Highlights in Human Brain 2023

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In 2023, our journal *Human Brain* maintained its original aims of integrating basic and clinical scientists in the study of human brain. The journal remains focusing on advancing our understanding of the human brain and brain disorders, the development of collaborative research platforms and databases related to the human brain. The following 10 manuscripts may be of particular interest to readers from a broad range of background and are presented in this editorial.

The Brain Aging National Cohort (BANC)-PUMC, characterized by its large-scale samples, strict enrollment strategy, and scientific evaluation, represents a domestic breakthrough in the systematic study of the causes and consequences of age-related neurological diseases (Han *et al.,* 2023). This examination addresses the data gap present in the Chinese demographic, fills an industrial void, and contributes to the advancement of our understanding of the origins of age-related neurodegenerative diseases. The ongoing follow-up program is expected to have a profound impact on the exploration of relevant pathological mechanisms.

Given the lack of standardized operational protocol (SOP) for human brain banking in amyotrophic lateral sclerosis (ALS), research groups have provided a guideline for the construction and operation of an ALS brain bank, aligning with the SOP for the human brain banking in China. Chen *et al.,* (2023) offer a detailed introduction to this guideline, which serves as a remarkable milestone for the research of ALS. With the gradual establishment and improvement of ALS brain bank, we anticipate increased attention and investment in ALS study, leading to a potential cure for this disease and ultimately benefiting patients.

With the rapid growth in the incidence of Alzheimer's disease (AD) and other types of dementia, China has become the country with the largest number of AD patients in the world. Understanding the facts is important to improve existing early-intervention strategies and treatment. Xiao *et al.,* (2023) explored the major domestic challenges in the diagnosis and treatment of AD through a population-based study. This study provided us with a comprehensive view of the current states of AD care in China and laid a solid foundation for more comprehensive and effective approaches to AD control in the future. This article has made a significant impact among our readers and was viewed for over 1000 times in the month following its online publication on our journal's website.

Some studies demonstrate that the TrkB receptor and its pathway may serve as potential therapeutic targets for AD. He *et al.,* (2023) discuss the role of primary TrkB-dependent signaling in the processes of AD pathogenesis. The article indicates that TrkB signaling activation can be effective in reducing Aß accumulation and Tau phosphorylation, which may open a new trial for AD treatment. To date, some preclinical small-molecule drugs targeting TrkB have shown promising positive effects.

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Aging is one of the pivotal factors causing neurodegenerative diseases and dementia, which is known not to affect individuals uniformly, even within the same person. Focusing on the variations from different brain regions and cell types, Chen *et al.*, (2023) fully evaluate the impact of healthy aging on the human brain.

With the advent of new imaging techniques that allow us to visualize cerebral venules more clearly than before, an increasing body of evidences shows that cerebral venules play an important role in many neurological disorders. Wang *et al.*, (2023) summarize the latest research advances regarding cerebral venules alterations related to several neurological disorders.

Immune checkpoint inhibitors, as a breakthrough discovery of the 21st century, have heralded a new era for biotechnology and remain a hotspot in cancer research. Currently, researchers are exploring the application of immune checkpoint modulators for the treatment of CNS diseases. Sun *et al.*, (2023) focus on these related advances, especially the PD-1 and CTLA-4 inhibitors.

Currently, great progress has been made in the field of nerve ultrasound, which aids conduct nerve studies for the diagnosis of peripheral neuropathies. Niu *et al.*, (2023) have introduced the application of ultrasonics in various inflammatory neuropathies. This application has rendered CSA (cross-sectional area) enlargement and its distribution as useful and quantifiable parameters, thereby enabling the assessment of peripheral nerves.

Deep brain stimulation (DBS) has been proven to be a promising strategy for enhancing the recovery of ischemic stroke. Geng *et al.*, (2023) suggest that electrical stimulation of multiple deep brain nuclei as targets may have a variety of positive effects on both rodents and humans.

Despite the rapid development and wide adoption of tissue transparency methodology in animal brains, high-resolution imaging and transparency in human brain tissues still face major challenges, such as high fat content, high density, and strong background fluorescence. Li *et al.*, (2023) have successfully developed a new method for human brain transparency called dFC-Tesos, which involves steps including tissue electrophoresis degreasing, antibody labeling, decolorization, and three-dimensional high-resolution imaging. To demonstrate the concept, the authors clearly showed the spatial relationships and pathological changes between microglia and Aβ plaques in the brain cortex from patients with Alzheimer's disease. For the first time, the dFC-Tesos method provides a useful tool for studying the macroscopic and ultrastructural structures of human brain tissue with transparency. This manuscript is also in memory of the fist author, Ms. *Di-Di Li*, who is both a talent scientist and a diligent collaborator.

In summary, the 2023 issue of *Human Brain* presented here attempts to reflect the latest research trends and developments, deepen our understanding of the brain, and improve the medical practice and quality of life for patients suffering from brain disorders. Furthermore, we typically hope that readers could leverage our sources as a platform to accelerate academic communication in the broad field of human brain science. ♦

REFERENCES

1. Xiao J, Li J, Wang J, Zhang X, Wang C, Peng G, *et al*. China Alzheimer's disease: facts and figures. Human Brain. 2023; 2(3).
2. Wang P, Cao Y, Zhu Y-C. An overview of cerebral venules: From structure, pathology, and imaging to related diseases. Human Brain. 2023; 2(1).
3. Niu J, Liu M. Progress in the nerve ultrasound of inflammatory peripheral neuropathies. Human Brain. 2024; 2(3).
4. Sun J, Shao X, Wang X, Liu F. Advance of immune checkpoint inhibitors in CNS disease. Human Brain. 2023; 2(3).
5. Han F, Qiu W-Y, Zhou L-X, Ni J, Yao M, Liu Y-T, *et al*. The Brain Aging National Cohort-PUMC: study design and baseline characteristics. Human Brain. 2023; 2(2).
6. He K, Nie L, Dai Z, Li S, Yang X, Liu G. The role of TrkB receptor signaling in Alzheimer's disease. Human Brain. 2023; 2(4).
7. Geng R, Wang Y, Wang R, Bao X. Deep Brain Stimulation for Ischemic Stroke Rehabilitation: from Rodents to Human. Human Brain. 2024; 2(3).
8. Chen Y, Zu G, Zhang BLF, Bai Z, Liu Q, Li W, *et al*. Regional- and cell type-specific changes of the human brain during aging. Human Brain. 2024; 2(3).
9. Chen Z, Wang X, Wu J, Du J, Wang N, Zhang D, *et al*. Standardized Operational Protocol of Human Brain Banking for Amyotrophic Lateral Sclerosis. Human Brain. 2023; 2(1).
10. Li D-D, Wang X, Qiu W-Y, Yang J-L, Wang W-P, Wang X-L. Study on the transparent dFC-Tesos microscopic imaging method for large tissues in human brain. Human Brain. 2023; 2(1).