ΔG
CVS-N2c RV	CRE（请咨询）	逆向不跨突触 (无毒)	/	ΔGL ΔL

*仅供科研使用


OE·bIO
fMOST
fluorescence Micro-optical Sectioning Tomography
fMOST (Fluorescence Micro-Optical Sectioning Tomography) combines ultra-thin sectioning with microscopic imaging. Using time-delay integration (TDI), it offers high-resolution 3D imaging of large tissue samples, overcoming depth limitations of traditional methods. With a consistent axial resolution of 1 micron, fMOST can automatically map neural and vascular structures, revolutionizing research efficiency.
Imaging mode
Fluorescent high-speed linear scanning
Voxel resolution
0.35μm x 0.35μm x 1μm
Slicing module
Diamond knife; 1-4μm thickness
Maximum sample volume
5cm x 5cm x 3cm
OE·bIO
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oebio-imaging.com
xuanran@oebio.com


EVIDENT
Transforming Precision Imaging
全新多色全光谱型激光扫描共聚焦 FV4000
NEW
全新多色全光谱型激光扫描共聚焦 FV4000
专利的全新共聚焦探测器技术
更高的灵敏度和信噪比
行业领先的光谱检测范围(400-900 nm)
用于共聚焦成像和光刺激的10色高功率激光谱线
高动态范围的光子数定量能力
温和高效的大视野快速共振扫描
激光功率检测系统维持恒定激发强度
高达6通道的全光谱共聚焦检测
人工智能降噪和分析技术
模块化设计，满足您的定制需求
FV4000
多光子激光扫描显微镜 FV4000MPE
专业深层高分辨率活体成像
新型高灵敏大动态范围硅基半导体探测器
多谱线6通道同步检测
大视野超快速成像
配置丰富可拓展多模态成像
FV4000MPE
转盘共聚焦活细胞超分辨系统 SpinSR
分辨率高达110 nm的实时超分辨率成像
专有反卷积算法进一步提升图像质量
宽视野成像，速度高达 200fps
特色硅油物镜可以实现活细胞深层成像
宽场、共聚焦、超分辨率模式自由切换
功能强大的智能cellSens软件平台
SpinSR
研究级全玻片扫描系统 VS200
全自动、简单、智能
高速度·高通量·高效率
五种观察方式，荧光图像拼接效果顶级
高倍镜成像、高分辨率，满足高端应用
SLIDEVIEW VS200 拥有多达五种观察方法的组合，
加载器最多可容纳 210 个载玻片，工作流程简洁强大，
且可结合深度学习的 TruAI 技术。
VS200
EVIDENT
www.evidentscientific.com.cn
400-969-0456
OLYMPUS

Shanghai Quanlan Technology Co. LTD

Shanghai Quanlan Technology Co., Ltd. develops closed-loop neuromodulation systems, providing advanced brain monitoring solutions for research and clinical use. With a focus on innovation and efficiency, we aim to accel-erate the translation of brain therapies from lab to clinic.

Neural Electrophysiology Systems

Offers electrophysiology acquisition and closed-loop stimulation systems for humans, non-human primates, and small animals.

AR4-M

ARS-Spike

Closed-Loop Stimulation Systems

Closed-loop neuromodulation devices based on non-invasive brain-computer interface technologies, covering research, clinical, and home applications.

X8

C256RS

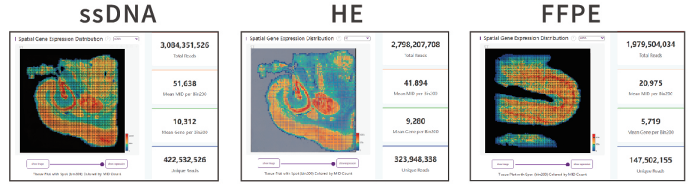
上海脑科学与类脑研究中心
Shanghai Center for Brain Science and Brain-Inspired Technology

Single-Cell Sequencing Platform (SCSP)

The Single-Cell Sequencing Platform (SCSP) at the Shanghai Center for Brain Science and Brain-Inspired Technology is dedicated to building a high-quality R&D service platform that facilitates cutting-edge research in brain science and intelligence. It aims to tackle major scientific challenges and advance key technologies by providing comprehensive and reliable multi-omics technical services. These include single-cell transcriptomics, single-cell epigenomics, and spatial transcriptomics. Through integrated solutions, the platform supports the development of a brain science research network centered in Shanghai and extending throughout the Yangtze River Delta region.

