

The EAN Brain Health Strategy: One Brain, One Life, One Approach

A strategy to reduce the burden of neurological disorders and to promote the health of the brain

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Abstract

Background

Brain health is essential for health, well-being productivity and creativity across the entire life. Its definition goes beyond the absence of disease embracing all cognitive, emotional, behavioural and social functions which are necessary to cope with life situations.

Methods

The EAN Brain Health Strategy responds to the high and increasing burden of neurological disorders. It aims to develop a non-disease, non-age centred holistic and positive approach ('one brain, one life, one approach') to prevent neurological disorders (e.g., Alzheimer's disease and other dementias, stroke, epilepsy, headache/migraine, Parkinson's disease, multiple sclerosis, sleep disorders, brain cancer) but also to preserve brain health and promote recovery after brain damage.

Results

The pillars of the EAN Brain Health strategy are: 1) Contribute to a global and international Brain Health approach (together with national and subspecialty societies, other medical societies, WHO, WFN, patients' organizations, industry, and other stakeholders); 2) Supporting the 47 European national societies, healthcare and policymakers in the implementation of integrated and people-centred campaigns; 3) Fostering Research (e.g. on prevention of neurological disorders, determinants and assessments of brain health), 4) Promoting Education of students, neurologists, general practitioners, other medical specialists and health professionals, patients, caregivers, and general public; 5) Raising public awareness of neurological disorders and brain health.

Conclusions

By adopting this 'one brain, one life, one approach' strategy in cooperation with partner societies, international organisations, and policymakers, a significant number of neurological disorders may be prevented while enhancing the overall well-being of individuals by maintaining brain health through the life course.

1. Brain Health and Neurology

The WHO defines Brain Health as the promotion of optimal brain development, cognitive health, and well-being for all across the life course¹. This definition implies that Brain Health is not just the absence of disease infirmity and fosters a person-centered approach focused on promotion, prevention, treatment, care, and rehabilitation.

While the definition of Brain Health is still debated², the concept that brain health is essential for the overall physical, mental and social health as well as well-being, productivity and creativity and coping with life situations (and critical life events) is undisputed. It is also widely

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accepted that brain health is a fundamental pre-requisite for mental health, even if both terms are sometimes erroneously seen as coterminous. In the aftermath of COVID lockdowns and the ensuing labour shortages in the United States, the importance of brain health to maintaining a functional workforce who can adapt and adjust to changes is becoming more apparent, as well as the consequent economic costs, with an estimated \$2.5 trillion in productivity being lost globally due to poor brain health³.

The years 2020-2022 mark a paradigm shift in the awareness of the importance of Brain Health with an extensive range of initiatives being taken by the WHO alongside those of patient groups, the EAN, the WFN and other stakeholders⁴. The WHO created its Brain Health Unit in 2020, while in June 2021 the EAN launched a series of activities, which share the ultimate goals and complement the WHO's launch of the Global Action Plan on Epilepsy and other neurological disorders, the first such GAP related to the brain and its disorders.

Neurologists diagnose, treat, and manage neurological disorders and, like other physicians, are trained with a focus on diseases rather than health. However, in recent years, the importance of preventing neurological disorders has become better recognized. For instance, recent data suggest up to 40% of dementias and 50% of strokes are potentially preventable^{5,6}. Accordingly, several societies and organizations have launched brain health strategies which are however focused on single diseases (e.g., dementia, stroke) or functions (e.g., cognition)^{7,8}.

With its Brain Health Strategy, the EAN aims at promoting a novel non-disease and non-age centred holistic and positive approach (one brain, one life, one approach) not only to prevent neurological disorders but also to preserve brain health and promote recovery after brain damage. In fact, multiple neurological disorders can lead on one hand to similar symptoms and disabilities (e.g., seizures, headache, cognitive deficits, motor impairment, bladder and gait difficulties, depression, sleep-wake disturbances), while on the other hand single risk factors (e.g., hypertension, unhealthy diet, sleep apnoea) can predispose to multiple neurological disorders such as stroke and dementia for example⁹.

