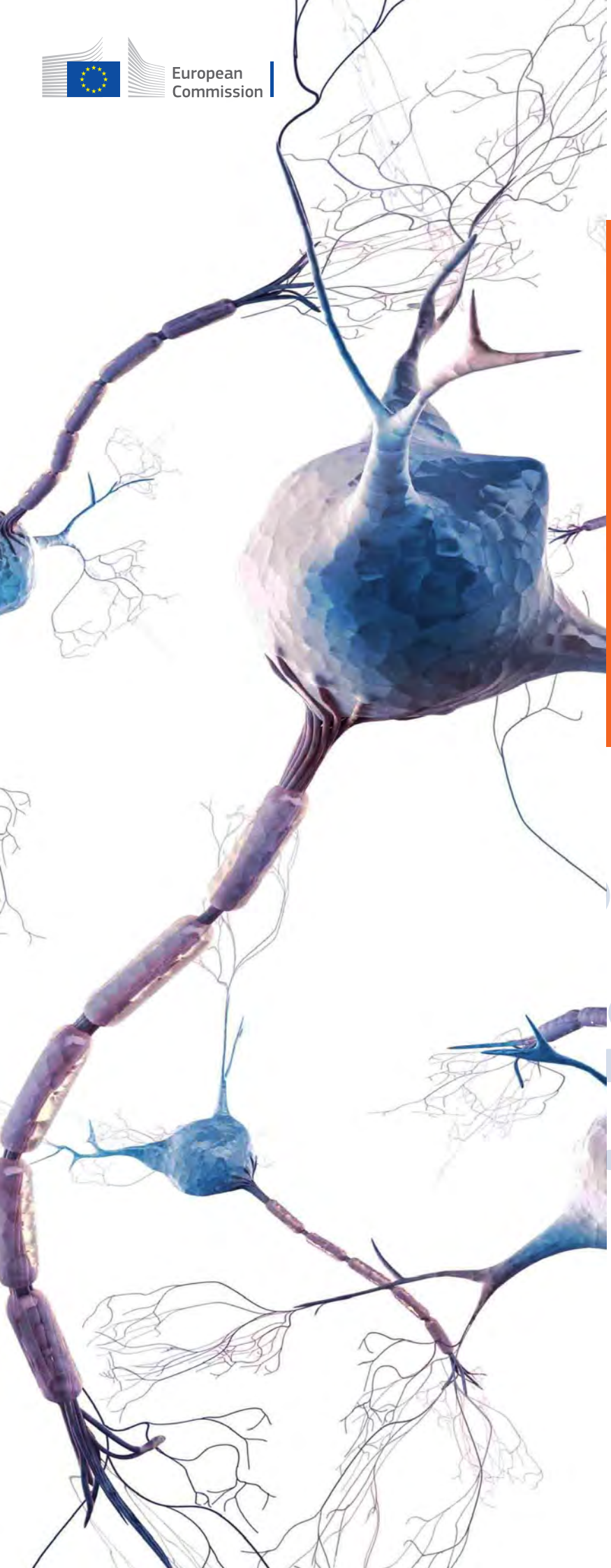


European Commission

Society for Neuroscience Annual Meeting

Neuroscience 2012
An insight into ERC projects

European Research Council
Established by the European Commission

http://erc.europa.eu

Neuroscience 2012: An insight into ERC projects

As many as 40% of Europeans suffer from a mental or neurological disorder, according to the last 2011 study done by the European College of Neuropsychopharmacology and the European Brain Council[1]. This has become a major public health issue and investing in research is essential.

Neuroscience is a fast evolving field. It aims at understanding how the nervous system functions and its various pathologies. It has brought new insights and methods to the field and has also improved our capability to better analyse, diagnose and treat human brain-related diseases, neurological and psychiatric disorders.

Massive efforts worldwide have been devoted to support neuroscience research and the European Union has been funding several programmes. In particular, the European Research Council (ERC) has been supporting cutting-edge and innovative studies in neurosciences since its creation in 2007.

Almost 200 research projects are supported for a granted budget over €250 million. About 15% of ERC-funded projects in life sciences have a neuroscience component. These projects aim at: advancing our knowledge of the nervous system in health and disease conditions; contributing to the development of new cellular, molecular, genetic and animal models and tools to investigate the activity of the nervous system in normal and pathological situations; and testing new concepts, ideas and techniques before transferring them to patients.