Platform Technologies

SCSP offers end-to-end multi-omics technology services tailored for neuroscience research, with a focus on constructing single-cell spatial transcriptome atlases of brain regions. Our services span the entire workflow, including experimental design, sample preparation, library construction, quality control, cell sorting, high-throughput sequencing, and data delivery. The platform has extensive experience in generating high-quality data from multiple species, such as mice, humans, and non-human primates.



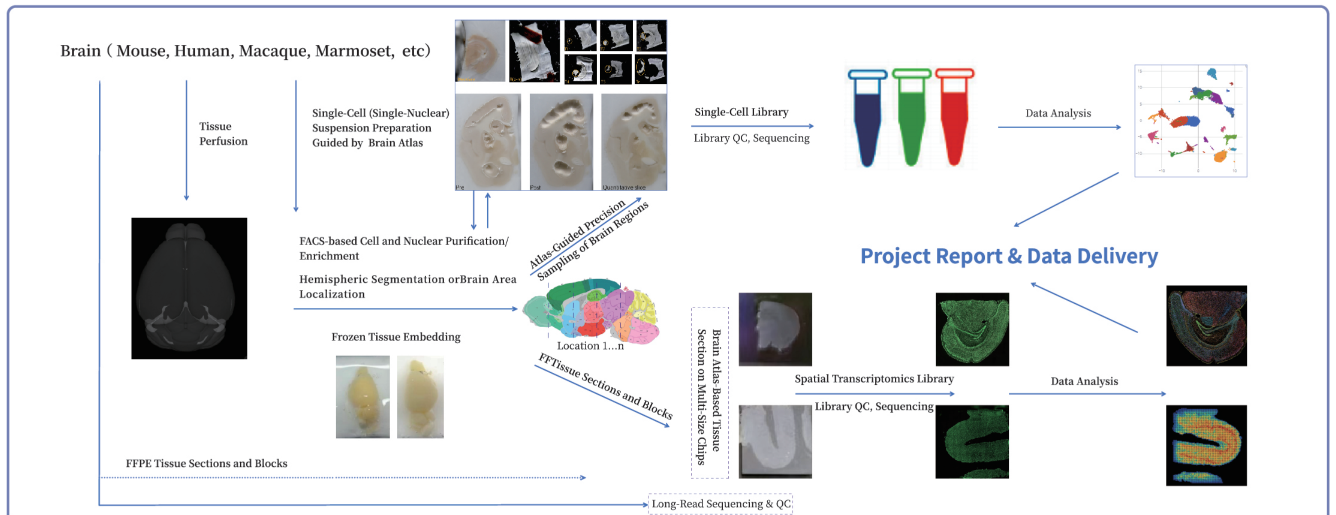
Stereo-seq：Marmoset Brain (FF-V1.3) ；Human Brain (FFPE)

Platform Services

Integrated with spatial transcriptomics, our platform enables multi-scale analysis—from tissues and cells to subcellular structures and molecules—within the same sample.

Key services include:

- Preparation of high-quality single-cell/nuclear suspensions
- Droplet-based library construction (TaiM4 technology) for single-cell RNA-seq and ATAC-seq
- Stereo-seq sample processing (both fresh and FFPE samples)
- Sample and nucleic acid fragment quality control
- Flow cytometry and cell sorting
- High-throughput next-generation sequencing (MGI DNBSEQ-T7)
- Long-read sequencing (CycloneSEQ G400-ER)
- Bulk RNA sequencing



Brain Atlas-guided integrated single-cell spatial transcriptomics workflow

The Center for Data and Computing in Brain Science

The Center for Data and Computing in Brain Science serves as the technical support platform established by the Center for Excellence in Brain Science and Intelligence Technology. By pioneering new approaches in data and computational technologies, it supports breakthroughs in neuroscience and brain-inspired intelligence.It establishes an integrated brain science data platform encompassing data collection, standardization, visualization, computation, application and sharing, empowering researchers to unlock new insights into the brain.

