

To Probe, Protect & Promote the Human Brain. Researchers imaging the future at Human Brain Forum 2024 in Beijing

Lijing Fang^a, Chao Ma^b, Yi-Cheng Zhu^c

“HUMAN BRAIN, THE FUTURE HAS ARRIVED”

Following the remark sentence at the end of the promotional trailer, the Human Brain Forum 2024 was successfully launched in Beijing on August 24, 2024. Hosted by the Chinese Society for Anatomical Science and organized by the National Human Brain Bank for Development and Function (Institute of Basic Medical Science, Chinese Academy of Medical Sciences-CAMS) and the Institute for Neuroscience (CAMS), co-organized by Peking Union Medical College Hospital (PUMCH), the Chinese Human Brain Consortium, and HUMAN BRAIN Journal, the forum attracted nearly 300 participants, including scholars, clinicians, and graduate students from domestic and international medical schools and institutions, research institutes, and related industries.

OPENING REMARKS AND KEYNOTES

The event commenced with an opening address by Vice President Bin Peng of PUMCH, followed by keynote speeches from Deputy Director Fan Lu (National Science and Technology Infrastructure, Ministry of Science and Technology of China), and Director Shan Lu (China National Center for Biotechnology Development). Professor Chao Ma (Vice President and Secretary-General of the Chinese Society for Anatomy Science, Director of the National Human Brain Bank for Development and Function, Institute for Neuroscience, CAMS), delivered a welcome speech and highlighted the progress of the human brain database released since the inaugural forum in 2023.

GROUNDBREAKING STUDY ON NORMATIVE NEUROLOGICAL DATA AND LAUNCH OF NEUROFUNCTIONDATASET-CN

Prof. Yicheng Zhu (Director of the Department of Neurology of PUMCH), presided over the opening ceremony and jointly held the release ceremony of the NeuroFunctionDataset-CN with Vice President Bin Peng (PUMCH), Prof. Liying Cui (PUMCH), Prof. Jun Ni (PUMCH), Researcher Feng Tian (Institute of Software, Chinese Academy of Sciences-CAS), and Researcher Xiangmin Fan (Beijing Zhongke Ruiyi Information Technology Co., Ltd). The study on the Normative Data for Chinese General Population Quantitative Neurological Function was led by PUMCH and involved 13 hospitals across 12 provinces and cities in China. Initiated in 2021, the study enrolled over 1,800 adults with normal cognitive and motor functions, using the ReadyGo™ balance test system and the BrainFit™ digital

^a Institute of Basic Medical Sciences, Neuroscience Center, Chinese Academy of Medical Sciences; Department of Human Anatomy, Histology and Embryology, School of Basic Medicine, Peking Union Medical College, Beijing 100005, China.

^b Institute of Basic Medical Sciences, Neuroscience Center, Chinese Academy of Medical Sciences; Department of Human Anatomy, Histology and Embryology, School of Basic Medicine, Peking Union Medical College, Beijing 100005, China. Corresponding Author: machao@ibms.cams.cn

^c Department of Neurology, Peking Union Medical College Hospital, Chinese Academy of Medical Sciences & Peking Union Medical College, Beijing 100730, China. Corresponding Author: zhuyc@pumch.cn

cognitive function evaluation system to comprehensively assess their motor and cognitive abilities. The release of the database has filled a critical gap in China's clinical normative data for quantitative neurological function. It serves as a reference for determining normal ranges in clinical evaluations, offering a baseline for comparison in future neurological research. Additionally, the database is accessible to the global scientific community, allowing researchers to submit data use applications through the National Human Brain DataBank Platform (<http://neurofunction.humanbrainbank.cn/>). These studies were funded by the Science and Technology Innovation 2030 (STI2030) - Brain Science and Brain-Inspired Intelligence Technology Major Project, and the CAMS Innovation Fund for Medical Sciences (CIFMS).

