Spontaneous and sensory-evoked activity shape neural circuits in the developing brain

Fact Sheet

Project information

**NeuroDevo**

Grant agreement ID: 804824

Status

Ongoing project

Start date
1 September 2019

End date
31 August 2024

Funded under:

H2020-EU.1.1.

Overall budget:

€ 1 290 525

EU contribution

€ 1 290 525

Hosted by:

MAX-PLANCK-GESELLSCHAFT ZUR FORDERUNG DER WISSENSCHAFTEN EV

Germany

Objective

To generate brain circuits that are both flexible and stable requires the coordination of powerful developmental mechanisms acting at different scales. How does the brain prepare to efficiently compute information and reliably generate behavior during early development without any previous experience? A prominent transient feature of developing circuits is the ability to generate spontaneous activity before sensory organs mature. We know little about the detailed structure of this activity; however, blocking or perturbing this activity leads to miswiring defects, suggesting its powerful role in shaping local and brain-wide neural circuits. After the onset of sensory experience, ongoing activity continues to modify sensory circuits, and plays an important functional role in the mature brain. Together with advances in experimental techniques, we propose that theory and models are needed to establish a unifying framework of neural circuit development. Using quantitative data analysis, experiment-driven theory and computational modeling, we will derive key principles for how neural circuits are built and organized during early postnatal development into functional units, and how they are modified by intact and perturbed sensory-evoked activity. We will provide a quantitative analysis of longitudinal recordings of single neuron and network activity for the first time by synthesizing data from three collaborating labs. Our goal will be to reveal novel aspects of this activity that drive circuit refinement over a prolonged timescale during development, and to identify the powerful ways in which activity and circuit properties influence each other. Our models will generate and test hypotheses for how individual components affect different aspects of
circuit organization during development. Therefore, the unique potential of our theoretical approach lies in dissecting the influence of each developmental process, making predictions to be tested in the real biological system.

**Field of Science**

quantitative analysis
data analysis

**Programme(s)**

H2020-EU.1.1. - EXCELLENT SCIENCE - European Research Council (ERC)

**Topic(s)**

ERC-2018-STG - ERC Starting Grant

**Call for proposal**

ERC-2018-STG

See other projects for this call

**Funding Scheme**

ERC-STG - Starting Grant

**Host institution**

MAX-PLANCK-GESELLSCHAFT ZUR FORDERUNG DER WISSENSCHAFTEN EV

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<th>Activity type</th>
<th>EU Contribution</th>
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<td>Research Organisations</td>
<td>€ 1 290 525</td>
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<tr>
<td>80539 Muenchen</td>
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Contact the organisation

**Beneficiaries** (1)
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EU Contribution: €1,290,525

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