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 450 researchers from the University of Barcelona. We encourage and welcome collaboration with international research groups and organisations.

69% National Projects
31% International Projects
87% Public Funding
13% Private Funding

635 Articles

4 CIBERs

21 Patents

6 Spin-Off

ICREA

4 Research Professors

6 Academia Professors

erc European Research Council

2 Advanced Grant

1 Consolidator Grant

MSCA

1 Doctoral Networks

6 Postdoctoral Fellowships

Total members 534

61% Women
39% Men

Institut de Neurociències
UNIVERSITAT DE 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.

Grant CEX2021-001159-M funded by:

UNIVERSITAT DE BARCELONA

Institute of Neurosciences of the University of Barcelona

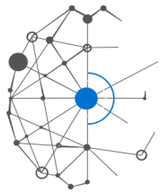
ANNUAL REPORT 2023

Institut de Neurociències
UNIVERSITAT DE BARCELONA

EXCELENCIA MARÍA DE MAEZTU

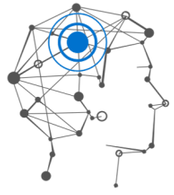
Research Areas

Pathophysiology of Nervous System Diseases



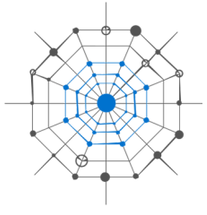
Here we focus on defining the pathophysiological mechanisms involved in the loss of normal and neuronal plasticity related to these diseases.
A deeper understanding of neuronal connectivity and dynamics, signaling molecules, cell-cell interaction and epigenetic factors in the nervous system will enable us to devise new pharmacological targets for therapeutic strategies to prevent or delay nervous system diseases

Experimental Neurology



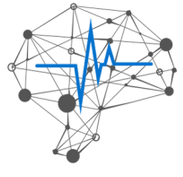
This area is focused on the study of the nervous system in normal conditions and during neurologic disorders. This includes studies about the correlation between genetic markers, cerebrospinal fluid biomarkers and structural, functional and molecular imaging in patients with movement disorders, dementia, 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 2023

1

Bonaventura, J., Boehm, M. A., Jedema, H. P., Solis, O., Pignatelli, M., Song, X., Lu, H., Richie, C. T., Zhang, S., Gomez, J. L., Lam, S., Morales, M., Gharbawie, O. A., Pomper, M. G., Stein, E. A., Bradberry, C. W., & Michaelides, M. (2023). **Expression of the excitatory opsin ChRERα can be traced longitudinally in rat and nonhuman primate brains with PET imaging.** *Science translational medicine*, 15(706), eadd1014. https://doi.org/10.1126/scitranslmed.add1014

2

Solana-Balaguer, J., Campoy-Campos, G., Martín-Flores, N., Pérez-Sisqués, L., Sitjà-Roqueta, L., Kucukerden, M., Gámez-Valero, A., Coll-Manzano, A., Martí, E., Pérez-Navarro, E., Alberch, J., Soriano, J., Masana, M., & Malagelada, C. (2023). **Neuron-derived extracellular vesicles contain synaptic proteins, promote spine formation, activate TrkB-mediated signalling and preserve neuronal complexity.** *Journal of extracellular vesicles*, 12(9), e12355. https://doi.org/10.1002/jev2.12355

3

Ballasch, I., García-García, E., Vila, C., Pérez-González, A., Sancho-Balsells, A., Fernández, J., Soto, D., Puigdellívol, M., Gasull, X., Alberch, J., Rodríguez, M. J., Canals, J. M., & Giralt, A. (2023). **Ikzf1 as a novel regulator of microglial homeostasis in inflammation and neurodegeneration.** *Brain, behavior, and immunity*, 109, 144–161. https://doi.org/10.1016/j.bbi.2023.01.016

4

Oltra, J., Habich, A., Schwarz, C. G., Nedelska, Z., Przybelski, S. A., Inguanzo, A., Diaz-Galvan, P., Lowe, V. J., Oppedal, K., Gonzalez, M. C., Philippi, N., Blanc, F., Barkhof, F., Lemstra, A. W., Hort, J., Padovani, A., Rektorova, I., Bonanni, L., Massa, F., Kramberger, M. G., … Ferreira, D. (2024). **Sex differences in brain atrophy in dementia with Lewy bodies.** *Alzheimer's & dementia : the journal of the Alzheimer's Association*, 20(3), 1815–1826. https://doi.org/10.1002/alz.13571

