

Consensus on brain research in Europe: a new statement

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Brain Research in Europe

Brain research is a rapidly evolving field, and increasingly at the forefront of science, but still highly needed for our understanding of the unknown basic functions of the nervous system

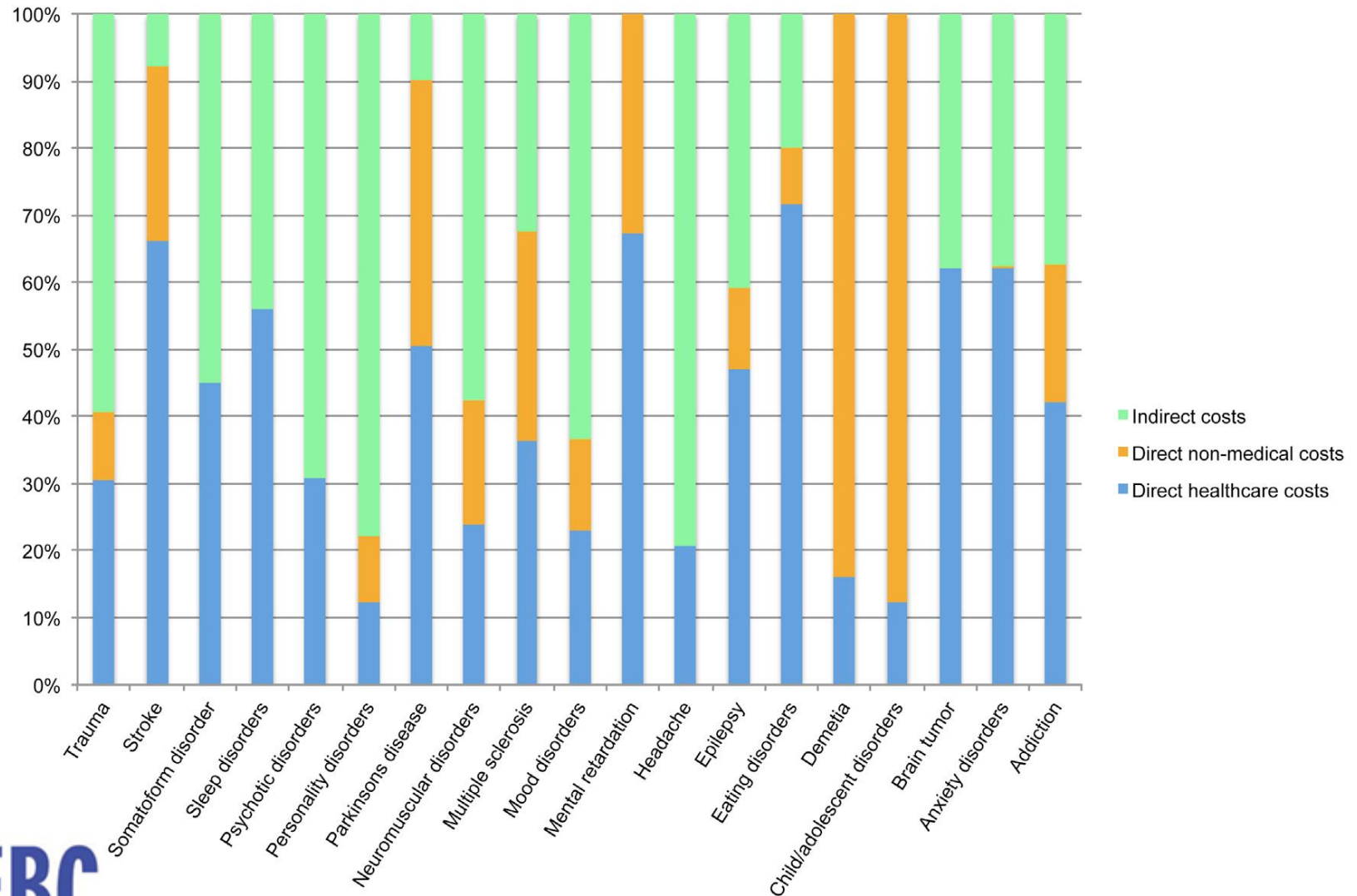
The complexity of understanding brain functions brings responsibilities as well as opportunities : responsibility to develop novel tools and approaches in order to integrate and advance our knowledge; opportunities to provide a better understanding of the underlying pathogenic mechanisms of brain diseases, and thus to generate novel therapeutic approaches for the benefit of society.