Many of these projects address public health challenges and emerging areas in neurosciences for example: projects that deal with memory, information coding and processing in the brain, genesis and repair of the nervous system, neuronal circuits in drug addiction, cell and gene therapy for Parkinson's and Alzheimer's diseases or computation models for man-machine interaction.

[1] http://www.ecnp.eu/~/media/Files/ecnp/communication/reports/ECNP%20EBC%20Report.pdf

ERC at Neuroscience 2012

Meet Dr Eloisa Herrera and Dr David Engblom

The European Research Council, A Great Funding Opportunity

Monday 15 October 2012, 6:30-8pm

Room 291, Ernest N. Morial Convention Center

Some ERC projects in this field

Getting wired: the development of visual circuits

An important feature of neural circuits is their ability to evolve in response to sensorial experience. But is experience the only trigger for this evolution? With her Starting Grant, Doctor Eloisa Herrera uses the visual system as a model to study the early development of neural circuits. She aims to understand how neuronal circuits "wire" to form a fully grown visual circuit. Dr Herrera focuses in particular on early spontaneous retinal activity that generates visual response even before a sensorial experience occurs. How do these first electrical and molecular activities combine and contribute to shape neuronal connectivity? To what extend does the wiring of neural circuits depend on the original properties of the brain and how does experience come into play to modify information processing? Dr Herrera will work with genetically modified mice - some of which equipped with high-tech prism goggles - and bring in imaging, electrophysiology and behaviour observation to address these keys questions in developmental neuroscience.

Principal Investigator: Dr Eloisa Herrera

Host Institution: Agencia Estatal Consejo Superior De Investigaciones Cientificas, Spain

ERC Project: Wiring up visual circuits: Interplay between gene expression and spontaneous and experience-dependent activity (WIRINGVISION)

ERC call: Starting Grant 2011

ERC funding: €1.5 million for five years

Researcher's webpage: http://in.umh.es/personal-detalle.aspx?personal=156

The neural mechanisms of drug addiction

How we feel and what we find motivating has a significant impact on our decisions, actions, and generally on our quality of life. In the brain, our affective and motivation state is fine-tuned by neural mechanisms that underlie the feelings of reward and aversion. Drug addiction directly affects this system: for example when drugs hyperactivate the "reward" circuit and trigger a strong motivation to continue to take drug. ERC grantee Doctor David Engblom will investigate how addictive drugs induce a "reward" signalling, focusing in particular on the role of dopaminergic neurons. His team will develop innovative genetically-modified mice lines to inactivate or visualise specific neural circuits and molecular mechanisms involved in addictive behaviours. Dr Engblom will also test his hypothesis on the signalling and location of "aversion" circuits in the brain, an area that was little explored so far. This may not only allow scientists to understand how the aversion circuits contributes to the persistence of drug addiction and to relapse; it could also open new avenues for the treatment of aversion-related symptoms, characterised by the loss of motivation, which can affect patients with chronic inflammatory diseases and cancer.

Principal Investigator: Dr David Engblom

Host Institution: Linköpings Universitet, Sweden

ERC Project: Drug addiction: molecular changes in reward and aversion circuits (ADDICTIONCIRCUITS)

ERC call: Starting Grant 2010

ERC funding: €1.5 million for five years

Researcher's webpage: http://www.hu.liu.se/ike/forskare-vid-ike/david-engblom?l=en&sc=true
Video: http://lioappl1.lio.se/video/2010/Framkant/tretton.htm

How we come to feel that we own a body

The experience of the body as part of oneself is a basic aspect of self-consciousness. But how do we identify limbs and other body parts as our own? In his project, Doctor Henrik Ehrsson aims to identify the multisensory mechanisms whereby the central nervous system attributes objects to the self rather than to the environment. His hypothesis is that there exist multisensory brain areas (in particular ventral premotor and intraparietal cortex) that integrate information from different sensory modalities (vision, touch and muscle sense) to produce the unified perception of limbs as part of one's own body, or a feeling of "body ownership". To test this hypothesis, the researcher has carried out several experiments using an inter-disciplinary approach, including the use of perceptual illusions - that allow the experimental manipulation of body ownership - in combination with state-of-the-art brain imaging techniques. His findings suggest that the experience of owning one's entire body is produced by a neuronal response that integrates multisensory information across body segments. The multisensory model of body ownership developed during the project is already used in the field of neuro-prosthetics and in the virtual reality research community, opening the path to important clinical and industrial applications.