Our Capability

01 Open Sharing and Standardization Processing of Data Resources

02 Data-Driven Application Product Research and Development

03 Novel Algorithm and Model Research for Application Empowerment

04 Data Integration for AI-Powered Digital Twins Systems

05 Construction of Brain-Inspired Intelligence Frameworks

06 High-Performance Compute and Storage Support

Contact Us

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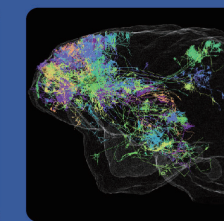
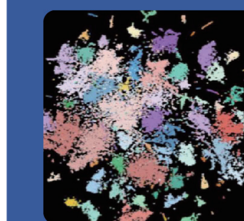
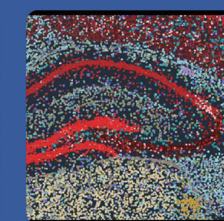
cdcbs@ion.ac.cn

Digital Brain
CEBSIT (ION)

Brain Atlas Database







Explore More

https://www.digital-brain.cn

Brain Science Data Center, Chinese Academy of Sciences

The data resources at the Brain Science Data Center of the Chinese Academy of Sciences cover various aspects of neuroscience research,from macroscopic to microscopic and multi-scale data. These data types include morphological and behaviors data of different species, brain structure and functional imaging, electrophysiology, optical imaging, electron microscopy, neuroelectrophysiology and neural genomics.

- Data Submission
- Data Storage
- Data Sharing
- DOI Registration Service

https://www.braindatacenter.cn

Biomedical Image Analyzer

Huizhong Tianzhi Technology is committed to the research of automated analysis of biomedical images, forming an interdisciplinary team of experts to transform terabytes of neuroscience experimental data into quantitative results using a combination of artificial and AI.

We revolutionize AI-powered biomarker imaging technology, harnessing the power of deep learning to bring imaging analysis to biomedical imaging research.

99.9%	500万+	60+
Annotation accuracy	Annual data processing volume	Professional annotation team

Full-process project services

1.Data reception and preprocessing
Standardize data formats, conduct quality assessment and preprocessing, and ensure that data meets labeling requirements

2.Experts finely label
Field experts manually annotate and review to ensure the accuracy of annotation results

3.Quality control testing
Multiple quality inspection processes, random sampling and review, to ensure that the labeling quality meets the standards

4.Data delivery and parsing
Generate standardized reports to support data visualization and result interpretation

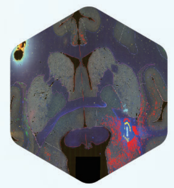
Technical advantages

Based on artificial intelligence-based algorithms, all signals in the imaging data are automatically reconstructed with full coverage, which greatly saves labor costs.

Manual proofreading ensures accuracy and ensures data accuracy and reliability.

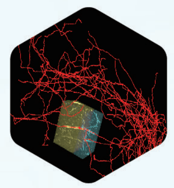
Complete process services from sample preparation, imaging to data analysis to meet customers' one-stop needs and improve research efficiency.

Core service capabilities



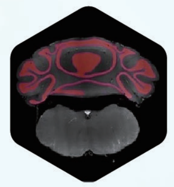
Spatial omics analysis

Support proteomics, transcriptomics, metabolomics, accurate cell segmentation, detailed morphometric analysis.



Neuronal remodeling

The three-dimensional morphology of neurons was reconstructed from zebrafish, rat brain, monkey brain and other samples, and the axon dendrite direction was traced to obtain complete nerves Internet.



Whole-Brain Segmentation and Registration

Whole brain samples are mapped to standard brain atlases for brain region labeling and precise segmentation based on customized partition features.

Other annotation services

- Expertise in Animal Behavior Annotation：Our team comprises animal behavior experts and data annotation engineers. Equipped with extensive experience in behavior classification, we can accurately identify various complex behavioral patterns, providing reliable data support for research in neuroscience, pharmacology, and other fields.
- Cell Counting Service: Counts cells in a specified area in a special site.