The Cost of Brain Diseases: A Burden or a Challenge?

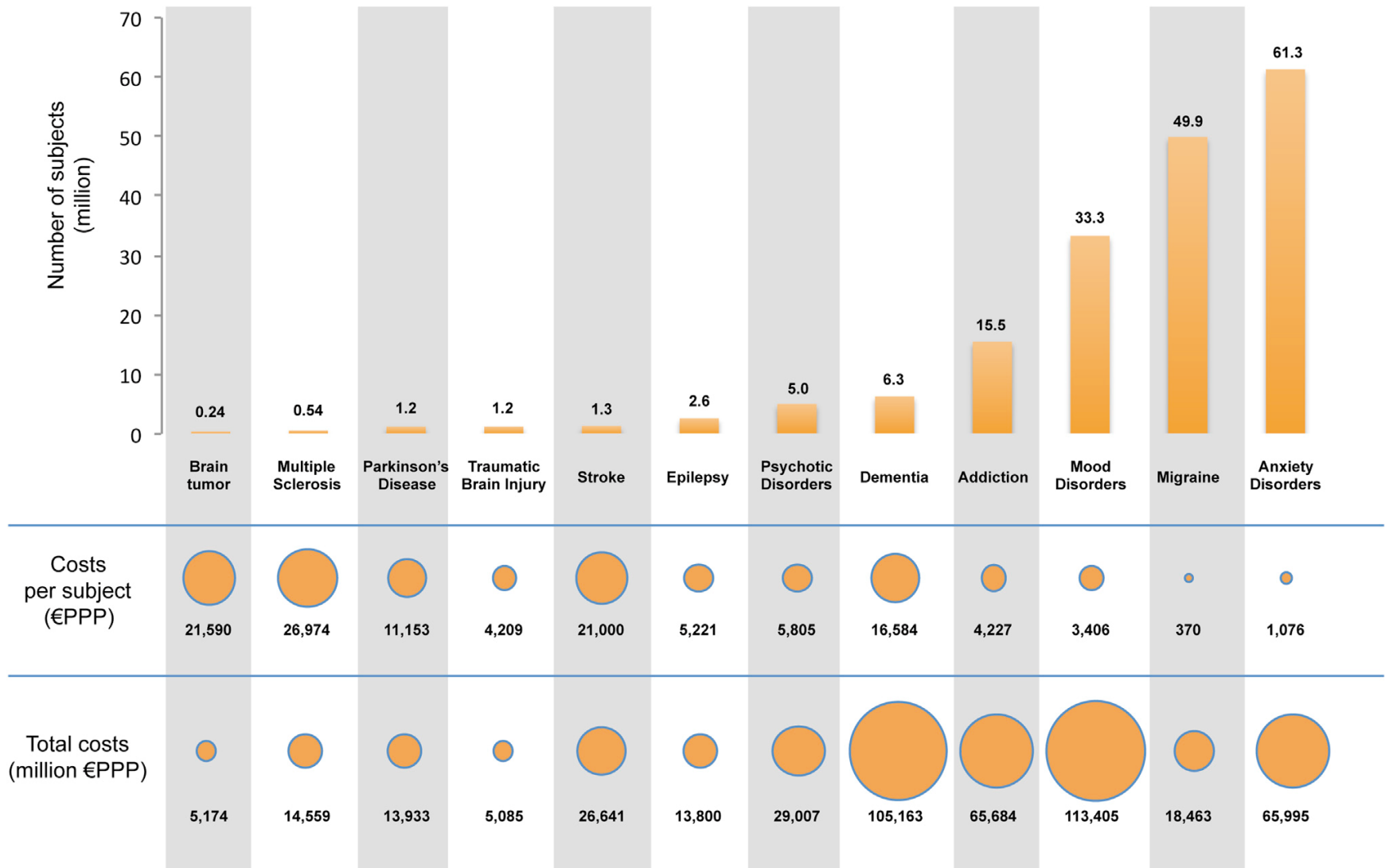
The cost of brain diseases in Europe has been estimated 798 billion euros

(The economic cost of brain disorders in Europe. Olesen et al, Eur J Neurol. 2012; DiLuca & Olesen, Neuron 2014)

Cost distribution of Brain Diseases: 19 diseases in 27 countries



The Cost of Brain Diseases: A Burden or a Challenge?



