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Introduction to the special issue on brain health

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ABSTRACT

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1.1. Why study brain health

Injury to the brain may leave behind a trail of devastation including but not limited to loss of ability to perform customary and instrumental activities of daily living, and personal and financial ruin. The brain is a treasure to protect. In recognition of the pivotal role of a healthy brain in daily life, the United Nations designated 2021–2030 the "Decade of Healthy Aging". The main goal of healthy aging is to improve the lives of persons and their families and communities by preservation of mental and physical health. In tandem with this movement, the World Health Organization (WHO) in 2022 issued a guidance statement on optimization of brain health across the life course in an effort to maintain and restore brain structure and function at every stage of life [1]. As such, local, national, and international brain health initiatives have surfaced with recommendations in the domains of education, research and clinical programs about how to protect the brain. Thus, from public health, clinical and research perspectives, brain health is at center stage. Furthermore, the severe acute respiratory syndrome coronavirus 2 (SARS-COV-2) pandemic has heightened awareness of the importance of brain health as cognitive impairment and other related manifestations may be complications of this coronavirus infection.

The brain may be thought of as a "command center" of the human body charged with control of conscious and some bodily functions which influence every aspect of life [1–3]. As the 'graying' of the world's population continues, deaths attributed to neurological diseases are expected to increase substantially, and disorders that impair cognitive function are projected to triple in frequency over the next 25 years [4]. Thus, there is a need to protect the brain via a comprehensive approach that promotes brain health. Because environment, lifestyle, societal influences, intrinsic risks, and other factors contribute to brain health beginning in the early decades of life and many of the aforementioned risks are preventable or modifiable, brain health is a life-long process. As knowledge of the determinants of brain health continues to grow, we are well-positioned to thwart these threats. Of note, clinical trials are emerging with readouts assumed to reflect brain health (e.g., cognitive and intellectual function, hippocampal volume) as endpoints [5].

1.2. What this special issue on brain health emphasizes

In this text, we provide a single source, expert, up-to-date reference on topics central to the understanding of brain health. The first section of the issue discusses the definition of brain health. For example, how broad or how restricted should the term brain health be and what are the pros and cons of the various proposed definitions that encompass brain health? Here we may define brain health pragmatically, as follows [6]: the ability to communicate, make decisions, problem-solve, and make productive and useful contributions to society. The section provides a foundation from which to explore the remaining topical sections. In the second section, the relevance of brain health is emphasized based on epidemiological data mostly related to cognitive and functional outcomes. In the third section, we explore the understanding of brain health along the full continuum of life and how the study of brain health represents an intersection of convergence science. Thus, the study of brain health is a transdisciplinary one. In the fourth section,

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neuropsychological and functional screening instruments are discussed to assist the practitioner in understanding whether there is brain health or injury. This section is complemented by the next section which addresses routine and more advanced neuroimaging markers of brain health. With the advent of the "ATN" (*A*= amyloid-beta, *T*= tau, *N*= neurodegeneration) research classification system, biomarkers such as amyloid-beta 42:40 ratio, phosphorylated-tau (e.g., p-tau 217), and neuroimaging markers of atrophy and other neurodegenerative metrics are translating into clinical practice, and healthcare providers must be well-grounded in the interpretation, availability and application of these markers.

The second half of this special issue on brain health focuses respectively on sections addressing specific cardiovascular risks, non-cardiovascular risks such as social determinants of health, results of traditional randomized controlled trials of modifiable risks (largely cardiovascular risk factors), multi-domain strategies, and global interventions. Taken together these will provide a state-of-the-art view of how brain health may be maintained. The next section reviews the state of national and international brain health initiatives and how global efforts may be taking hold to protect the brain. The penultimate section provides new insights on how molecular or "bench" research such as exploration of the neurovasculome may open new pathways in our understanding of brain health, and how such information may be applied to assure brain health. Finally, the closing section of the issue provides insights on challenges ahead of us in the quest to achieve brain health locally and worldwide. In clinical medicine we are witnessing the proliferation of strategies for preventing cognitive impairment in clinical medicine, person-centered long-term care of older persons, and initiatives to close gaps in brain health in underserved communities [7–9]. It seems pertinent to ask: What will it take to achieve brain health globally?

