



ERA-Net NEURON

ERA-Net **NEURON** was launched in January 2007 and is funded under the ERA-Net scheme in FP6 by the European Commission. The aim of **NEURON** is to promote the development of a European strategy for research in the area of disease related neuroscience. Among the many diseases affecting human health, disorders of the brain are major causes of morbidity, mortality and impaired quality of life. According to estimates by the World Health Organization (World Health Report 2001), more than one billion people suffer from disorders of the central nervous system. In Europe, disorders of the brain account for approximately one-third of the total burden of all diseases. The project envisages creating a group of relevant research funding organizations in Europe and, thereby, gain maximum added value from investment in this field. Sixteen European national research funding organizations from Austria, Finland, France, Germany, Italy, Israel, Luxembourg, Poland, Romania, Spain, Sweden and UK are cooperating under this single umbrella.

FENS Satellite Symposium

Geneva (Switzerland) - July 11th, 2008

Foreword – Alexis Brice, France

Neuroscience faces significant challenges, considering the high incidence and potential severity of nervous system disorders on the one hand, and the immense complexity of the nervous system on the other. However, breakthroughs are expected due to major technological advances as well as multi-scale and multidisciplinary approaches. In the first part of this newsletter we portray how neuroscience funding is organized in Europe and in the US. In the second part we illustrate how technological and methodological advances can help answer several fundamental questions related to the normal and pathological function of the nervous system. This workshop has stimulated a lot of fruitful discussions and will certainly contribute to identifying new frontiers and challenges in neurosciences.



Funded by the European Commission

More information can be found in our web page
<http://www.neuron-eranet.eu/index.php>

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Prospects for Funding Neuroscience in Europe

Funding of Neuroscience in Europe: the ERA-Net NEURON

PD. Dr. Marlies Dorlöchter, Germany



ERA-Net NEURON, as part of the ERA-Net initiative, is aimed at standardizing and unifying regional funding programmes for neuroscience research across the European Community. NEURON actively supports multi-national research consortia by initiating joint calls. In the first joint call, focused on neurodegeneration, 12 research consortia were selected. Other activities include streamlining technology transfer procedures, supporting young scientists and more. A recent funding survey carried out by NEURON in Europe and Israel revealed significant heterogeneity

in funding strategy (bottom-up versus top-down) and in the proportion of single projects versus consortia. The main funding criterion, however, was always scientific excellence, even though political and national criteria were also included. The funding rate was quite unanimously low, ranging from 10 to 30% of submitted proposals. On the other hand the budgets for neuroscience funding are overall quite generous, reaching some 20% of the total national biomedical budget.

The EC funding policy for neuroscience

Dr. Patrizia Tosetti, European Commission, DG Research



Biomedical, and in particular neuroscience funding at the EU has markedly increased during the last Framework Programmes (FPs). FP5 (1998-2002) comprised 290 projects (60 dedicated to the brain) and €483 millions (M). In support of the European Research Area, FP6 (2002-2006) allocated €2.255 M to research in the life sciences, €256 M of which were dedicated to brain research and supported 71 projects. The new FP7 (2007-2013) has a health budget of €5,984 billion and aims to further reinforce pan-European translational and collaborative research. The first two FP7 Health calls funded

43 proposal in brain research, for a total of €191.5 M. The third FP7 Health call was published in September 2008 and proposals are currently being evaluated. Further information can be found on the following sites:

Seventh Framework Programme: http://cordis.europa.eu/fp7/home_en.html

Information on research programmes and projects: <http://cordis.europa.eu>

IMI: <http://www.imi-europe.org/Pages/default.aspx>

Prospects for Funding Neuroscience in Europe

EC Parliament representative (Scientific and Technological
Options Assessment: STOA)

Prof. Joel Hasse Ferreira, Portugal-European Parliament



H. Ferreira presented the EC Parliament's point of view regarding scientific research in general, and neuroscience in particular. Neuroscience receives significant attention in the EC, and its contribution to public health is duly noted. In fact, it was agreed that research funding will increase during FP7, with clear mention of "brain and brain related diseases". The defined funding period of FP7, with a re-evaluation stage in 2010, offers neuroscientists and MEPS a special opportunity to increase funding to neurosciences in general and not only to the more "fashionable" fields. Private funding should be considered, with appropriate precautions.