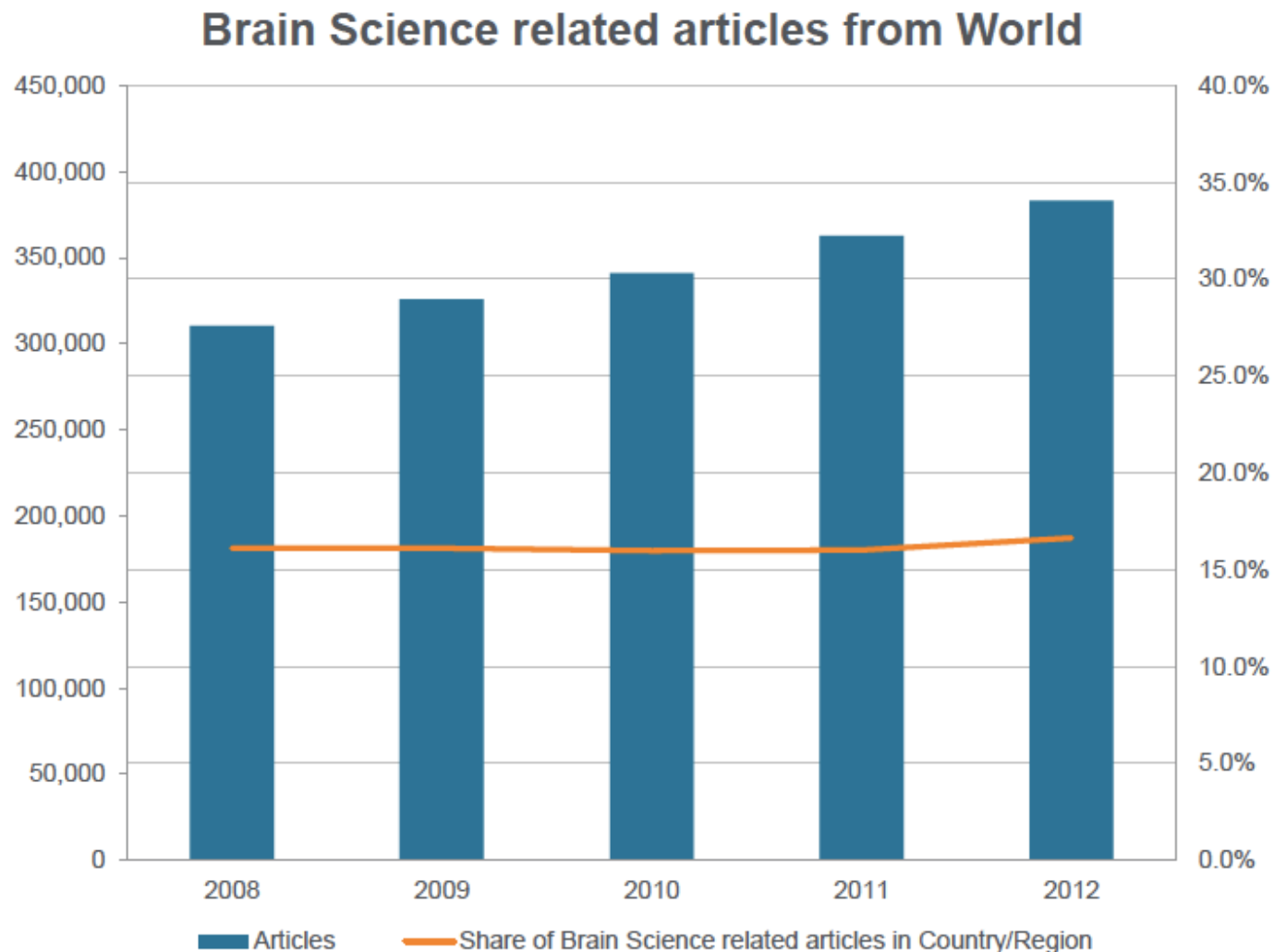
Issues at stake of brain research

- Understanding the brain and its diseases remains one of the greatest scientific challenge
- Complex and highly multidisciplinary research
- Brain diseases constitute a major burden to our society, with a cost of about €800 billion in 2010
=> € 1.5 million per minute
- Europe's population is getting older