Principal Investigator: Dr Henrik Ehrsson

Host Institution: Karolinska Institutet, Sweden

ERC Project: Neural mechanisms of body ownership and the projection of ownership onto artificial bodies (BODY-OWNERSHIP)

ERC Call: Starting Grant 2007

ERC Funding: €900 000 for five years

Researcher's webpage: http://www.ehrssonlab.se
BBC Video: http://www.youtube.com/watch?v=xeBFjRnsAqg

When neuroscience inspires telecoms

Although the way information is encoded and processed in our brain is an enigma for neuroscientists, it has become a source of inspiration for some telecommunications specialists. Professor Claude Berrou, the co-inventor of the "turbo codes" which are widely used in 3G and 4G mobile devices, leads an Advanced Grant project at the interface of biological sciences, computational intelligence and information theory. The researcher sets out to identify and exploit the similarities between the encoding of information by the neural system and the modern, error-correcting, decoders studied in communications sciences. The team will build on concepts stemming from recent advances in cerebral biology such as neural clusters, neural cliques and sparse coding. This should allow them to devise new ways of transmitting and storing unstructured information in a network. Their aim is to implement electronic brain-inspired networks and machines able to "learn" millions of messages and situations, and retrieve and combine them to produce new information instantly. His research could pave the way for new applications in the field of machine learning and artificial intelligence while contributing to the understanding of the biology of long- and short-term memories.

Principal Investigator: Prof. Claude Berrou

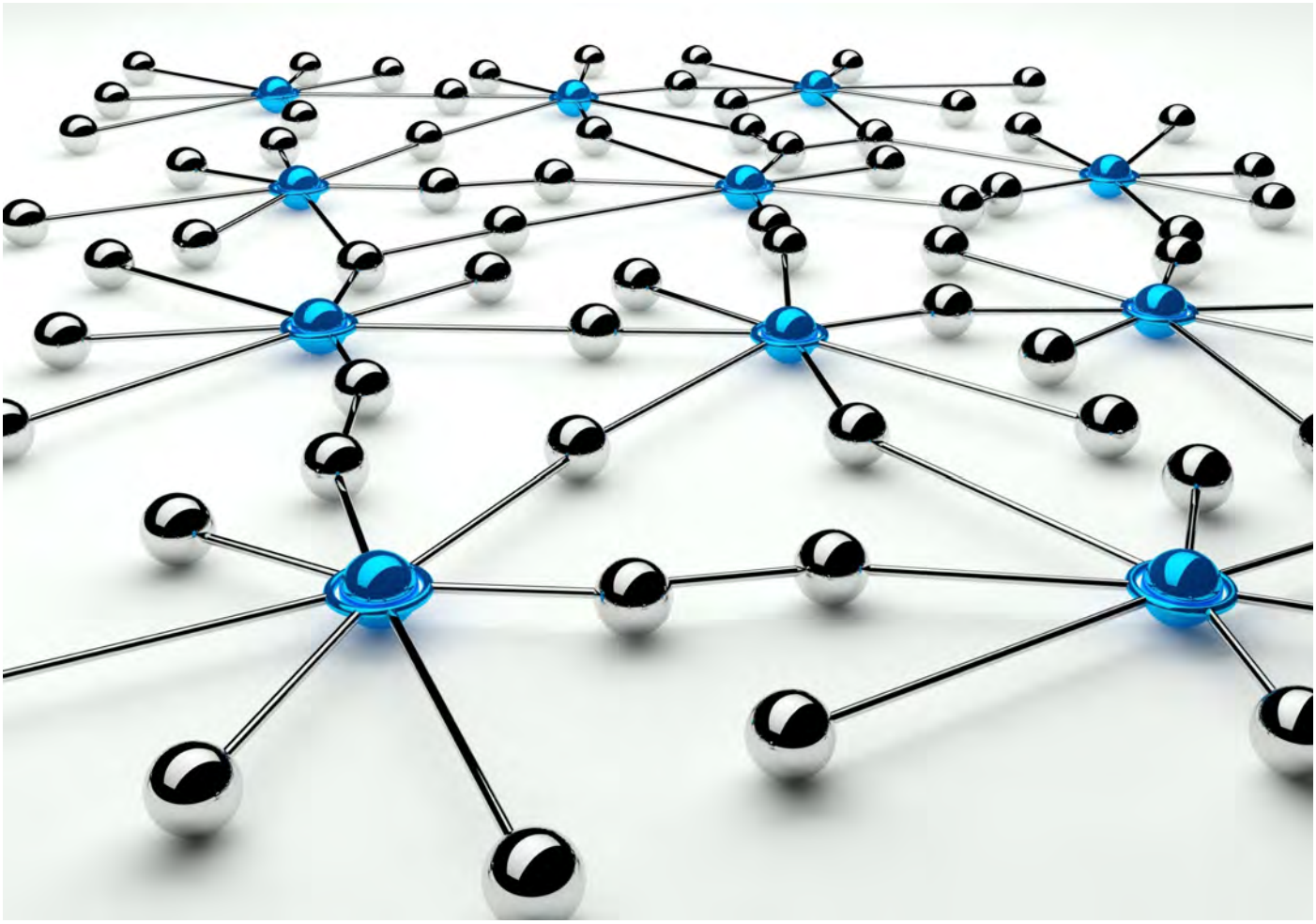
Host Institution: Télécom Bretagne, Institut Mines-Télécom, France

