



**Brain  
research in  
Europe: our  
mission for  
the future**




**We stand together for the Brain**











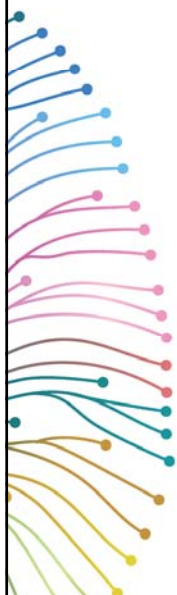



- National Brain Councils
- Industry partners



## Brain Research in Europe

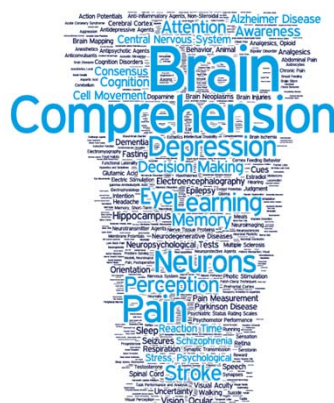
Brain research is an evolving field at the forefront of science, highly and urgently needed for our understanding of the still unknown functions of the nervous system



## Facing the complexity

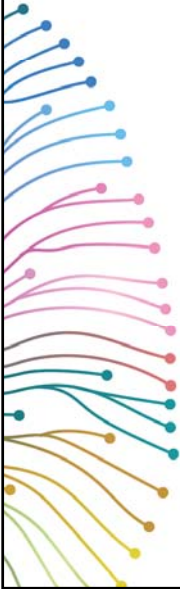
The brain is the most complex organ of the human being and disorders of the brain are more complicated to analyse, diagnose and treat than other diseases.

This complexity has long hindered the analysis, diagnosis and treatment of Brain Disorders.





## Facing the complexity



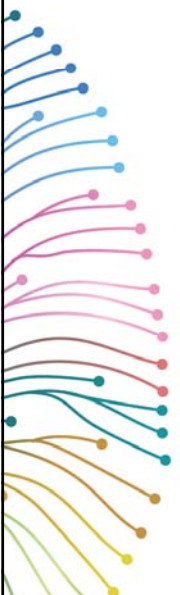
The complexity of understanding brain functions brings responsibilities as well as opportunities :

- ✓ responsibility to reach a better understanding through high quality research and 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 brain contains 100 billion neurons. Although that extraordinary number is of the same order of magnitude as the number of stars in the Milky Way, it cannot account for the complexity of the brain.*



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

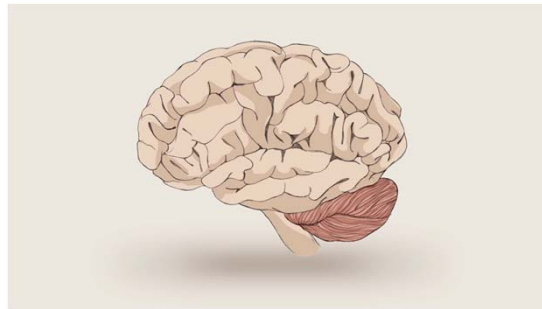


The cost of brain diseases in Europe has been estimated 798 billion euros

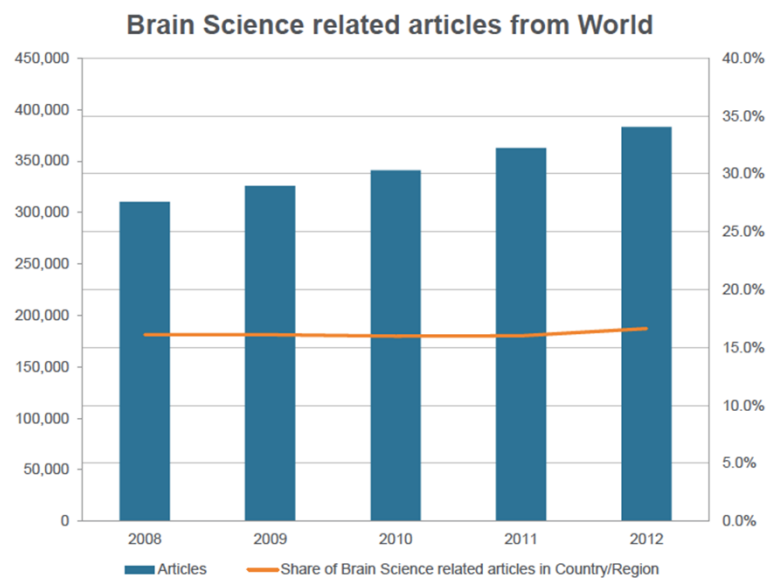
179 million of European citizens affected

