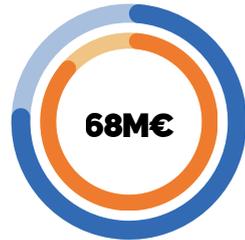# THE INSTITUTE

The Institute of Neurosciences of the University of Barcelona is a frontrunner in international neuroscience research, being one of the few institutes in the world that investigates the brain at every level. UBneuro was created under the premise to gather all research at the University of Barcelona that focused on a common goal: understanding the nervous system as a whole to give response to society challenges.

As a university research Institute, we support training of the neuroscience research workforce and disseminate timely and accurate information about neurological and mental disorders to the research community, physicians, patient associations and the public.

The Institute has been awarded with the María de Maeztu Unit of Excellence accreditation, and gathers more than 550 researchers from the University of Barcelona. We encourage and welcome collaboration with international research groups and organisations.

68M€

- **77%** National Projects
- **23%** International Projects
- **88%** Public Funding
- **12%** Private Funding

606 Articles **23** Patents **6** Spin-Off

ICREA

4 Research Professors **4** Academia Professors

erc European Research Council

1 Consolidator Grant **1** Proof of Concept Grant

MSCA

1 Doctoral Networks **7** Postdoctoral Fellowships

Total members 583

62% Women
38% Men

Institut de Neurociències
UNIVERSITAT DE BARCELONA

Institute of Neurosciences of the University of Barcelona

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EXCELENCIA MARÍA DE MAEZTU
2023 - 2026

María de Maeztu Unit of Excellence. CEX2021-001159_M. Ministerio de Ciencia, Innovación y Universidades. Institute of Neurosciences of the University of Barcelona.

UNIVERSITAT DE BARCELONA

Institute of Neurosciences of the University of Barcelona

ANNUAL REPORT 2024

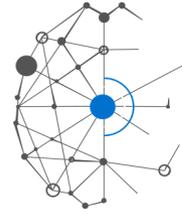**Institut de Neurociències**
UNIVERSITAT DE BARCELONA

EXCELENCIA MARÍA DE MAEZTU

Research Areas

Pathophysiology of Nervous System Diseases

Here we focus on defining the pathophysiological mechanisms involved in the loss of normal and neuronal plasticity related to these diseases.

A deeper understanding of neuronal connectivity and dynamics, signaling molecules, cell-cell interaction and epigenetic factors in the nervous system will enable us to devise new pharmacological targets for therapeutic strategies to prevent or delay nervous system diseases

Experimental Neurology

This area is focused on the study of the nervous system in normal conditions and during neurologic disorders.

This includes studies about the correlation between genetic markers, cerebrospinal fluid biomarkers and structural, functional and molecular imaging in patients with movement disorders, dementia, autoimmune synaptic disorders and other neurological diseases

Mental Health
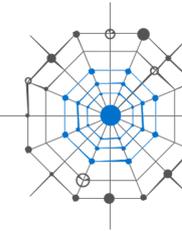
Under a multidisciplinary approach, the Institute actively embraces the challenge of advancing mental health knowledge around underlying neurobiological mechanisms, cognitive and daily life functioning. It also focuses on developing new treatments and therapies in psychotic and affective disorders in childhood, adolescence, and adulthood

Cognitive and Behavioural Neuroscience
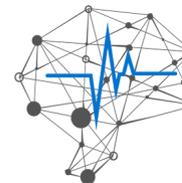
The focus is on the cerebral circuits, networks, processes and computational mechanisms that underpin a plethora of functions, such as perception, attention, memory, language, decision making, emotion... These functions are at the essence of cognition and give rise to the uniqueness of our human nature, a rich mental activity that can even generate the subjective phenomenon of consciousness

Outstanding Publications in 2024

Viana, D., Walston, S.T., Masvidal-Codina, E., Illa, X., Rodríguez-Meana, B., del Valle, J., Hayward, A., Dodd, A., Loret, T., Prats-Alfonso, E., de la Oliva, N., Palma, M., del Corro, E., de Pilar Bernicola, M., Rodríguez-Lucas, E., Gener, T., de la Cruz, J M., Torres-Miranda, M., Taygun Duvan, F., Ria, N., Sperling, J., Martí-Sánchez, S., Chiara Spadaro, M., Hébert, C., Savage, S., Arbiol, J., Guimerà, A., Puig, M. V., Yvert, B., Navarro, X., Kostarelos, K. & Garrido, J. A. Nanoporous graphene-based thin-film microelectrodes for in vivo high-resolution neural recording and stimulation. *Nature Nanotechnology* **19**, 514–523 (2024). https://doi.org/10.1038/s41565-023-01570-5

Granés, L., Essers, E., Ballester, J. Petricola, S., Tiemeier, H., Iñiguez, C., Soriano-Mas, C. & Guxns, M. Early life cold and heat exposure impacts white matter development in children. *Nature Climate Change* **14**, 760–766 (2024). https://doi.org/10.1038/s41558-024-02027-w

Wang, Y., Su, B., Xie, J. Garcia-Rizo, C. & Prieto-Alhambra, D. Long-term risk of psychiatric disorder and psychotropic prescription after SARS-CoV-2 infection among UK general population. *Nature Human Behaviour* **8**, 1076–1087 (2024). https://doi.org/10.1038/s41562-024-01853-4