Ferreira will present his impressions from this conference to the Parliament, President Barroso and the European Council.

The Funding policy for Neuroscience in North America

Prof. Richard Nakamura, USA - NIH



The overall NIH mission is science in pursuit of fundamental knowledge about the nature and behavior of living systems and the application of that knowledge to extend healthy life and reduce the burdens of illness and disability.

Depression, Parkinsons, Azheimers, schizophrenia, or substance abuse and autism are examples of common chronic illness that carry tremendous burden globally. The NIH neuroscience budget 2008 of \$5.2 billion provided through 16 Institutes including the National Institute of Mental Health (NIMH). Other US sources exist, both governmental and private. The NIH primarily relies on a

bottom-up funding scheme, and research applications are evaluated by a scientific committee consisting primarily of competitively successful scientists. More information on NIH interests in neuroscience can be found at: <http://neuroscienceblueprint.nih.gov>

Frontiers in Neuroscience

Advances and Challenges in Neuroscience

Prof. Paola Bovolenta, Spain

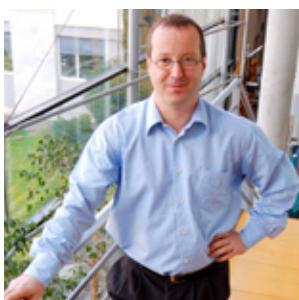


P. Bovolenta discussed the overwhelming complexity of the brain, and introduced recent scientific progress in the field of brain development, using novel imaging techniques, transgenic procedures and genomics. For example, a chimera between the Rx3 transcription factor and GFP, led to elucidating the mechanisms underlying the morphogenesis of optic vesicles in fish. Signalling molecules, such as FGF and sonic hedgehog (SHH) are also crucial for CNS development. These two factors control axon guidance of retinal ganglion cells, as well as more general aspects in eye formation and patterning. An important

mechanism underlying phenotypic variability is the differential regulation of gene function by cis-regulatory modules. A set of such elements has been identified surrounding Six3, and they serve to orchestrate the spatio-temporal organization of regulatory gene networks. Finally, a better understanding of embryonic neurogenesis mechanisms could help treat CNS pathologies, such as photoreceptor degeneration disease.

Nanoscience and optics to understand synaptic transmission

Dr. Daniel Choquet, France



D. Choquet discussed using nano-optics for dynamic imaging of individual synaptic protein complexes in live cells (e.g. using PALM or STORM), to perform bulk measurements at nanometre resolution (e.g. using STED) or to determine the molecular basis of synaptopathies. Spatial resolution using these methods can reach 10-20 nm. Immuno-based nanotechniques have allowed the tracking of single molecules and nano-particles like quantum dots or metallic particles. Such techniques led to the surprising finding that retrograde NGF vesicles often contain

only one dimer. Other such studies showed that the tau protein can regulate microtubule dependant axonal transport, a finding with direct bearings on Alzheimer's disease. Studies using quantum dot stained AMPA-Rs indicated that lateral mobility of this receptor plays a crucial role in post-synaptic depression, a finding of major importance from both a fundamental and a clinical point of view.