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

## The role of the scientific and clinical community



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



## The achievements

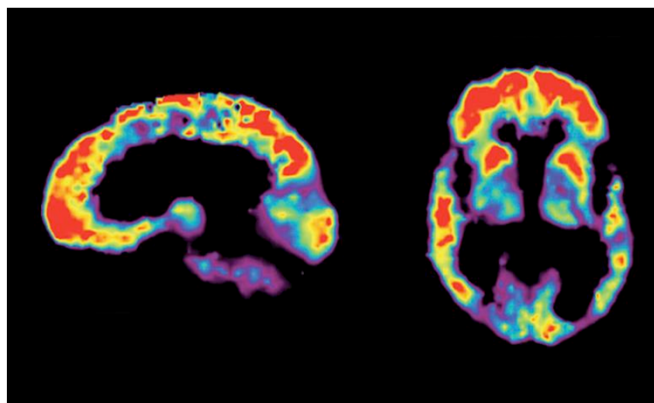
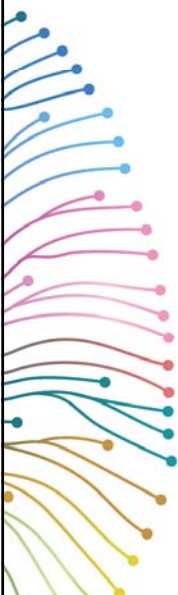


## The achievements: diagnosis

**Diagnosis:** Revolutionary imaging techniques, including *positron emission tomography* (PET), *functional magnetic resonance imaging* (fMRI), and optical imaging with weak lasers, have revealed the brain systems underlying attention, memory, and emotions. These techniques also have pointed to dynamic changes that occur in *schizophrenia* and other disorders and to alteration occurring during neurodegenerative diseases like Alzheimer.



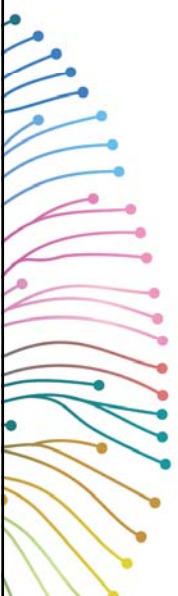
## Amyloid PET scans: a game changer



Amyloid PET scans allow, for the first time, accurate detection of amyloid plaques—one of the hallmarks of Alzheimer's disease—in living people.



## New Therapies



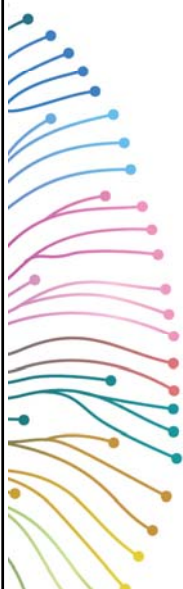
**New Therapies** Researchers have gained insight into the mechanisms of molecular neuropharmacology, or how drugs affect the functioning of neurons in the nervous system, providing a new understanding of dysfunction occurring in major diseases.

These studies resulted in new treatment for multiple sclerosis, stroke, Parkinson Disease and addiction.





## New knowledge translated



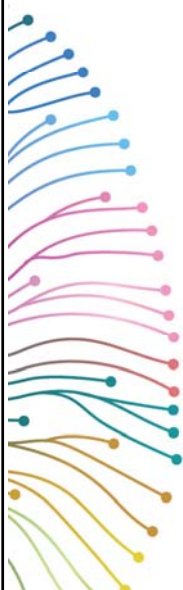
### Optogenetic

Optogenetics is a technology that involves the use of light to control cells in living tissue, typically neurons, that have been genetically modified to express light-sensitive ion channels. It allows targeted, fast control of precisely defined events in biological systems as complex as freely moving mammals. By delivering optical control at the speed (millisecond-scale) and with the precision (cell type-specific) required for biological processing, optogenetic approaches have opened new landscapes for the study of biology

K Deisseroth | Nature Methods, 2010



## New knowledge translated



### Optogenetic Therapies Move Closer to Clinical Use

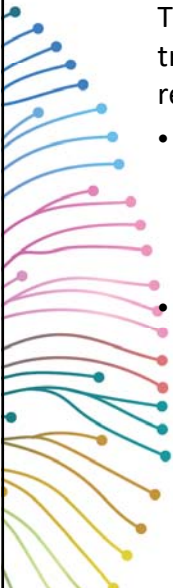
With a clinical trial underway to restore vision optogenetically, researchers also see promise in using the technique to treat deafness, pain, and other conditions.

Shawna Williams | November 16, 2017





## Tackling the challenge

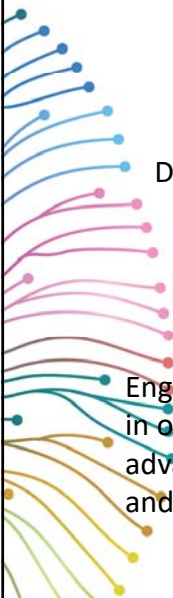


The inherent complexity of the nervous system slowed down our translational capacity, suggesting that a higher level of integration is required.

