*Introduction to the Special Issue on Brain Health*

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**1.1 Why Study Brain Health**

The brain is a complex organ composed of approximately 100 billion neurons connected by a highway consisting of thousands of myelinated axons. 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.

The brain may be thought of as a “command center” of the human body charged with control of conscious and unconscious 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 epochs 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.

**1.2 What This Special Issue on Brain Health Emphasizes**

In this text, we provide a single source, expert, up-to-date reference on 12 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? 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, 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, and neuroimaging markers of atrophy and other neurodegenerative metrics have spilled into clinical practice, and healthcare providers must be well-grounded in the interpretation, availability and application of these markers. For an understanding of the interpretation of cerebrospinal fluid and blood biomarkers in brain health readers are referred to a separate special issue of *Cerebral Circulation, Cognition and Behavior* (publisher to list here reference to separate issue of CCCB on biomarkers}.

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 to provide a state-of-the-art view of how brain health may be maintained. The next section reviews that state of national and international brain health initiatives and how global efforts may be taking hold to protect the brain. The next to final section provides new insights on how 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. As we are witnessing the proliferation of prevention of cognitive impairment in clinical medicine, person-centered long-term care of older persons, and initiatives to close gaps in brain health in underserved communities, what will it take to achieve brain health globally [5-7]?

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 of disseminating and increasing knowledge about brain health issues in clinical settings [2-4]. As 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, and politicians who may influence health more than doctors are rarely focused on the distant future [8]. As prosperity rises there is interest in health, healthy living and 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) [8]. Brain health requires our understanding, attention, and efforts to advance the field.

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