



Public Report on modelling and simulation tools, facilities, workflows, and use cases created by WP3 (Deliverable 3.15a)

Project title: EBRAINS-Italy- European Brain ReseArch INfrastructureS-Italy

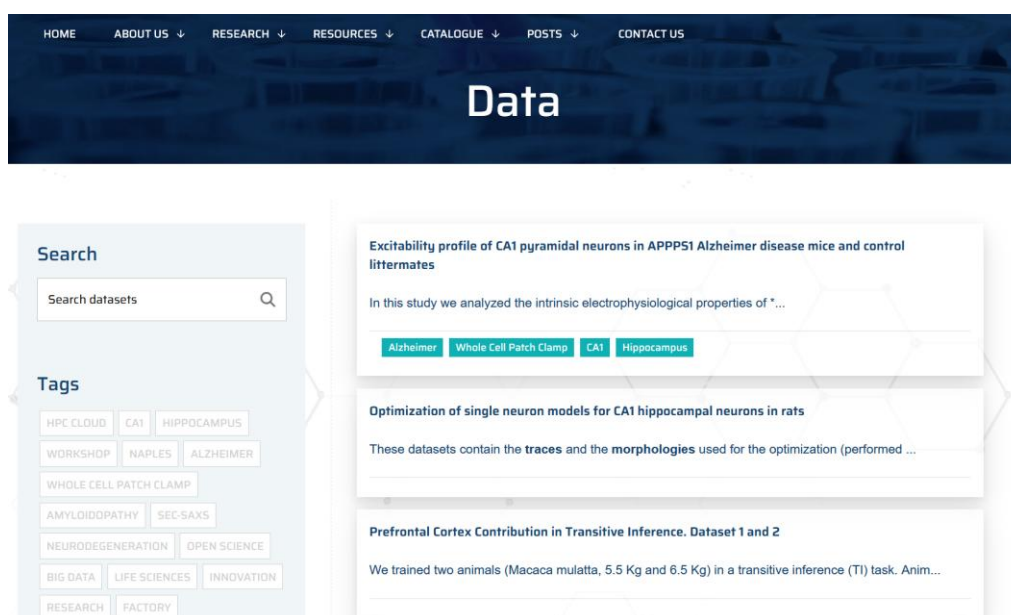
CUP: B51E22000150006

Authors: Rosanna Migliore, Francesca Spataro, Luca Leonardo Bologna, Michele Migliore.

EBRAINS-Italy's Work Package 3 (WP3) “Analysis, Modelling, and Simulation Facilities and Services” has developed several tools, facilities, workflows, and use cases, to support neuroscience research across theoretical, experimental, and clinical domains. Many of the results achieved were made possible thanks to close collaboration with the Work Package 2 (WP2), which provides high-quality experimental data and related services. The EBRAINS-Italy website (<https://www.ebrains-italy.eu/>) has played a key role as a central access point to a wide range of models, tools, and workflows. Through this platform, users have not only been able to explore and use the available resources, but also to acquire the necessary skills to do so independently and effectively. This has been made possible by a system of virtual, remote, and physical access to research infrastructures, supported by the Transnational Access (T-NA) program, which has significantly expanded collaboration and growth opportunities for the involved scientific community. An example of the components, datasets and use-cases, currently available through the EBRAINS-Italy website and accessible by the Transnational Access (T-NA) program, is listed below.

Data (<https://ebrains-italy.eu/resources/datasets>)

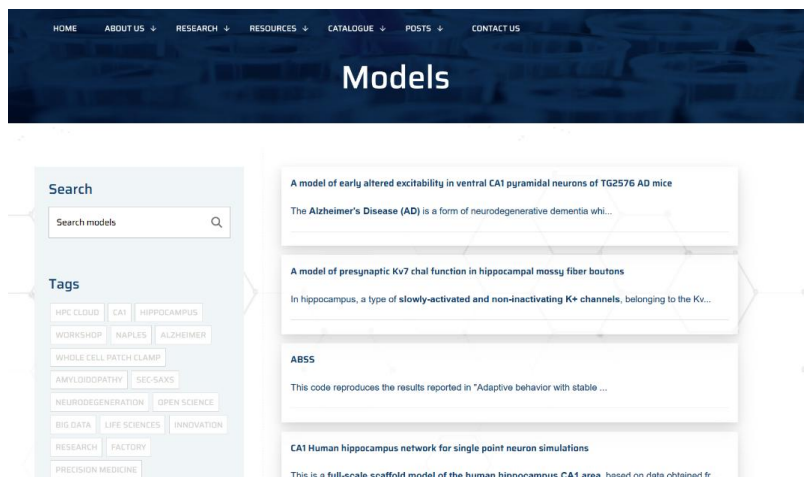
- Excitability profile of CA1 pyramidal neurons in APPPS1 Alzheimer disease mice and control littermates
- Optimization of single neuron models for CA1 hippocampal neurons in rats
- Prefrontal Cortex Contribution in Transitive Inference. Dataset 1 and 2
- SEC-SAXS data of active gelsolin
- SEC-SAXS data of gelsolin: actin complex
- SEC-SAXS data reduced of AIF
- Simultaneous iEEG and scalp hd-EEG data in humans
- Wistar rat hippocampus CA1 pyramidal cell morphologies – Extension with additional reconstructions (v1)