Technical parameters

Service items	Accuracy indicators	Processing speed	Data backed
Neuronal remodeling	Submicron level	2000 cells/hour	SEM & LM Images
Whole brain segmentation	99.8% accuracy	48 hours delivery	MRI、fMRI、CT
Spatial transcriptome	Single-cell resolution	72-hour analysis cycle	10x Genomics, NanoString
3D imaging analysis	0.5 μm isotropy	Real-time rendering	Light-sheet & Confocal Data

Contact us

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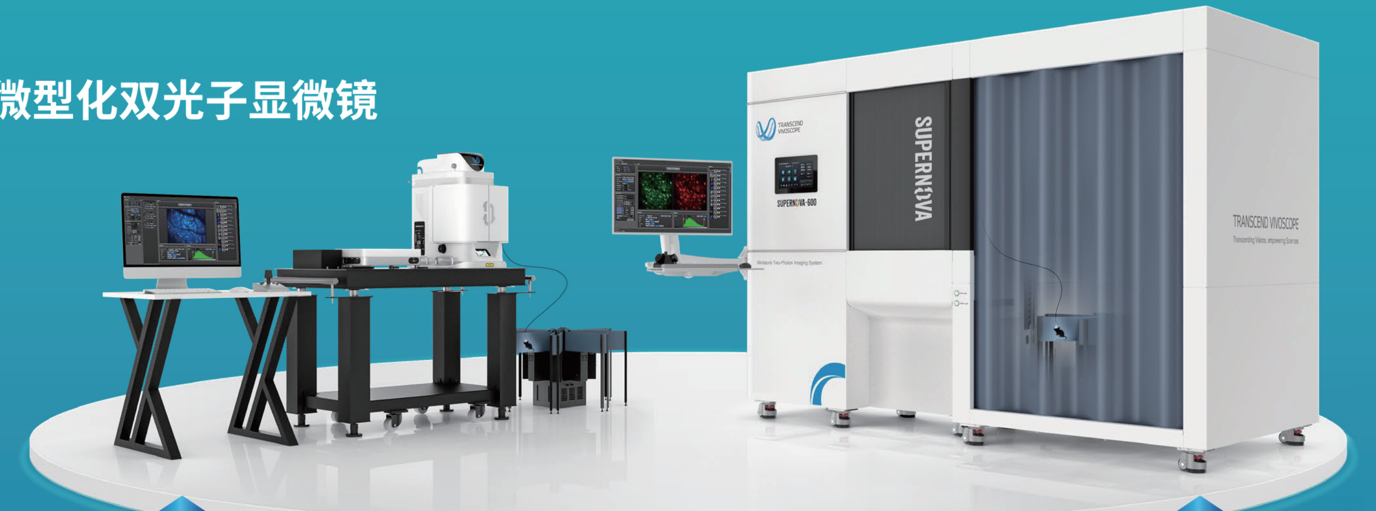
汇众天智
HUI ZHONG TIAN ZHI