ERC Project: Neural coding, specification, design and test of message passing neural machines (NEUCOD)

ERC Call: Advanced Grant 2011

ERC Funding: €1.88 million for five years

Video: http://www.youtube.com/watch?v=pzF891Hxxr8



Unravelling the dynamics at the origin of Alzheimer

Chronic accumulation of beta-amyloid peptides forms deposits in the brain of patients with Alzheimer's disease (AD). Beta-amyloid is thought to play a central role in initiating the disease by damaging the synapses, connection structures through which neurones communicate. However, several key questions remain unresolved as to how this is really happening. This project pursues to correlate the structure and the function of single synapses in the hippocampus, one of the first regions of the brain to be impaired in AD. Using innovative techniques such as FRET spectroscopy, FLIM, high-resolution optical imaging and electrophysiology, the research team will elucidate fundamental principles of neuronal circuits' function. Their results could identify critical steps at the very early stages of "sporadic AD", which is the most frequent form of the illness.

Principal Investigator: Dr Inna Slutsky

Host institution: Tel Aviv University, Israel

ERC Project: Evolution of Alzheimer's disease: From dynamics of single synapses to memory loss (ABatSynapse)

ERC Call: Starting Grant 2011

ERC funding: €2 million for five years

Researcher's webpage: http://www.slutskylab.com/

Nanotechnology and the future of neuroscience

Professor Maurizio Prato is working at the interface of nanotechnology and neurobiology, with an interdisciplinary team including chemists and neuroscientists. His project aims to exploit the capacity of functionalized carbon nanotubes to manipulate neuron activity and neural network performance. Such research could revolutionise the treatment of degenerative diseases – spinal injuries for example. The ambition is to lay the groundwork for the development of devices which could be implanted into a patient with neurological problems. Prof. Prato also aims to design more efficient drug delivery systems, known as nanovectors, which would allow a drug to reach the diseased area of the body much more effectively. Such nanovectors, developed from carbon nanotubes, may be efficiently used for the treatment of neurological disorders but also of cardiac diseases. Ultimately Prof. Prato's team hope to be influential in establishing a new generation of innovations in nanomedicine, with wide-ranging implications for healthcare in the future.