5

Martinez-Alvarez, A., Gervain, J., Koulaguina, E., Pons, F., & de Diego-Balaguer, R. (2023). **Prosodic cues enhance infants' sensitivity to nonadjacent regularities.** *Science advances*, 9(15), eade4083. https://doi.org/10.1126/sciadv.ade4083

6

Evans, F., Alí-Ruiz, D., Rego, N., Negro-Demontel, M. L., Lago, N., Cawen, F. A., Pannunzio, B., Sanchez-Molina, P., Reyes, L., Paolino, A., Rodríguez-Duarte, J., Pérez-Torrado, V., Chicote-González, A., Quijano, C., Marmisolle, I., Mulet, A. P., Schlapp, G., Meikle, M. N., Bresque, M., Crispo, M., … Peluffo, H. (2023). **CD300f immune receptor contributes to healthy aging by regulating inflammaging, metabolism, and cognitive decline.** *Cell reports*, 42(10), 113269. https://doi.org/10.1016/j.celrep.2023.113269

7

Ma, X., Johnson, D. A., He, X. J., Layden, A. E., McClain, S. P., Yung, J. C., Rizzo, A., Bonaventura, J., & Banghart, M. R. (2023). **In vivo photopharmacology with a caged mu opioid receptor agonist drives rapid changes in behavior.** *Nature methods*, 20(5), 682–685. https://doi.org/10.1038/s41592-023-01819-w

8

Grandjean, J., Desrosiers-Gregoire, G., Anckaerts, C., Angeles-Valdez, D., Ayad, F., Barrière, D. A., Blockx, I., Bortel, A., Broadwater, M., Cardoso, B. M., Célestine, M., Chavez-Negrete, J. E., Choi, S., Christiaen, E., Clavijo, P., Colon-Perez, L., Cramer, S., Daniele, T., Dempsey, E., Diao, Y., … Hess, A. (2023). **A consensus protocol for functional connectivity analysis in the rat brain.** *Nature neuroscience*, 26(4), 673–681. https://doi.org/10.1038/s41593-023-01286-8

Outstanding Projects Granted in 2023

1.900.285 €
Uncovering the human subcortical pathway for auditory threat detection (HumanSUBthreat)
ERC-2022-COG | European Union
Judith Dominguez

1.216.302 €
Molecular interactions of guidance receptors acting in early cortical development
226647/Z/22/Z | Wellcome Trust
Daniel Del Toro

611.572 €
Next Generation Glioma Treatments using Direct Light Therapy
HORIZON-EIC-2023-PATHFINDEROPEN-01 | European Union
Merce Masana

505.237 €
A toolset for hyper-realistic and XR-based human-human and human-machine interactions (PRESENCE)
HORIZON-CL4-2023-HUMAN-01-CNECT | European Union
Melvyn Slater

451.491 €
Somatic cell therapy (Mesenchymal Stem Cells)
CERT22/00038 | Ministerio de Ciencia e Innovación (MICINN)
Josep Maria Canals

300.000 €
Nuevas funciones de la reelina en el desarrollo neuronal y en la patogénesis de la enfermedad de Alzheimer
PID2022-138105OB-C21 | Ministerio de Ciencia e Innovación (MICINN)
Eduardo Soriano

281.250 €
Hacer que el aprendizaje profundo funcione en el mundo real: una perspectiva centrada en los datos
PID2022-141566NB-I00 | Ministerio de Ciencia e Innovación (MICINN)
Petia Ivanova

237.500 €
Nuevas perspectivas sobre el papel del receptor de imidazolina I2 en la neuroinflamación. Identificación y validación como diana para la enfermedad de Alzheimer
PID2022-138079OB-I00 | Ministerio de Ciencia e Innovación (MICINN)
Merce Pallas

218.125 €
Workplace Digital Mental Health Ecosystem - Evaluación Objetiva en Tiempo Real de la Funcionalidad y Salud Mental de los Trabajadores mediante IA y Psicometría, para Integrar la Gestión de Riesgos Psicosociales, Absentismo y Productividad (WD-MHE)
CPP2022-010001 | Ministerio de Ciencia e Innovación (MICINN)
David Gallardo

erc European Research Council

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