Multimodal mossy fiber input and its role in information processing in the cerebellar granule cell layer

Fact Sheet

Project Information

MULTIMOSSY

Grant agreement ID: 331710

Project closed

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1 September 2013

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31 August 2015

Funded under
Specific programme "People" implementing the Seventh Framework Programme of the European Community for research, technological development and demonstration activities (2007 to 2013)

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€ 221 606,40

EU contribution
€ 221 606,40

Coordinated by
UNIVERSITY COLLEGE LONDON

Objective

Synaptic connectivity within and between neurons in brain networks determines the flow of information, how signals are combined and how they are transformed. However, our understanding of information processing in brain networks remains poor. The cerebellar cortex is an attractive model to study network processing because it consist of relatively few, well defined cell types and a relatively simple

structure. The cerebellum is involved in motor coordination, and the maintenance of balance. It receives both sensory and motor inputs and integrates this information to perform its function. However, at the cellular level, the specific connectivity of mossy fibres (Mfs; the major input to the cerebellar cortex) and their integration is uncertain. This proposal focuses on Mfs arising from different precerebellar nuclei conveying both sensory information and motor command signals. Mfs contact Golgi cells (GoCs) and granule cells (GCs) in the cerebellar granule cell layer (GCL). However, the connectivity rules, and thus the integration of different Mf inputs onto these cells remain poorly understood. To tackle this question, I propose a multidisciplinary approach based on electrophysiology, optogenetics, 2-photon microscopy and network modelling. I will describe the functional connectivity between Mfs and GoCs and GCs by infecting distinct precerebellar nuclei with Channelrhodopsin (ChR)-expressing adeno-associated viruses to label and activate Mfs. I will measure the synaptic weight and plasticity of these connections. Using variants of ChR activated by distinct wavelengths, I will examine whether individual GoCs and GCs receive multimodal information from distinct nuclei. The results will be included in a detailed 3D network of the GCL and spatio-temporal dynamics and processing by the network will be investigated. This work will provide an important conceptual advance in our understanding of information processing in a major cortical structure in the mammalian brain.

Fields of science (EuroSciVoc)

engineering and technology > materials engineering > **fibers**

natural sciences > biological sciences > microbiology > **virology**

natural sciences > physical sciences > optics > **microscopy**

natural sciences > computer and information sciences > data science > **data processing**

Programme(s)

FP7-PEOPLE - Specific programme "People" implementing the Seventh Framework Programme of the European Community for research, technological development and demonstration activities (2007 to 2013)

Topic(s)

FP7-PEOPLE-2012-IEF - Marie-Curie Action: "Intra-European fellowships for career development"

Call for proposal

FP7-PEOPLE-2012-IEF
See other projects for this call

Funding Scheme

MC-IEF - Intra-European Fellowships (IEF)

Coordinator

UNIVERSITY COLLEGE LONDON

EU contribution

€ 221 606,40

Total cost

No data

Address

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Activity type

Higher or Secondary Education Establishments

Links

Contact the organisation Website
Participation in EU R&I programmes
HORIZON collaboration network

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Permalink: https://cordis.europa.eu/project/id/331710