Principal Investigator: Prof. Maurizio Prato

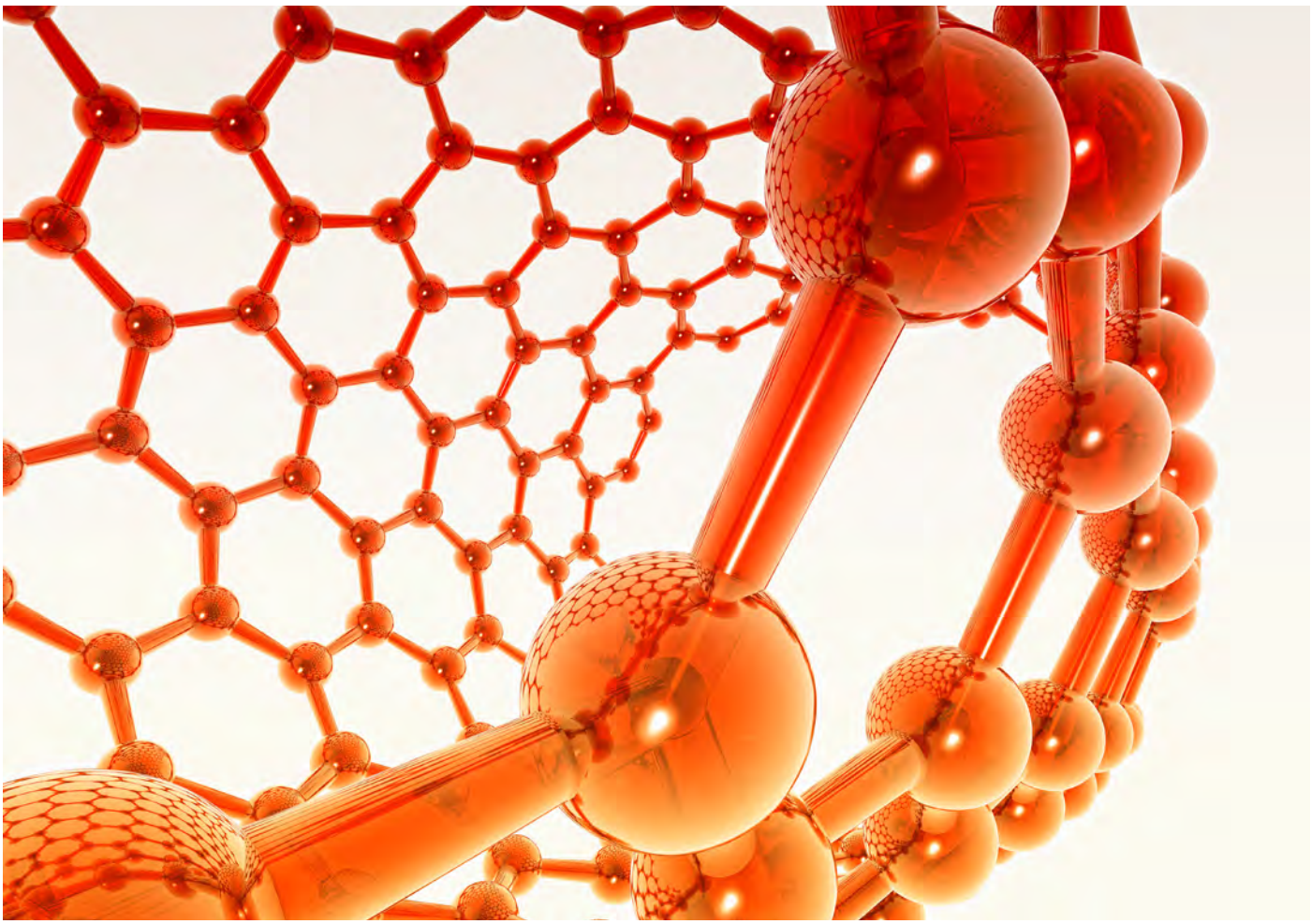
Host institution: Università degli studi di Trieste, Italy

ERC Project: Neuron Networking with Nano Bridges via the Synthesis and Integration of Functionalized Carbon Nanotubes (CARBONANOBRIDGE)

ERC Call: Advanced Grant 2008

ERC funding: €2.5 million for five years

Researcher's webpage: http://www2.units.it/pratoweb/Maurizio_Prato/Welcome.html



"The Scientific Council is committed to continuously work hard to fulfil the ERC's unique mission. ERC will continue to make fundamental contributions to the transformation of Europe into a world-leading knowledge area, where frontier research can be the hotbed for innovation and the well being of its citizens."

Prof Helga Nowotny
ERC President and Chair of its Scientific Council

European Research Council

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All on-going projects funded by the ERC

http://cordis.europa.eu/projects/home_en.html

Special features:

World Multiple Sclerosis Day 2012

http://erc.europa.eu/succes-stories/world-multiple-sclerosis-day-erc-funded-research

Alzheimer's World day, 21 September 2011

http://erc.europa.eu/succes-stories/alzheimers-world-day-21-september-erc-funded-research

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