Several determinants of brain health (Figure 1) have been identified (or are currently proposed) and include:

1. **Preserve:** Promoting factors related to an individual's mental and physical activity such as keeping to a healthy diet, getting sufficient and good quality sleep, maintaining social interactions and promoting adaptive coping strategies.
2. **Protect and Prevent:** This includes protective (as well as preventive) factors such as avoiding excessive alcohol, consumption, not smoking, reducing sugar intake, and controlling cholesterol levels. Hypertension, excessive weight, depression, diabetes, hearing impairment and cataracts are also factors that can have a significant impact on brain health.

3. **Plan:** Factors which must be addressed by policymakers including access to education, environmental factors such as air pollution, political situation, research strategies, and socio-economic conditions.

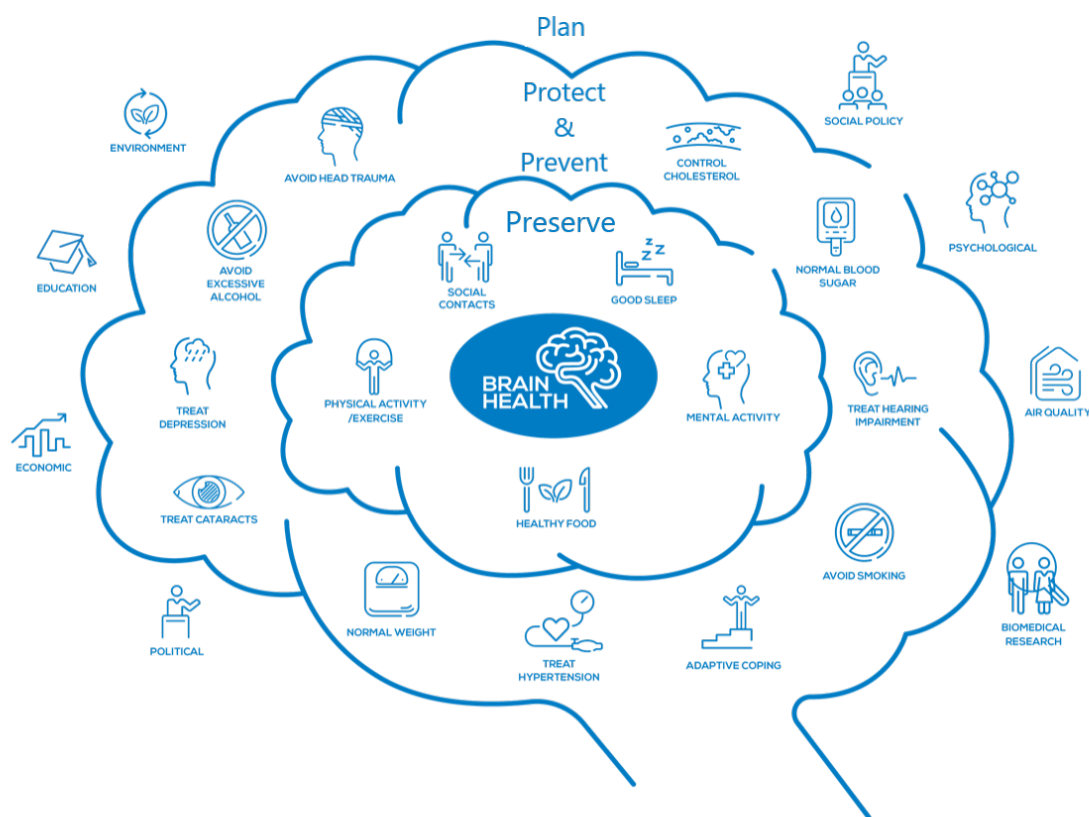


Figure 1: Brain Health and its determinants (some of them are established, some of them suggested/to be confirmed)

2. The Burden of Neurological Disorders is High and Increasing

Neurological disorders are the leading cause of disability and second leading cause of deaths worldwide¹⁰. According to the WFN, 70% of the burden falls on low- and middle-income countries.