Shen, Y. R., Zaballa, S., Bech, X., Sancho-Balsells, A., Rodríguez-Navarro, I., Cifuentes-Díaz, C.,Seyit-Bremer, G., Hee Chun, S., Straub, T., Abante, J., Merino-Valverde, I., Richart, L., Gupta, V., Li, H.-Y., Ballasch, I., Alcázar, N., Alberch, J., Canals, J. M., Abad, M., Serrano, M., Klein, R., Giralt, A. & del Toro, D. Expansion of the neocortex and protection from neurodegeneration by in vivo transient reprogramming. *Cell Stem Cell*, **31**, 1741–1759 (2024). https://doi.org/10.1016/j.stem.2024.09.013

Campoy-Campos, G., Solana-Balaguer, J., Guisado-Corcoll, A., Chicote-González, A., Garcia-Segura, P., Pérez-Sisqués, L., Torres, A. G., Canal, M., Molina-Porcel, L., Fernández-Irigoyen, J., Santamaría, E., Ribas de Pouplana, L., Alberch, J., Martí, E., Giralt, A., Pérez-Navarro, E. & Malagelada, C. RTP801 interacts with the tRNA ligase complex and dysregulates its RNA ligase activity in Alzheimer's disease. *Nucleic Acids Research* **52**, 11158–11176 (2024). https://doi.org/10.1093/nar/gkae776

Puighermanal, E., Luna-Sánchez, M., Gella, A., van der Walt, G., Urpi, A., Royo, M., Tena-Morraja, P., Appiah, I., de Donato, M. H., Menardy, F., Bianchi, P., Esteve-Codina, A., Rodríguez-Pascau, L., Vergara, C., Gómez-Pallarès, M., Marsicano, G., Bellocchio, L., Martinell, M., Sanz, E., Jurado, S., Soriano, F. X., Pizcueta, P. & Quintana, A. Cannabidiol ameliorates mitochondrial disease via PPARγ activation in preclinical models. *Nature Communications* **15**, 7730 (2024). https://doi.org/10.1038/s41467-024-51884-8

Ballasch, I., López-Molina, L., Galán-Ganga, M., Sancho-Balsells, A., Rodríguez-Navarro, I., Borràs-Pernas, S., Rabadan, M. A., Chen, W., Pastó-Pellicer, C., Flotta, F., Maoyu, W., Fernández-Irigoyen, J., Santamaría, E., Aguilar, R., Dobaño, C., Egri, N., Hernandez, C., Alfonso, M., Juan, M., Alberch, J., del Toro, D., Arranz, B., Canals, J. M. & Giralt, A. Alterations of the IKZF1–IKZF2 tandem in immune cells of schizophrenia patients regulate associated phenotypes. *Journal of Neuroinflammation* **21**, 326 (2024). https://doi.org/10.1186/s12974-024-03320-3

Pardo, J., Montal, V., Campabadal, A., Oltra, J., Uribe, C., Roura, I., Bargalló, N., Martí, M. J., Compta, Y., Iranzo, A., Fortea, J., Junqué, C. & Segura, B. Cortical macro- and microstructural changes in Parkinson's disease with probable rapid eye movement sleep behavior disorder. *Movement Disorders* **39**, 814–824 (2024). https://doi.org/10.1002/mds.29761

Outstanding Projects Granted in 2024

577,460 €
Refining iPSC-Based Spinal Cord Model Systems by Fabricating Developmentally Programmed Extracellular Matrix Cues
1R01AG086270-01 | National Institute of Health (NIH)
J. Alberto Ortega

551,142 €
Lighting the way towards in situ osteochondral regeneration throughmicroextrusion and filamented light bioprinting
101191804 | European Union
Josep M. Canals

406,250 €
Iluminando los trastornos relacionados con la dopamina: Adaptar la farmacoterapia a los oligómeros de GPCR
PID2023-147425OB-I00 | Ministerio de Ciencia e Innovación
Francisco Ciruela

394,629 €
Redes neuronales humanas diseñadas para el desarrollo de tareas de inteligencia artifical
CNS2023-143862 | Ministerio de Ciencia e Innovación
Daniel Tornero

350,000 €
Nuevos mecanismos patogénicos que alteran la integridad de la red neuronal para generar terapias modificadoras de la evolución de las enfermedades de los ganglios bas
PID2023-150728OB-I00 | Ministerio de Ciencia e Innovación
Jordi Alberch

325,786 €
Marcadores cerebrales de la representacion del "self" explican y predicen la emergencia de depresión futura en pacientes con dolor cronico
CNS2023-145425 | Ministerio de Ciencia e Innovación
Marina López-Solà

293,750 €
Estudio de la Interacción de RNAs pequeños Inmunogénicos y Sensores de RNAs en la Neuroinflamación: Perspectivas desde la Enfermedad de Huntington
PID2023-146279OB-I00 | Ministerio de Ciencia e Innovación
Eulàlia Martí

262,500 €
Mecanismos iónicos de la excitabilidad cerebral: canales de K+ de fuga y posibles dianas terapéuticas para enfermedades con hiperexcitabilidad neuronal
PID2023-148439OB-I00 | Ministerio de Ciencia e Innovación
Xavier Gasull

148,225 €
Deep Tech Brain: Virtual Reality, Artificial Intelligence, Neuroimaging and Neuromodulation
700081 | EIT tech talent
Rubén Perellón