

# eNEURO – multilevel modelling and simulation of the nervous system

<https://neurodegenerationresearch.eu/survey/eneuro-multilevel-modelling-and-simulation-of-the-nervous-system/>

## **Name of resource (including any acronym)**

eNEURO – multilevel modelling and simulation of the nervous system

## **Name of Principal Investigator**

Title            Professor

First name Gaute

Last name Einevoll

## **Address of institution where award is held**

Institution        Norwegian University of Life Sciences

Street Address P.O. Box 5003

City                Aas

Postcode         NO-1432

## **Country**

Norway

## **Website link with details of how to contact the resource**

<http://www.umb.no/imt/ansatte/gaute.einevoll>

## **Purpose of the resource**

The project focuses on a central challenge in neuroscience today, namely bridging the gap in understanding between microscopic (single nerve cells) and macroscopic (systems-level) neuroscience. This is addressed by large-scale application and development of a set of computational neuroscience methods and multilevel models to facilitate direct comparison with various types of experimental data, that is, electrical and optical recordings of brain tissue slices and recordings with multicontact (laminar) electrodes in anesthetized animals. The project involves a close interdisciplinary collaboration between computational and experimental neuroscientists at the University of Oslo and at the Norwegian University of Life Sciences as well as international partners at UCSD in California, RIKEN in Japan, and Honda Research Institute in Germany.

In the project, experimentally validated models of single neurons and networks of thousands of neurons will be constructed in a multilevel approach. Neuron models at three levels of biological detail will be considered: biophysically realistic compartmental models (class I), simplified spiking neurons (class II), and firing-rate models (class III). Two particular neurobiological systems will be studied: (i) the processing of sensory tactile stimuli in rat barrel cortex, and (ii) the processing of visual stimuli in the thalamocortical system of mammals.

The simulation tools NEURON and NEST will be used for class-I and class-II neuron and network models, respectively. These tools will be developed and adapted to facilitate the optimization of neuron (NEURON) and network models (NEST) against experimental data or models at different levels of detail. Further, a user interface for NEST that allows for use by nonexpert modellers and

experimentalists will be developed.

The project will also establish a vibrant, internationally oriented neuroinformatics environment in the Oslo region centered at UiO and UMB.

**1. The resource is**

General (e.g. DNA sequence, proteomic data)

**2. The resource specifically provides for the following neurodegenerative diseases**

Neurodegenerative disease in general

**3a. The resource is accessible to the research community**

2

**3b. Procedures and rules for access**

Other requirements exist

**5a. Maintenance of the resource is dependent on continued funding**

2

**5b. End date of current funding period**

2013

**5c. Plans to secure further funding beyond this period**

Don't know