In Europe, neurological disorders are the third leading cause of disability and deaths, the main driving forces being stroke, dementia and neurodegenerative disorders, and headaches¹¹. In fact, according to WHO and confirmed by recent studies¹⁰, at least 1 in 3 people of all ages will suffer from a neurological disorder in their lifetime, making this the highest figure of all non-communicable diseases (Figure 2).

Mainly because of the epidemiological transition and of aging population, the absolute number of deaths worldwide has increased by 39% and disability by 15% in the last 30 years¹⁰. The number of people aged 60 years or older across the world had already reached around 900 million in 2015 and is expected to grow to two billion by 2050. This trend will add to the

growing burden of neurological disorders, especially when coupled with increasingly unhealthy lifestyles (lack of exercise, unhealthy diet, obesity, sleep loss)¹².

In addition, there is the secondary impact as the number of people occupied as caregivers will increase with an aging population and increase prevalence of chronic neurological disorders.

In 2011 a systematic European study assessed the costs of brain disorders, in which the costs of neurological disorders were estimated to be around 300 billion¹³ with dementia, stroke, headache, and sleep disorders as main drivers of cost.

More recently in 2019, the costs of dementia were estimated to represent about 1.5% of the world gross domestic product (GDP) or \$1.3 trillion¹⁴, and the costs of sleep disorders to range between 1 and 3% of the GDP of five Organisation for Economic Co-operation and Development (OECD) countries¹⁵. EAN launched a study in 2021 to systematically assess the economic burden of neurological disorders in Europe (first results will be presented during the 2022 EAN Congress).



Figure 2: Infographic depicting the burden of Neurological disorders in Europe and globally

The Covid-19 pandemic is also adding to the burden of neurological disorders as procedures deemed non-essential are delayed and care becomes more limited. In addition, several studies have shown that the nervous system is one of the main 'targets' of the SARS-CoV-2 virus and its complications, within the acute phase and in the so-called long-Covid phase. This has been shown by several publications, including those promoted by the EAN through its ENERGY consortium^{16,17,18}

Major crises due to armed conflict (including the current invasion of the Ukraine by the Russian army), natural disasters or other emergencies also increase the burden of neurological disorders. Environmental crises such as chemical spills or radiation exposure can have especially heavy effects on the brain. Head trauma, psychosocial stress, economic restrictions, and other consequences of war have a negative impact on both brain and mental health. In addition, the consequent shift in healthcare resources towards critical care leave patients with neurological disorders with reduced resources and care. This has the potential to lead to a long-term healthcare burden after the crisis, as chronic mental and neurological disorders emerge due to an adverse impact on brain health.

3. Initiatives to Reduce the Burden of Neurological Disorders

Several large-scale scientific initiatives have been funded in the last few years internationally such as the Human Brain Project in Europe¹⁹, the BRAIN Initiative in the US²⁰, and others in countries including Korea, Canada, and Australia to foster our understanding of the healthy and sick brain, of diseases, their diagnosis, and treatment.

Research on neurological disorders and underlying causes for them will profit not only from the above-mentioned campaigns activities and the discovery (and availability) of innovative technologies but also better ways (and a stronger culture) of international collaboration and data sharing.

The unprecedented growth of digital technologies may not only improve the diagnosis, monitoring and treatment of neurological disorders (e.g. via “teleneurological” approaches) but also promote efficient and cost-effective approaches to promote prevention on an individual base and in the home environment^{21,22}.

The COVID-19 pandemic has shown how efficient international collaborations may be and may offer rapid scientific progress but also the pitfalls and limitations of such interactions²³, EAN has long history of international collaborations and during the early days of the pandemic spring 2020 called for an international collaboration to work towards better understanding of the neurological manifestations of COVID-19¹⁶.