Frontiers in Neuroscience

Biology and Therapeutic Potential of Neurotrophic Factors

Prof. Mart Saarma, Finland



M. Saarma discussed the role of neurotrophic factors (NTFs) in controlling the number of neurons and maintenance of neuronal networks in the CNS. For example, GDNF promotes the survival of motoneurons and can protect and regenerate dopamine neurons in animal models of Parkinson's disease (PD). Thus, NTF-based drugs can be potentially efficient against PD, but phase II clinical trials using GDNF showed no therapeutic benefit and some patients developed neutralizing antibodies. Current approaches focus, therefore, on the search for new NTFs and on the development of small molecules mimicking the activity of NTFs. A recently discovered new neurotrophic factor is CDNF, found in numerous brain areas. Importantly, CDNF not only protects dopaminergic neurons, but also repairs the nigrostriatal dopaminergic system and therefore, is a good candidate for the treatment of PD.

Neuropsychology and imagery of word reading:

footprints of culture in the brain

Prof. Laurent Cohen, France



Pure alexia is evidence that the brain has a designated "reading area", despite the recent emergence of reading in evolutionary terms. L. Cohen aimed to elucidate this paradox, by presenting an overview of the interface between the visual and the verbal systems in reading. The visual system represents strings of letters as a "visual word form" (VWF), which is the main input for the language system. Following brain surgery in the occipitotemporal cortex, a patient developed pure alexia, indicating that the VWF area is solely dedicated to proficient reading. The VWF system represents words in a format invariant for font and case, but sensitive to orthography. In conclusion, humans allocate to word recognition brain areas which are initially devoted to the general recognition of objects. The inherent capacities, constraints and limitations of these areas directly influence the novel function of reading.

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Frontiers in Neuroscience

Brain Computer Interfaces:

Applications in Paralysis and Emotional Disorders

Prof. Niels Birbaumer, Germany



N. Birbaumer described the status of brain-computer or brain-machine interface research. The focus is on non-invasive brain-computer interfaces (BCIs) and their clinical utility for direct brain communication in paralysis and motor restoration in stroke. BCIs based on electroencephalographic (EEG) potentials or oscillations are ready to undergo large clinical studies and commercial production as an adjunct or a major assisted communication device for paralysed and locked-in patients. However, attempts to train completely locked-in patients with BCI communication after entering the complete locked-in state with no remaining eye movement failed. It was proposed that a lack of contingencies between goal directed thoughts and intentions may be at the heart of this problem. Experiments with chronically curarized rats support our hypothesis; operant conditioning and voluntary control of autonomic physiological functions turned out to be impossible in this preparation. In addition to assisted communication, BCIs consisting of operant learning of EEG slow cortical potentials and sensorimotor rhythm were demonstrated to be successful in drug resistant focal epilepsy and attention deficit disorder. First studies of non-invasive BCIs using sensorimotor rhythm of the EEG and magnetoencephalography (MEG) in restoration of paralysed hand movements in chronic stroke and single cases of high spinal cord lesions show some promise, but need extensive evaluation in well-controlled experiments. Invasive BCIs based on neuronal spike patterns, local field potentials or electrocorticogram may constitute the strategy of choice in severe cases of stroke and spinal cord paralysis. Future directions of BCI research should include the regulation of brain metabolism and blood flow and electrical and magnetic stimulation of the human brain (invasive and non-invasive).



Ministry of Health (MOH), Italy



Academy of Finland (AKA), Finland



National Research Agency (ANR), France



National Center for Scientific Research (CNRS), France



Der Wissenschaftsfonds.
Austrian Science Fund (FWF), Austria



Federal Ministry of Education & Research (BMBF), Germany



National Institute for Medical Research (INSERM), France



Chief Scientist Office, Ministry of Health (CSO-MOH), Israel



Fonds National de la Recherche Luxembourg
National Research Fund (FNR), Luxembourg



Narodowe Centrum Badań i Rozwoju
The National Centre for Research and Development (NCBIR), Poland



National Authority for Scientific - Ministry of Education, Research and Youth (ANCS - MECT), Romania



German Aerospace Centre, Project Management Agency



Institute of Health Carlos III (ISCIII), Spain



Vetenskapsrådet
Swedish Research Council (SRC), Sweden



Medical Research Council (MRC), UK



National Centre for Programmes Management



Ministry of Science and Innovation (MICINN), Spain