NeuroSeeker
Project ID: 600925
Funded under: FP7-ICT

Investigation of local and global cortical circuits with advanced neural probes for high-resolution electrophysiological monitoring and optogenetic stimulation

From 2013-01-01 to 2017-06-30, closed project | NeuroSeeker Website

Project details

| Total cost: | Topic(s): |

| EU contribution: | Call for proposal: |
| EUR 6 180 000 | FP7-ICT-2011-9 | See other projects for this call |

| Coordinated in: | Funding scheme: |
| Germany | CP - Collaborative project (generic) |

Objective
Most cognitive functions are based on computations that take place in the cerebral cortex, composed of a larger number of areas, each with a complex anatomical structure, with neurons of different types and in different layers interacting according to a precise scheme. The anatomical organization of cortical areas is similar, with some modulation according to its sensory, motor or associative function. Several areas have a columnar organization, but in all areas a similar vertical organization of cortical modules is repeated, suggesting that the same fundamental computation scheme is carried out. Despite the large amount of available data, this processing capability of the cortical module is still poorly understood. Two key technological advances to explore cortical computation have been ensemble electrophysiology, the use of multiple electrodes to record groups of neurons, and optogenetics. However, the optogenetic tools are still critically lacking in layer and cell-type specificity, and the recording techniques still do not attain the yields necessary to properly characterize the cortical microcircuit. To overcome these limitations, we propose a new probe that dramatically increases the density of electrodes providing an unprecedented view of currents in the extracellular medium. This will be complemented with an optical stimulator, capable of activating excitatory and inhibitory channelrhodopsins with a 100 µm resolution. We will take full advantage of the rich data that can be obtained with these new devices by producing new strategies for signal classification, to locate cells in cortical layers and assign them to a cell type based on the spatiotemporal fingerprint generated at each action potential. We will analyze cortical function at multiple scales in a number of contexts, from memory formation, to ongoing processing during decision making, and to sensorimotor integration for actions, advancing our understanding of cortical representations.

Related information

Result In Brief
Mechanistic insight into cognition in mammals
Coordinator

ALBERT-LUDWIGS-UNIVERSITAET FREIBURG
FAHNENBERGPLATZ
79098 FREIBURG
Germany
See on map

**Activity type:** Higher or Secondary Education Establishments

**Administrative contact:** Patrick Ruther
Tel.: +49 7612037197
Fax: +49 7612037192
Contact the organisation

Participants

INTERUNIVERSITAIR MICRO-ELECTRONICA CENTRUM
KAPELDREEF 75
3001 LEUVEN
Belgium
See on map

**Activity type:** Research Organisations

**Administrative contact:** Christine Van Houtven
Tel.: +3216281613
Contact the organisation

ATLAS NEUROENGINEERING
WINDMOLENVELDSTRAAT 58/101
3000 LEUVEN
Belgium
See on map

**Activity type:** Other

**Administrative contact:** Arno Aarts
Tel.: +32 281677
Contact the organisation

University of Lethbridge
4401 University Drive
T1K 3M4 Lethbridge
Canada

**Activity type:** Higher or Secondary Education Establishments

**Administrative contact:** Bruce McNaughton
Tel.: +1 4033943909
Contact the organisation
MAX-PLANCK-GESELLSCHAFT ZUR FORDERUNG DER WISSENSCHAFTEN EV
HOFGARTENSTRASSE 8
80539 Munich
Germany
EU contribution: EUR 391 500

Activity type: Other
Administrative contact: Wolf Singer
Tel.: +49 69 96769 218
Fax: +49 69 96769 327
Contact the organisation

INSTITUT NATIONAL DE LA SANTE ET DE LA RECHERCHE MEDICALE
RUE DE TOLBIAC 101
75654 PARIS
France
EU contribution: EUR 144 854

Activity type: Research Organisations
Administrative contact: Célia Farge
Tel.: +33 4 72138859
Fax: +33 4 72138801
Contact the organisation

MAGYAR TUDOMANYOS AKADEMIA TERMESZETTUDOMANYI KUTATOKOZPONT
MAGYAR TUDOSOK KRT 2
1117 BUDAPEST
Hungary
EU contribution: EUR 199 920

Activity type: Higher or Secondary Education Establishments
Administrative contact: Istvan Ulbert
Tel.: +36 305370284
Fax: +36 1 3542416
Contact the organisation

UNIVERSITA DEGLI STUDI DI PARMA
VIA UNIVERSITA 12
43100 PARMA
Italy
EU contribution: EUR 543 600

Activity type: Higher or Secondary Education Establishments
Administrative contact: Giuseppe Luppino
Tel.: +32 0521 033893
Fax: +39 0521 903900
Contact the organisation
UNIVERSITEIT VAN AMSTERDAM
SPUI 21
1012WX AMSTERDAM
Netherlands
EU contribution: EUR 0

Activity type: Higher or Secondary Education Establishments

Administrative contact: Luc Gentet
Tel.: +31 205258025
Contact the organisation

STICHTING KATHOLIEKE UNIVERSITEIT
GEERT GROOTEPLEIN NOORD 9
6525 EZ NIJMEGEN
Netherlands
EU contribution: EUR 849 301

Activity type: Higher or Secondary Education Establishments

Administrative contact: Sabine Vernooij
Tel.: +31 243652616
Contact the organisation

FUNDACAO D. ANNA SOMMER CHAMPALIMAUD E DR. CARLOS MONTEZ CHAMPALIMAUD
AVENIDA BRASILIA CENTRO DE INVESTIGACAO DA FUNDACAO CHAMP ALIMAUD
1400 038 LISBOA
Portugal
EU contribution: EUR 396 000

Activity type: Higher or Secondary Education Establishments

Administrative contact: Tania Vinagre
Tel.: +351210480114
Fax: +351210480299
Contact the organisation

UNIVERSITY COLLEGE LONDON
GOWER STREET
WC1E 6BT London
United Kingdom
EU contribution: EUR 0

Activity type: Other

Administrative contact: Giles Machell
Tel.: +44 2031089375
Fax: +44 20 78132849
Contact the organisation

Subjects

Information and Media