THEMATIC REPORTS AND SUB-FORUMS

Following the opening ceremony, the forum transitioned into the theme report stage, hosted by Prof. Liying Cui and Prof. Xiaoping Wang. Several prominent experts delivered insightful presentations that captivated the audience: Prof. Shumin Duan, an academician of the CAS, presented on "A Brain Circuit Underlying Sexually Dimorphic Aggression". Prof. Shimin Hu, an academician of the CAS, discussed "Innovation and Medical Application of Deep Learning Framework". Prof. Xunming Ji, an academician of the Chinese Academy of Engineering, focused on "Clinical and Translational Research Driven by New Findings in Patients". Researcher Qi Xu from the Institute of Basic Medicine, CAMS, gave a talk on "A Pivotal Role of Human Brain in Neuropsychiatric Research and Strategies for Validation and Drug Discovery". These reports sparked considerable interest and discussion among the attendees.

In the afternoon, six sub-forums were organized, covering themes like Human Brain Banking, Neuropsychiatric Disorders, Neurodegenerative Diseases, Neuro-Imaging, Brain Aging Cohorts, and Multidisciplinary Innovations. A total of 24 domestic and foreign scholars delivered reports in these sub-forums, which were novel and rich in content.

The Human Brain Banking sub-forum was hosted by Prof. Aimin Bao and Prof. Xinjie Bao. Prof. Inge Huitinga (Director of the Netherlands Brain Bank and the Netherlands Institute for Neuroscience in Amsterdam), gave a report titled "The Netherlands Neurogenetics Database." Prof. Jing Zhang (The First Affiliated Hospital of Zhejiang University)

discussed the progress in the study of co-morbidities in the Chinese human brain bank. Prof. Jiangning Zhou (School of Life Sciences, University of Science and Technology of China) presented "The Molecular Regulation and Single-Cell Dissection of Stress Circuits." Lastly, Prof. Maurice Curtis of Neuroscience at the University of Auckland spoke on preparing the Neurological Foundation Human Brain Bank for the future of neuroscience.

The Neuropsychiatric Disorders sub-forum was hosted by Prof. Chao Ma and Prof. Naihong Chen. The following reports were given during the forum: Prof. Zhang Yan (Vice President of The Second Xiangya Hospital of Central South University) presented on "Stress and the Brain." Prof. Chao Chen (Central South University) delivered a report on "Investigating the Etiology of Schizophrenia Based on Human Brain Samples." Prof. Aimin Bao (Zhejiang University) discussed "The Role of Oxytocin in Bipolar Disorder: From Animal Model to Postmortem Human Brain Study." Prof. Yizheng Wang (an academician of the CAS, Fudan University) spoke on "TRPC6 and the Diagnosis of Alzheimer's Disease."

At the Neurodegenerative Disorders sub-forum hosted by Prof. Gang Wang and Dr. Fei Han (Associate Chief Physician), several reports were presented: Prof. Jianzhi Wang (Tongji Medical College, Huazhong University of Science and Technology) discussed the key role of abnormal tau accumulation in neurodegeneration and its targeting strategy. Assistant Prof. Xiaoying Chen (School of Medicine, University of Washington) presented on brain-immune interaction in health and disease. Researcher Jianxiong Zeng (Shanghai Jiaotong University) spoke about infection and immune modulation of Alzheimer's disease. Prof. Zhentao Zhang (Department of Neurology, Renmin Hospital of Wuhan University) discussed the role of pathologic protein aggregation in neurodegenerative diseases.

The Neuro-Imaging sub-forum, hosted by Prof. Feng Feng and Dr. Ming Yao (Associate Chief Physician), featured the following reports: Prof. Jiahong Gao (Magnetic Resonance Imaging Research Center, Peking University) shared advances in neuroimaging technologies. Prof. Yufeng Zang (The Affiliated Hospital of Hangzhou Normal University) presented the localization and precise modulation of abnormal brain activity by rs-fMRI reference normals. Prof. Yong He (Beijing Normal University) discussed the developmental mapping and computational modeling of the human brain connectome. Shi Feng, a distinguished researcher

at Shanghai Tech University, talked about how artificial intelligence enables brain image analysis.