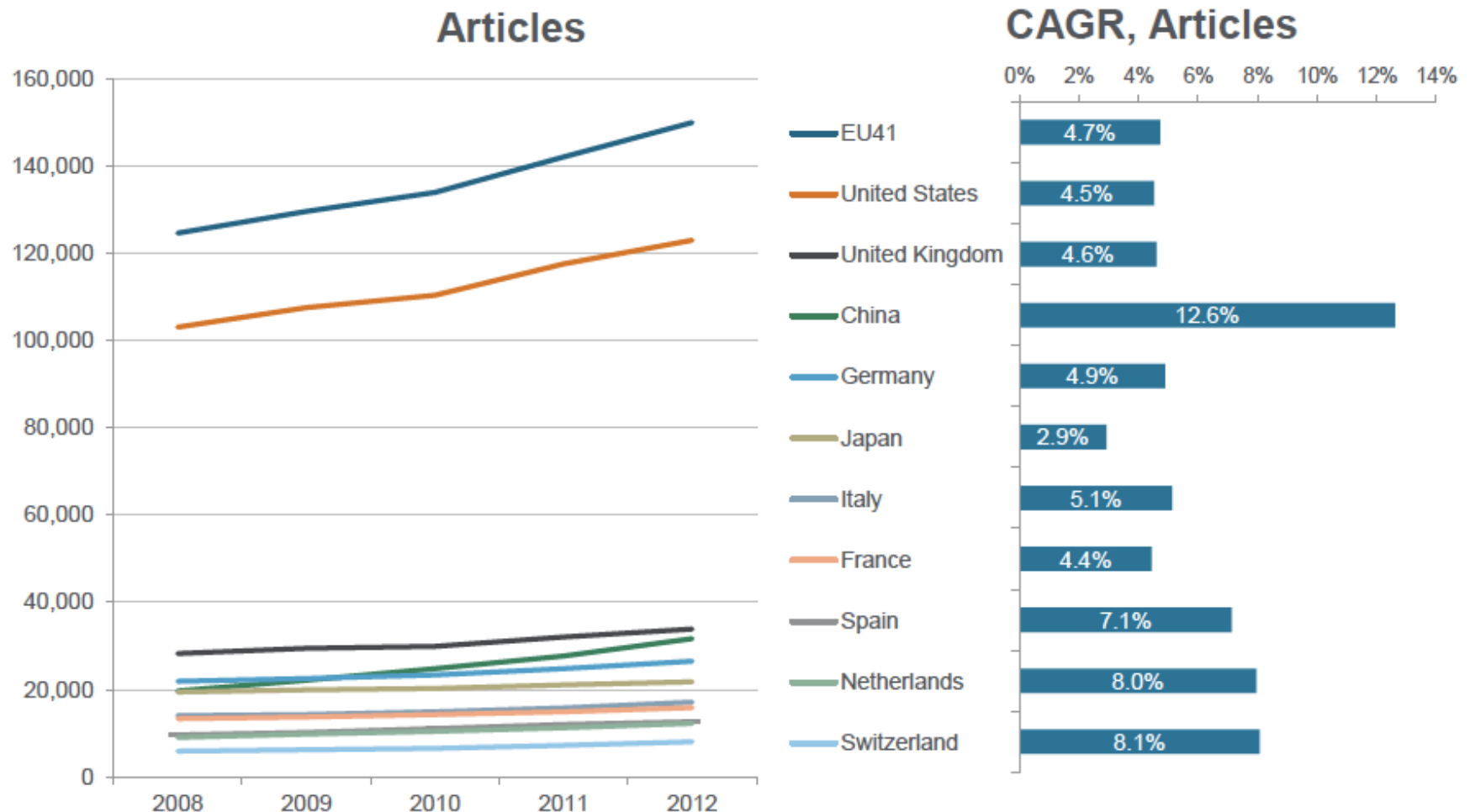


Tackling the challenge

Increasing publication output in Brain Science with stable share at ~16% of world output



The top 10 most prolific countries in Brain Research and the EU41 all show growth in the last 5 years



EU response to this challenge

- Provided a comprehensive support for brain research in FP7
- Dedicated financial resources unmatched by any previous research framework programme
- More than EUR 3,1 billion dedicated to brain-related research since 2007
- 1,931 projects
- 4,312 participations of 1,515 institutions

The need of brain research to tackle societal challenges

Tackling societal challenges and making breakthrough discoveries is not a linear process, and therefore what is needed is support for science and innovation as a holistic system.