At the political level, recent initiatives recognising the importance of neurological disorders and of brain health have been emerging. The WHO Member States are expected, as said above, to adopt the Intersectoral Global Action Plan (GAP) on epilepsy and other neurological disorders at the 75th World Health Assembly to be held in May 2022. The global action plan aims “to improve care, recovery, well-being and participation of people living with neurological disorders across the life-course.” With the GAP, WHO considers neurological disorders, for the first time, as a distinct priority for which Member States can define national actions defined also by specific steps and indicators.

In 2020, the EAN launched, together with the European Federation of Neurological Associations (EFNA), the OneNeurology initiative to stimulate collaborative advocacy, action and accountability for the prevention, treatment, and management of neurological disorders worldwide and to support the WHO's GAP and promote its adoption. This initiative is persuading the European and the broader international community to see neurological disorders as a top priority.

4. Challenges in reducing the burden of neurological disorders and promoting brain health

1. Determinants of Brain Health

Despite major advances in fields such as multiple sclerosis, stroke, epilepsy, migraine, neuromuscular and sleep disorders, breakthroughs in the treatment of neurological disorders (e.g., Alzheimer's disease, Parkinson's disease, brain cancer, motor neuron diseases) remain insufficient²⁴. This reflects a still fragmentary understanding of the basic/molecular mechanisms of many neurological disorders²⁵. In addition, the role of psychological, socioeconomic, and environmental (pollution, climate changes) factors is underestimated and understudied. Consequently, current diagnostic criteria and treatment approaches are inappropriate for several neurological disorders.

2. Neurology workforce

Currently, there are not enough neurologists. The World Federation of Neurology (WFN) has estimated that only 25% of the world has access to more than two neurologists per 100,000 people²⁶. In a study conducted by the EAN, a total of 85,000 neurologists were recorded for 900 million citizens across Europe (Figure 3). On average, this means 10,000 patients per neurologist²⁷. There are also major regional differences within Europe in prevalence of neurological disorders and size of the neurological workforce. The COVID-19 pandemic has caused additional burden disrupting cross-sectoral services for neurological disorders²⁸. Furthermore, it is recognised that enhanced neurological training and resources for physicians at primary care level as well as other physicians outside neurology will be crucial to ensure adequate care for patients, as relying on specialists alone will not be sufficient.

3. Research funding

Funding for research on mechanisms, management and prevention of neurological disorders are insufficient and, in many countries, prevention is still not a crucial pillar of national health strategy^{29,30}. In addition, knowledge about determinants of brain health is increasing but still insufficient.

4. Holistic (non-disease and non-age-centred) and positive approach to brain health

A scientific assessment of brain health as a person-centred state which includes multiple functional dimensions is almost completely lacking³¹. In fact, most efforts have so far been

disease- and age-centred. Some publications have suggested multidimensional tools, however validated measures (scores) of brain health from a holistic biopsychosocial perspective are still to be developed³².

5. Prevention of neurological disorders

The evidence for efficient and cost-effective prevention^{21,22}, which starts to be shown for stroke and Alzheimer's disease and other dementias is lacking for most of the remaining neurological disorders is missing.

6. Awareness

Awareness of the burden of neurological disorders is lacking, in stark contrast to that of cancers and cardiovascular diseases. A recent international, online cross-sectional survey has also documented relevant differences in the public perception of brain health³³.

Better understanding of brain health and neurological disorders would also help to remove stigmas associated with many conditions. Furthermore, global knowledge that there is no health without brain health should find ways to be disseminated at all scientific and lay levels.

NR OF NEUROLOGISTS
PER 100 000
POPULATION



Figure 3: Chart depicting number of neurologists per 100,000 population in WHO Europe Countries

5. The EAN Brain Health Strategy: One brain, One Life, One approach!

The EAN recognises the urgent need to promote Brain Health and prevent neurological disorders across the life span and launched its Brain Health Campaign in 2021 (with a series of communications, conferences and talks during the annual congress). This campaign draws

attention to key preventative measures identified thus far as having a major impact on the burden of neurological disorders if addressed.

The EAN's 47 National Neurological Societies (Figure 4), as well as its corresponding members outside Europe, are key partners in implementing this strategy, bringing it to the attention of national health authorities, as well as neurology and other non-neurology stakeholders creating a network of engaged and committed actors to develop and/or implement national action plans. At national level, Norway is the first country in Europe to have launched its Brain Health Strategy 2018-2024 [30].