This issue, a single source reference on brain health, provides readers with foundational and state-of-the-art information on a developing field that promises to grow and take greater hold over time. As there are many modifiable factors and routes to maintenance of brain health, the goal of achieving local and global brain health programs is within our grasp. Although not sufficient, there is urgent need for disseminating and increasing knowledge about brain health issues in clinical settings [2–4]. As the eminent epidemiologist Geoffrey Rose pointed out many years ago, doctors often act as though their professional responsibility does not extend beyond the sick or those at immediate risk. Equally, politicians who may influence health more than doctors are rarely focused on the distant future [10]. As a nation's prosperity rises there is interest in individual health, healthy living and a healthy environment. Preventive efforts provide options for individuals and society to choose from. Whereas one can debate the economic arguments for and against prevention, Rose concluded that it is better to be healthy than ill or dead (the beginning and end of the only real argument for prevention) [10]. Brain health requires our understanding, attention, and efforts to advance the field.

Submission declaration and verification

The article has not been published previously, is not under consideration for publication elsewhere, is approved by all authors who are responsible for the content, and will not be published elsewhere in the same form.

Declaration of generative AI in scientific publishing

The authors have not used AI and AI-assisted technologies in the writing process.

CRediT authorship contribution statement

Philip B. Gorelick: Formal analysis. **Atticus H. Hainsworth:** Conceptualization. **Anders Wallin:** Conceptualization.

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References

[1] Optimizing Brain Health Across the Life Course: WHO position paper. Geneva: World Health Organization; 2022. License: CC BY-NC-SA 3.0 IGO; https://creativecommons.org/licenses/by-nc-sa/3.0/igo/.
[2] Practical Aspects of Cognitive Impairment and the Dementias, in: PB Gorelick, FA Sorond (Eds.), Practical Aspects of Cognitive Impairment and the Dementias, Clin. Geriatr. Med. 39 (1) (2023) 1–190.
[3] A. Wallin, P. Kettunen, P.M. Johansson, et al., Cognitive medicine-a new approach in health care science, BMC Psychiatry 18 (2018) 42, https://doi.org/10.1186/s12888-018-1615-0.
[4] P.B. Gorelick, K.L. Furie, C. Iadecola, et al., Defining optimal brain health in adults. A Presidential Advisory from the American Heart Association/American Stroke Association, Stroke 48 (2017) e284–e303.
[5] F.B. Ortega, J. Mora-Gonzalez, C. Cadena-Sanchez, et al., Effects of an exercise program on brain health outcomes for children with overweight or obesity. the activebrains randomized clinical trial, JAMA Network Open 5 (8) (2022) e2227893, https://doi.org/10.1001/jamanetworkopen.2022.27893.
[6] World Federation of Neurology. Brain Health Initiative. London: World Federation of Neurology, 2021: access online March 6, 2023 at: https://wfneurology.org/activities/brain-health-initiative/what-makes-your-brain-healthy.
[7] G.B. Frisoni, D. Altomere, F. Ribaldi, N. Vilain, C. Brayne, N. Mukadam, et al., Dementia prevention in memory clinics: recommendations from the European task force for brain health services, Lancet Regional Health-Europe (2023), https://doi.org/10.1016/j.lanepe.2022.100576.
[8] G.L. Darmstadt, B. Kirkwood, S. Gupta, et al., WHO Strategic and technical advisory group of experts for maternal, newborn, child, and adolescent health and nutrition kmc working group, Lancet 401 (2023) 1751–1753.
[9] B.N. Archer, P. Abdelmalik, S. Cognat, P.E. Grand, J.A. Mott, B.I. Pavlin, et al., Towards anti-racist policies and strategies to reduce poor health outcomes in racialized communities: introducing the O'Neill-Lancet Commission on racism, structural discrimination and global health, Lancet 401 (2023) 1834–1836.
[10] Rose Geoffrey, The Strategy of Preventive Medicine, Oxford University Press, Oxford, 1994, pp. 1–5, reprinted.