超维景
TRANSCEND VIVOSCOPE

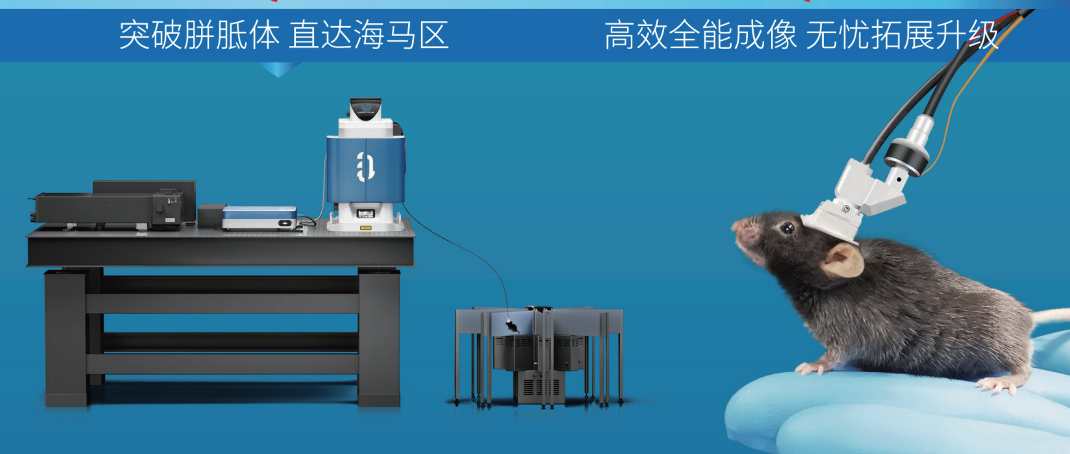
神经科学多光子显微成像解决方案

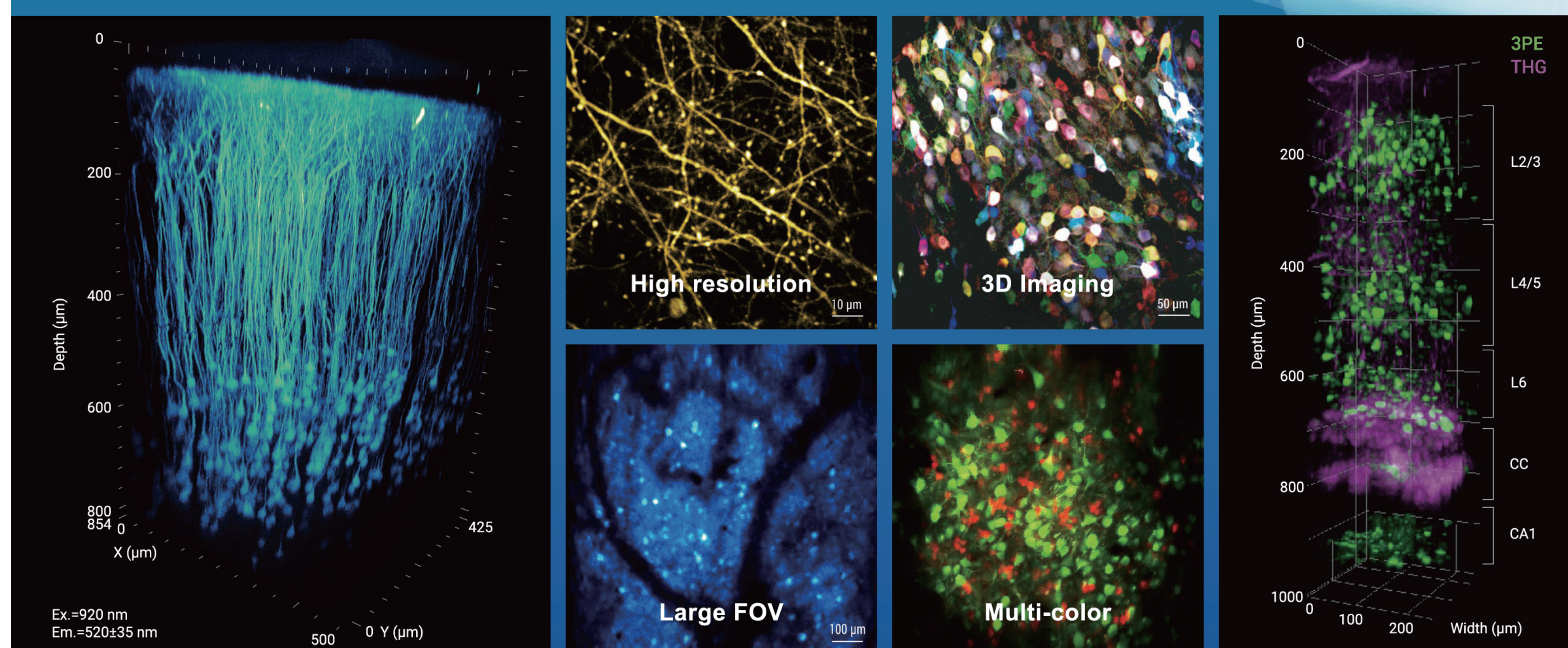
微型化双光子显微镜



SUPERNOVA-100	SUPERNOVA-3000	SUPERNOVA-600
紧凑集成设计 灵动空间适配	突破胼胝体 直达海马区	高效全能成像 无忧拓展升级

微型化三光子显微镜





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超维景官方

超维景科研解决方案