



## OPEN ACCESS

EDITED AND REVIEWED BY  
Anastasia Bougea,  
National and Kapodistrian University of  
Athens, Greece

\*CORRESPONDENCE  
Yuzhen Xu  
✉ tianyayizhe@126.com

SPECIALTY SECTION  
This article was submitted to  
Neurological Biomarkers,  
a section of the journal  
Frontiers in Neurology

RECEIVED 15 March 2023  
ACCEPTED 21 March 2023  
PUBLISHED 11 April 2023

CITATION  
Xu Y, Han J, Tu W-J and Zhang J (2023)  
Editorial: Potential biomarkers in neurovascular  
disorders. *Front. Neurol.* 14:1186852.  
doi: 10.3389/fneur.2023.1186852

COPYRIGHT  
© 2023 Xu, Han, Tu and Zhang. This is an  
open-access article distributed under the terms  
of the [Creative Commons Attribution License  
\(CC BY\)](https://creativecommons.org/licenses/by/4.0/). The use, distribution or reproduction  
in other forums is permitted, provided the  
original author(s) and the copyright owner(s)  
are credited and that the original publication in  
this journal is cited, in accordance with  
accepted academic practice. No use,  
distribution or reproduction is permitted which  
does not comply with these terms.

# Editorial: Potential biomarkers in neurovascular disorders

Yuzhen Xu<sup>1\*</sup>, Jinming Han<sup>2</sup>, Wen-Jun Tu<sup>3</sup> and John Zhang<sup>4</sup>

<sup>1</sup>The Second Affiliated Hospital of Shandong First Medical University, Taian, Shandong, China, <sup>2</sup>Department of Neurology, Xuanwu Hospital, Capital Medical University, Beijing, China, <sup>3</sup>Peking Union Medical College, Chinese Academy of Medical Sciences, Beijing, China, <sup>4</sup>Department of Physiology and Pharmacology, Loma Linda University, Loma Linda, CA, United States

## KEYWORDS

neurovascular, biomarkers, peripheral blood, cerebrospinal fluid, mechanisms

## Editorial on the Research Topic Potential biomarkers in neurovascular disorders

Neurovascular disorders are a leading cause of disability and death in adults by affecting the arteriovenous system and blood supply. Neurological disorders accounted for 92 million disability-adjusted life-years (DALYs) in 2005 and are projected to reach 103 million worldwide by 2030 (1), serving as the leading cause of DALYs and the second leading cause of death. The annual economic burden due to neurovascular disorders is USD 765 billion in the United States and EUR 788 billion in Europe (2, 3). In view of the huge economic burden and high morbidity of neurovascular disorders, the identification of potential early biomarkers is crucial.

Ischemic stroke is the most common neurovascular disorder. He et al. found that the decreased serum transthyretin level in patients with acute ischemic stroke may serve as one major cause of intracranial atherosclerosis. Wang F.-H. et al. indicated that the decreased plasma adiponectin levels and increased visceral adipose tissue (VAT) to subcutaneous adipose tissue (SAT) ratio may be involved in intracranial atherosclerotic stenosis. Based on the report from Ding et al., Cystatin C, encoded by CST3, is a potential biomarker of atherosclerosis, with its rs13038305 and rs911119 polymorphisms independently affecting large artery atherosclerotic stroke. Furthermore, Wang A. et al. showed that the stability of atherosclerotic plaque can be affected by the non-high-density lipoprotein cholesterol (non-HDL-C)/high-density lipoprotein cholesterol (HDL-C) ratio. The higher the ratio, the less stable the atherosclerotic plaque appears to be. The understanding of blood glucose management with intravenous thrombolysis and blood pressure management after endovascular thrombectomy (EVT) in patients with acute cerebral infarction has also been expanded by new research. Cai et al. found that patients with stroke who treated with intravenous thrombolysis can aggravate the prognosis through inflammatory response and increased blood glucose fluctuation. Zhang Q. et al. found that early blood pressure management after EVT may be important for the functional outcome of acute cerebral infarction patients with a successful recanalization.

Subarachnoid hemorrhage (SAH) is a type of hemorrhagic stroke with a high mortality and disability, accounting for 5–10% of stroke. High levels of systemic immune-inflammation index (SII) predict delayed cerebral ischemia (DCI) after SAH (Chen et al.). In addition, significantly downregulated specific plasma miRNAs, including miR-23b-3p, miR-590-5p, miR-20b-5p, miR-142-3p and miR-29b-3p, may play a role in the regulation of SAH progression (Zheng et al.).