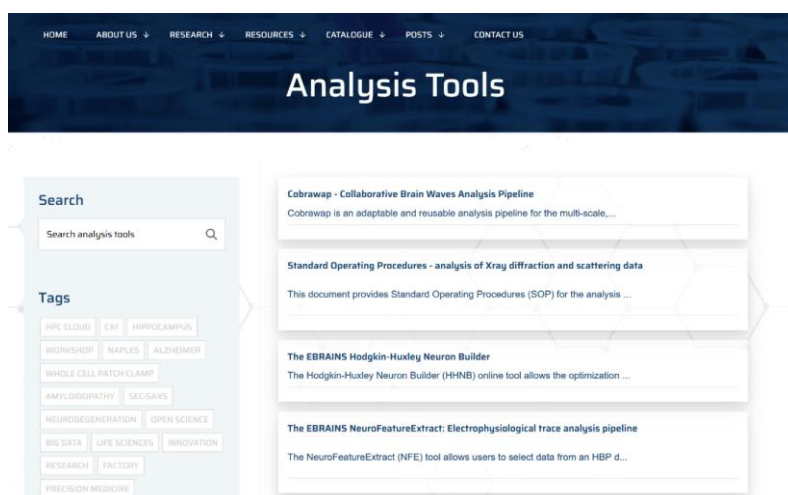
Models (<https://ebrains-italy.eu/resources/models>)

- A model of early altered excitability in ventral CA1 pyramidal neurons of TG2576 AD mice
- A model of presynaptic Kv7 channel function in hippocampal mossy fiber boutons
- ABSS
- CA1 Human hippocampus network for single point neuron simulations
- Collection of hippocampal CA1 pyramidal cell and interneuron models
- Kinetic scheme of inhibitory events
- Models of C.elegans motor neurons and interneurons
- NeuralFields.jl
- Perseus
- Scaffold model of mouse CA1 hippocampus
- Sequence learning in a single trial: a spiking neurons model based on hippocampal circuitry
- Stimulations on cortical field
- Target based learning in network of multi-compartment neurons with apical amplification
- Two-Compartment neuron with apical-amplification (wake), -isolation (NREM) and -drive (REM), -drive (REM)








Analysis Tools (<https://ebrains-italy.eu/resources/analysis-tools>)

- The EBRAINS NeuroFeatureExtract: Electrophysiological trace analysis pipeline
- The EBRAINS Hodgkin-Huxley Neuron Builder
- Cobrawap - Collaborative Brain Waves Analysis Pipeline
- Standard Operating Procedures - analysis of Xray diffraction and scattering data



Facilities and use-cases (<https://www.ebrains-italy.eu/facilities>)

EBRAINS-Italy supports Trans-National Access (T-NA) to facilities offered by top-class neuroscience research Institutions in Italy. EBRAINS-Italy T-NA services aim to provide coordinated open, physical, and/or virtual access to facilities and services in the neuroscience field. This involves national and international stakeholders in advanced research, technology, innovation, and data services.

Operative Unit (OU)	Facility	Location
 CNR IBFa	Acceleration service	Palermo
 CNR IBFa, CNR IBFc	Cellular level simulation of the rat, mouse, and human Hippocampus under physiological and pathological conditions	Palermo
CINECA  CNR- IBFa (in house provider CINECA)	EBRAINS-Italy Resources (EIR) Allocation Program. HPC Resources on Galileo 100- LINELA- Submission form for open-science project proposals	Palermo
 CNR IBFb	Proteins production and characterization; identification of small molecules/drugs; extracellular vesicles engineering and production for drug delivery	Milan, Palermo
 CNR- ISASI	Magnetoencephalography (MEG) system integrated for biomedical applications	Naples
 INDa	Technologies and expertise for neuro-functional imaging	Florence
 INDa	Brain dynamics for in-silico simulations interfaced with structural imaging data	Rome
 CNR-ISTC	ETIC - EBRAINS Training and Innovation Centre	Rome
 CNR-ISTC + ALL	EBRAINS-Italy Advanced School in Computational Neuroscience and Neurorobotics	Rome
 INFN	Software tools and pipelines for the analysis and comparison of experimental and simulated brain activity	Rome
 ISS	Data driven large-scale models of cortical networks	Rome

Among the services of EBRAINS-Italy, the Allocation Program has been launched: EIR- EBRAINS-Italy Resources (<https://www.ebrains-italy.eu/survey>). Promoted by the CNR (National Research Council) – Institute of Biophysics, and in-house provider the CINECA, an Italian inter-university consortium, with cutting-edge hardware resources and highly- qualified personnel, the object of EIR is accelerating scientific discovery by providing high performance computing resources (HPC), data management, data analytics, storage systems and HPC services.

[HOME](#)
[ABOUT US](#)
[RESEARCH](#)
[RESOURCES](#)
[CATALOGUE](#)
[POSTS](#)
[CONTACT US](#)

EIR Allocation Program



Submission form for open-science project proposals

[APPLY NOW](#)

Is your research ready to expand?

To enhance the collaboration between the Italian and the global neuroscience community, all researchers and stakeholders can be considered eligible to apply to the EIR Allocation Program and access to HPC resources into Galileo 100 (CINECA).

EBRAINS-Italy is owner of 4 PB as active storage available for applicants, coming from at least one Italian institution/organization, that submit a project proposal.

Principal Investigators with Italian affiliation who are not part of the EBRAINS-Italy Consortium have to sign a scientific agreement with CNR-Institute of Biophysics.

Applicants can have a maximum of 2 approved projects running in the same period, while collaborators do not have any limitation in terms of approved projects they are members of.

Contact: rosanna.migliore@cnr.it <https://www.ebrains-italy.eu/>