Figure 4: Map depicting EAN'S global membership

At the global level, EAN is already supporting the WHO-led GAP in which Brain Health is a key priority, while also contributing to the World Federation of Neurology's Brain Health initiative as a partner. Furthermore, the EAN Brain Health Strategy will take account of the OECD's Brain Capital Grand Strategy for investments in a 'Brain Health in All Policies' approach for post-COVID economic renewal, reimagination, and long-term economic resilience [31].

The EAN will also work closely with EFNA in integrating patient perspectives and bridging between national neurological societies and national patient associations, while the European Brain Council (EBC) coordinates communication among National Brain Councils. EAN's roles in the EBC coordinated project on the European Brain Research Area (EBRA) and Policy Roadmap on Brain Health in Europe, as well as the EBRAINS Research Infrastructure that will power brain research in Europe will also be leveraged to foster brain health. Finally, the EAN will also

ensure that the Brain Health Strategy links to other EU initiatives such as the EU Pharmaceutical Strategy and the European Health Data Space.

6. The Five Pillars of the EAN Brain Health Strategy

The EAN Brain Health Strategy consists of five main pillars which support the goals and aims.

Contribute to a global and international Brain Health Approach

The EAN, is one of the driving forces in the elaboration of a new concept and creation of an appropriate frame for an holistic and global/international brain health approach. As the home of all neurology subspecialties and national societies in Europe, and through its established links with WFN, WHO and other stakeholders including other specialists (e.g. psychiatrists, cardiologists, oncologists, psychologists, preventive medicine specialists), EBC, EFNA, academic institutions, industry) the EAN aims to make Brain Health a top priority among health professionals, researchers, policymakers and the general public.

Supporting International and National Policy Making

The EAN, together with the EU, the WHO, and other continental organizations, supports policy development in the 47 national European member societies to promote the GAP and integrated, people-centred, affordable, and effective brain and brain health campaigns.

Fostering Research

The EAN supports and performs novel studies on brain health

and calls for European (in particular the EU) and national funding to:

- Identify the gaps in the current brain health concept and approach
- apply the definition of brain health in research settings
- understand determinants and predictors of brain health
- create multidimensional metrics to assess brain health
- assess interventions (tests, tools, apps) to promote brain health
- study the gaps between evidence and healthcare delivery

Promoting Education

The EAN engages in the education of medical students and next generation neurologists using educational programmes that stress the importance of brain health and prevention. General neurologists, general practitioners and other medical specialists and health professionals as well as neurological patients, caregivers and general public are also an important for the EAN to ensure an adequate and affordable prevention and care of neurological disorders. Such educational programmes will also need to take an interdisciplinary approach, including nurses, psychologists, speech-language pathologists, and many other professionals who are key to diagnosis, treatment and prevention of brain disorders.

Raising Public Awareness

Together with partner societies, international organisations, and healthcare authorities, EAN promotes brain health through press and media campaigns, including the use of social and informational material for the public. A crucial component will be to address and dispel stigmas associated with neurological disorders.

7. Conclusion

While there are clearly challenges to overcome in addressing the burden of neurological disorders, there are also substantial inroads to be made by taking a more comprehensive approach towards brain health, focusing on health and prevention in addition to diagnosis and treatment.

The EAN's Brain Health emerged from the COVID-19 pandemic, as it became apparent that health systems must adapt urgently and build resilience in an unprecedented health situation. It was these conditions, which prompted the EAN to emphasize brain health as a means of easing significant strain on these health systems by reducing one of the largest healthcare burdens, neurological disorders.

By adopting this 'one brain, one life, one approach' strategy in cooperation with partner societies, international organisations, and policymakers, we take a big step towards realising "a state in which every individual can realize their own abilities and optimize their cognitive, emotional, psychological and behavioural functioning to cope with life situations" [1].

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PD: Parkinson's Disease