The Brain Aging Cohort sub-forum was chaired by Prof. Yicheng Zhu and Prof. Jun Ni. During the forum, several reports were presented: Prof. Ni Zhen (National Institute of Neurological Disorders and Stroke, National Institutes of Health) delivered a report on the application of brain stimulation in neurological diseases. Prof. Guangliang Shan (Institute of Basic Medicine, CAMS) presented a report on modern cohort study concepts and models in practice. Prof. Lu Shen (Department of Neurology, Xiangya Hospital, Central South University) discussed the development of clinical cohort studies and precision diagnostics for neurodegenerative diseases. Director Lei Cao (The General Office of Stroke Prevention Project Committee, National Health Commission) provided insights on the National Stroke Screening and Intervention Program for People at High Risk of Stroke.

The Multidisciplinary Innovations sub-forum was chaired by Prof. Deling Li and Prof. Haiteng Deng and included the following presentations: Prof. Luping Shi (Tsinghua University) spoke about brain-inspired computing and perception. Assistant researcher Xiaolan Peng (Institute of Software, CAS) discussed the key intelligent interaction technology in the ancillary diagnosis of nervous system diseases. Associate researcher Youning Lin (Shenzhen BGI Life Sciences Research Institute) explained spatiotemporal omics approaches to understanding brain development and disease. Associate Prof. Junxia Zhang (Department of Neurosurgery, Jiangsu Provincial People's Hospital) presented on precision surgery for Glioma - The intraoperative application of precision cell-level imaging technology.

YOUNG SCHOLARS FORUM

A roundtable forum for young scholars was held in the evening, co-chaired by Prof. Linya You, Associate Researcher Fan Liu, and Assistant Prof. Xiaoying Chen. Eight young scholars presented their research, including Prof. Qiong Liu (Department of Anatomy and Histoembryology, School of Basic Medical Sciences, Fudan University) spoke about the mechanism of cognitive impairment and depressive disorder based on the molecular dynamic of human hippocampus aging. Dr. Fei Han (associate

chief physician of the Department of Neurology, PUMCH) reported on key points in the clinical trial design for cerebral small vessel disease. Prof. Yan Li (School of Basic Medicine, Shanghai Jiao Tong University) presented a draft human brain spatial proteome atlas for understanding the molecular basis of brain function. Associate researcher Xia Wang (the Institute of Basic Medicine, CAMS) shared insights on the ALDH2 rs671 G>A enhances Alzheimer's disease pathology. Prof. Zhiyong Chen (School of Basic Medicine, Harbin Medical University) highlighted the application experiences of neuroelectrophysiology and imaging technologies in neuroscience research. Assistant researcher Yuting Hu (National Health and Disease Human Brain Tissue Resource Center, Zhejiang University) discussed the downregulation of peripheral luteinizing hormone rescues ovariectomy-associated cognitive deficits in APP/PS1 mice. Prof. Linya You (Department of Human Anatomy and Histoembryology, School of Basic Medicine, Fudan University) spoke about neuronal excitotoxicity in aging and mental illness. Lastly, Dr. Jiuyang Ding (School of Forensic Medicine, Guizhou Medical University) shared insights on APOE4 couples AS and AD-like tau pathology.

Starting in 2023, the Human Brain Forum is dedicated to the aims of "*Probe, Protect & Promote the Human Brain*". Planned to be held annually, this forum convenes leading experts in both basic and clinical brain science to share the latest advancements in the establishment of human brain banks and research on human brain science worldwide. The forum organizers wish to pave the way to promote scientific and technological innovation in neuroscience, particularly related to human brain health and diseases, by facilitating an opportunity to integrate basic, clinical research and translational research, including industrial transformation of academic results.

Conflict of interest

All members declare no conflict of interest.

List of abbreviations

CAMS Chinese Academy of Medical Sciences; PUMCH Peking Union Medical College Hospital; CAS Chinese Academy of Sciences. ♦





Publisher's note: Eurasia Academic Publishing Group (EAPG) remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

Open Access. This article is licensed under a Creative Commons Attribution-NoDerivatives 4.0 International (CC BY-ND 4.0) licence, which permits copy and redistribute the material in any medium or format for any purpose, even commercially. The licensor cannot revoke these freedoms as long as you follow the licence terms. Under the following terms you must give appropriate credit, provide a link to the license, and indicate if changes were made. You may do so in any reasonable manner, but not in any way that suggests the licensor endorsed you or your use. If you remix, transform, or build upon the material, you may not distribute the modified material. To view a copy of this license, visit <https://creativecommons.org/licenses/by-nd/4.0/>.