- Capitalizing on previous results:
  - recent methodological breakthroughs provided a powerful dual opportunity to relieve the societal burden of brain disorders and innovate at the frontiers of technology.
- Understanding of the brain provides valuable knowledge
  - Strong potential to not only treat diseases, but also to innovate in the areas of artificial intelligence, brain machine interface, robotics, and technology.



## A Mission for the brain



### Brain Mission

**Understand – Fix – Enhance**

**The space race of the 21<sup>st</sup> century**

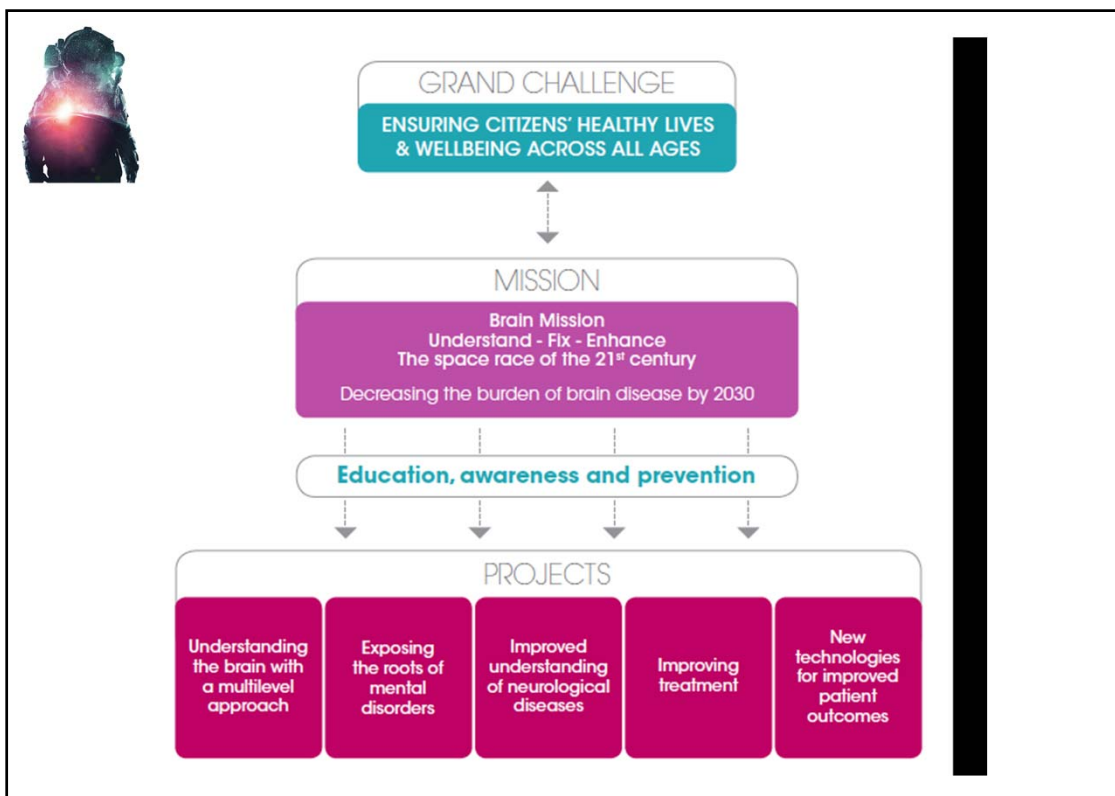



Decrease the burden of brain diseases through better **understanding** of **physiology** of the brain and **disease** states, awareness and relevant **prevention** strategies.



Engagement of the scientific and clinical community at all levels is required in order for the European population to benefit from discoveries and for advances in basic neuroscience to be translated into new diagnostics tools and treatments for brain disorders





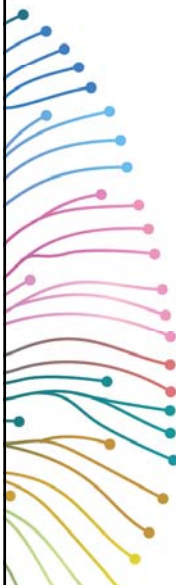


## EBRA: Overview

**Goals:** EBRA is conceived to bring together the major brain research initiatives and the research community at large to streamline and better co-ordinate brain research effort and strategies across Europe while fostering global initiatives.

**Duration:** 3 years project started on Nov 1<sup>st</sup> 2018

**Consortium made up of EBC (and EBC membersip), the Human Brain Project, JPND and ERANET-NEURON.**





## Brain Mission: SMART milestones



- ✓ Educating & raising awareness on the specificity of the brain to foster public & patient engagement
- ✓ Coordinating & expanding current patient empowerment programmes
- ✓ Creating & promoting EU Strategies for prevention & early detection of brain disorders
- ✓ Assessing & monitoring improvements in health outcomes (a.o. mortality, morbidity, quality of life, functionality, societal burden) for people living with brain disorders, against an agreed benchmark
- ✓ Embedding fully new knowledge and information technologies (a.o. artificial intelligence) into an integrated approach to brain health and brain research