In particular, the challenges presented by brain diseases for which insight into basic functional mechanisms are still poorly understood, requires support for the full breadth of neuroscience research.

Major world “Brain Initiatives”

- ✓ the Allen Brain Initiative (US),
- ✓ the Israel Brain Initiative
- ✓ the Chinese Brain Initiative
- ✓ the Human Brain Project (EU),



Understanding brain research as a priority for our society

The importance of continuously supporting brain research for the benefit of our society: a new consensus document

Consensus Statement on European Brain Research The need to expand Brain Research* in Europe – 2015

Morris RGM, Oertel W , Arteel P, Gaebel W, Goodwin G, Little A, Westphal M, Nutt DJ, Di Luca M

European Brain Council

European Academy of Neurology (EAN)

European Association of Neurosurgical Societies (EANS);

European College of Neuropharmacology (ECNP);

European Federation of Neurological Associations (EFNA);

European Psychiatric Association (EPA);

Federation of European Neuroscience Societies (FENS);

Global Alliance of Mental Illness Advocacy Networks-Europe (Gamian-Europe);

The board of the European Brain Council (EBC) adopted the present document on November 26th 2015.

**note – in this document brain research is used to refer to both fundamental curiosity-driven and translational research on disorders of the brain, spinal cord and peripheral nervous systems and to cover both psychiatric (mental) and neurologic illnesses*

A new consensus document: challenges in brain research

Making the brain: developmental neuroscience

- The bridge from brain development to mature circuit function and dysfunction as seen also in neuro-developmental disorders

A new consensus document: challenges in brain research

Understanding causal mechanisms: linking cellular/molecular mechanisms to complex behaviours and disease states

- Another major challenge in neuroscience is a variety of ‘bridging’ problems. Specifically, understanding the mechanisms that bridge multiple spatial and temporal scales, namely the task of linking the activity of individual components (e.g., molecular biology, genetics, and neuron networks) to the overall complex dynamic behavior of the brain and nervous system remains very difficult. It is, however, vital for progress.

A new consensus document: challenges in brain research

Information processing: what the brain does.

- The brain controls behaviour, and it succeeds in doing this through an interlinked set of elaborate mechanisms: *sensing the world around us (e.g. seeing), and the world within (e.g. proprioception); the transformation of this sensory input into an object-oriented understanding (via perception); linking this knowledge with stored information from memory; and the organisation of actions and habits guided by emotion and motivation.* We understand a lot, but so many aspects of these processes remain a mystery, especially fundamental concepts like numerosity and decision-making, but also how they are impaired in neurologic and mental health disorders

A new consensus document: challenges in brain research

**Brain and mental health disorders -
Neurological and psychiatric brain disorders of
children and adults**

A new consensus document: challenges in brain research

Computational Neuroscience and data repositories

- The large number of technological advances in basic neuroscience has led to an exponential growth of data production regarding various aspects of the brain, under numerous different conditions and across several species. Computational neuroscience approaches including theoretical modeling and large scale data analysis/integration methods will be essential to turn this data into better understanding of the brain and help develop new tools for dealing with brain dysfunctions.

A new consensus document: challenges in brain research

Understanding and Improving Drug Delivery to the Brain.

- Increasing insight into the pathophysiology of brain diseases, be they metabolic, inflammatory, traumatic, immunological, neurodegenerative or oncological has led to the development of many promising reagents which as drugs may have tremendous impact on the disease processes. The brain, however, is well protected against influx of many reagents by the blood-brain barrier which in particular does not allow crossing of large molecules, especially proteins which as monoclonal antibodies can be tailored to many relevant dysfunctional molecules in all the aforementioned disease classes. The biggest challenge for newly designed neuro-therapeutics unless they are freely penetrable “small molecules” is to reach an even distribution in the brain beyond the blood brain barrier.

The importance of continuously supporting brain research for the benefit of our society: a new consensus document

Recommendation

- We call on European authorities to devise and implement a plan to tackle brain health in an integrated and comprehensive manner in cooperation with all EU member states.
- We highlight the need to augment the support for basic and clinical brain research in Europe through current funding platforms, especially to retain promising young neuroscientists.
- We recommend the EBC serve as a liaison to optimise support for patients and research, and to ensure funding support is best aligned with today's fundamental challenges and opportunities.
- Nevertheless, it is the joint responsibility of all stakeholders to ensure that basic research is adequately translated into concrete applications.