It is estimated that there are ~50 million people living with dementia today, and this number will grow to 152 million by 2050 (4). Vascular dementia (VD) is the second largest type of dementia after Alzheimer's disease. Specifically, the new myosin hormone irisin is considered to be associated with VD and reduced serum irisin levels can predict cognitive impairment in VD patients (Zhang F. et al.). The prevalence of post-stroke cognitive impairment (PSCI) ranges from 20 to 80% (5). Gao et al. found that neuroglobin is associated with cognitive impairment after intracranial hemorrhage and low levels of neuroglobin may be used as a biomarker of cognitive impairment after intracranial hemorrhage. Recent studies regarding the involvement of gut microbiota and cognitive function have gradually emerged. Lu et al. analyzed the differences in intestinal flora between cognitive impairment group and control group, providing novel insights for subsequent research.

Moyamoya disease is a disorder characterized by narrowing and blockage of arteries in the brain, which eventually leads to ischemic stroke, hemorrhagic stroke or/and seizures. The percent amplitude of fluctuation (PerAF) can be used as an effective indicator of ocular complications and emotional complications in patients with Moyamoya disease (Li et al.). Angiogenesis and reconstruction are widely used treatments for Moyamoya disease. Caveolin-1 (Cav-1) may serve as a biomarker driving angiogenesis and collateral formation in patients with Moyamoya disease after the bypass surgery (Zhao et al.). In addition, Chen et al. showed that the TGF $\beta$ 1/VEGF pathway may be a key mechanism involved in vascular remodeling in patients with Moyamoya disease.

Optic nerve and vascular lesions are important parts of neurovascular disorders in the central nervous system. Using fMRI to scan patients with optic neuritis and orbital fractures in the resting state, it was found that the amplitude of low-frequency fluctuations (ALFF) can predict abnormal functional activities at different frequencies and brain regions (Yan et al.; Kang et al.). Hu et al. used voxel-based morphometry (VBM) to analyze imaging data to investigate potential morphological changes in the brains of female patients with menopausal dry eye (DE), and analyzed the relationship between VBM and behavioral performance, suggesting that DE patients have brain changes during menopause. Abnormal spontaneous activity of the region may be the underlying pathological mechanism causing the disease. Interestingly, retinal thickness is considered as a potential

biomarker for both Sjogren's syndrome (Liu et al.) and Pterygium (Wang F. et al.).

## Author contributions

YX and JH drafted the manuscript. All authors contributed to the article and approved the submitted version.

## Funding

The present study was funded by the Shandong Medical and Health Technology Development Fund (202103070325), the Shandong Province Traditional Chinese Medicine Science and Technology Project (M-2022216), the Natural Science Foundation of Shandong Province (ZR2022MH124), and the Nursery Project of the Shandong First Medical University Youth Science Fund Cultivation Funding Program (202201-105).

## Acknowledgments

We would like to thank all the authors who participated in the subject collection and all the reviewers who were involved in the review process, and we are very grateful to all the editors who assisted us in processing the manuscripts.

## Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

## Publisher's note

All claims expressed in this article are solely those of the authors and do not necessarily represent those of their affiliated organizations, or those of the publisher, the editors and the reviewers. Any product that may be evaluated in this article, or claim that may be made by its manufacturer, is not guaranteed or endorsed by the publisher.

## References

- Kaddumukasa M, Mugenyi L, Kaddumukasa MN, Ddumba E, Devereaux M, Furlan A, et al. Prevalence and incidence of neurological disorders among adult Ugandans in rural and urban Mukono district, a cross-sectional study. *BMC Neurol.* (2016) 16:227. doi: 10.1186/s12883-016-0732-y
- Feigin VL, Vos T, Alahdab F, Amit AML, Barnighausen TW, Beghi E, et al. Burden of Neurological Disorders Across the US From 1990–2017: A Global Burden of Disease Study. *JAMA Neurol.* (2021) 78:165–76. doi: 10.1001/jamaneurol.2020.4152
- Deuschl G, Beghi E, Fazekas F, Varga T, Christoforidi KA, Sipido E, et al. The burden of neurological diseases in Europe: an analysis for the Global Burden of Disease Study 2017. *Lancet Public Health.* (2020) 5:e551–67. doi: 10.1016/S2468-2667(20)30190-0
- Wang Q, Xu Y, Qi C, Liu A, Zhao Y. Association study of serum soluble TREM2 with vascular dementia in Chinese Han population. *Int J Neurosci.* (2020) 130:708–12. doi: 10.1080/00207454.2019.1702548
- Wang Q, Wang K, Ma Y, Li S, Xu Y. Serum galectin-3 as a potential predictive biomarker is associated with poststroke cognitive impairment. *Oxid Med Cell Longev.* (2021) 2021:5827812. doi: 10.1155/2021/5827812