Cerebellar-Cortical Control: Cells, Circuits, Computation, and Clinic

Sprawozdania

Informacje na temat projektu

C7

Identyfikator umowy o grant: 238214

Projekt został zamknięty

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Final Report Summary - C7 (Cerebellar-Cortical Control: Cells, Circuits, Computation, and Clinic)

C7 is an initial training network under the FP7 Marie Curie Actions, running from October 2009 – October 2013. It provided 17 young researchers with the opportunity to work in Europe's leading laboratories in cerebellar research. Fellows across the network worked together in interdisciplinary research teams on cutting-edge questions and received part of their training at one or more of the other partner sites.
The C7 network brings together 9 research groups, 2 industrial partners, and 2 patient organizations that

form a European institute that conducts a truly interdisciplinary study of the cerebellum. With electrophysiology, behavioural and clinical research, computational modelling and neuroimaging the project aimed to answer three important questions:
What computation is performed in cerebellar networks?
How do distributed synaptic changes lead to learning?
How do cortico-cerebellar loops generate motor control and cognition?

One group of researchers investigated the computations ongoing in the neuronal activity in the cerebellum. They studied how behavioral parameters are encoded in complex spikes (Pascal Warnaar) and simple spike firing of Purkinje cells (Aleksandra Smilgin), as well as in deep cerebellar nuclei cells (Zong-Peng Sun). Other researchers worked on how the cerebellum exchanges in formation with the rest of the brain (Joao Couto, Han Lageslag, Eric Avila). This question was also addressed at the systems level in the context of eye movements (Tafadzwa Sibindi). The group has also contributed to important technical advances is the recording of cerebellar neurons, through the development of spike-sorting software in collaboration with our Industrial partner Alpha-Omega (Peter Holland).

Plasticity and learning is key to understanding the function of the cerebellum in health and disease. The cellular site of plasticity were studied (Nicolas Gutierrez Castellanos, Leonardo Tolosa). In the clinic, fellows have also investigated how rehabilitation of cerebellar patients in balance training causes neuronal changes (Roxana Burciu), and the role of he deep cerebellar nuclei in degeneration patients (Roxana Stefanescu). Finally, other researchers have explored the mechanisms behind transcranial direct current stimulation, which has the potential to enhance cerebellar learning (Suman Das).

A third group of researchers explored how the cerebellum helps in learning the timing and order of sequential movements (Katja Kornysheva) and the learning of novel visuo-motor transformations (Sebastian Telgen, Maria Dagioglou). Finally, a series of elegant studies addressed the question of how the cerebellum is involved in language processing and prediction (Elise Lesage). For a more detailed description of the individual research projects, please see the website: www.cerebellumC7.eu.

The project has brought together some of the top cerebellar researchers in Europe and has triggered many collaborative projects that will outlast the duration of the C7 project. Only with such closer collaborative ties will it be possible to address the scientific challenges ahead. The fellows trained in the network have received a unique experience of being exposed to Neuroscience in an interdisciplinary fashion, ranging from cellular mechanisms to the whole brain and human behavior. In a time of increasing specialization of each field, such a perspective early in training is essential to enable young scientists to think “out of the box”. Many projects also have direct impact on the clinical question, and many fellows had the opportunity to work with patient populations, which otherwise would not have been possible.

Overall, the project has helped to accelerate cerebellar research in Europe, training a new generation of scientists to address clinical real-world problems from an integrated neuroscience perspective.

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