Molecular Neurodegeneration

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DESCRIPTION

The Molecular Neurodegeneration research line was formed in 2014 and was officially recognised as an emerging research group in 2022. Our focus is on the search for novel biomarkers and therapeutic targets to aid in the diagnosis and management of patients with neurodegenerative diseases and psychiatric disorders characterised by synaptopathy, employing techniques such as mass spectrometry, immunoassays, biochemical fractionation, and in vitro cell-based assays. The group is supported by national and international research and knowledge transfer grants, and our biomarkers are protected by a patent, licensed to ADx Neurosciences.

MAIN LINES OF RESEARCH

- Development and validation of fluid biomarkers of synapse degeneration in neurodegenerative diseases and psychiatric disorders characterised by synapse degeneration and dysfunction. (Belbin, Olivia Elizabeth).
- Omic approaches to understand the molecular basis of synapse degeneration in Alzheimer's disease. (Belbin, Olivia Elizabeth).
- Development of pathway-based polygenic risk scores to elucidate the genetic factors underlying Alzheimer's disease and use of in vitro cell-based assays to assess their function. (Belbin, Olivia Elizabeth).

SCIENTIFIC CHALLENGES

- Consolidating our own niche while maintaining synergy with the Neurobiology of Dementia research group.
- Maintain our scientific production and funding, prioritising the projects with higher impact.
- Establishing Tools for Early Detection of Alzheimer's disease through polygenic risk score.
- Incorporating Synaptic biomarkers into longitudinal studies and clinical trials through closer relations with pharma.
- Exploring synaptic biomarker utility in primary psychiatric disorders.
- Explore the effect of disease comorbidities on synaptic biomarkers.

ACTIVE & AWARDED GRANTS

- Belbin, Olivia Elizabeth. Prediagnostic early synaptic disturbances in neurodegenerative diseases. JPND2021-650-078. EU JOINT ACTIONS. Alteraciones preclíncas de sinapsis en enfermedades neurodegenerativas. AC21_2/00017. Instituto de Salud Carlos III (ISCIII). Duration: 2022-2024. 154.880,00 €
- Belbin, Olivia Elizabeth. Estudio traslacional de una predicción de riesgo poligénico y biomarcadores para la detección de la degeneración sináptica en la enfermedad de Alzheimer. PI21/00063. Instituto de Salud Carlos III (ISCIII). Duration: 2022-2024. 111.320,00 €
- Belbin, Olivia Elizabeth. Role of synaptic miRNA and astrocyte miRNA delivery in Alzheimer's disease. AARG-22-974373. Alzheimer's Association. Duration: 2022-2025. 141.222,50 €
- Belbin, Olivia Elizabeth. Validación de prototipos de inmunoensayos para la detección y seguimiento de sinaptopatía en biofluidos de pacientes con enfermedades neurodegenerativas y trastornos afectivos. DTS22/00111. Instituto de Salud Carlos III (ISCIII). Duration: 2023-2025. 84.700,00 €
- Belbin, Olivia Elizabeth. Grup de Recerca en Demències: Sant Pau. 2021 SGR 00979. Agència de Gestió d'Ajuts Universitaris i de Recerca (AGAUR). Duration: 2022-2025. 40.000,00 €.
- Belbin, Olivia Elizabeth. Evaluación de proteínas del complejo SNARE como biomarcadores en líquido cefalorraquídeo de la degeneración sináptica en cohortes de demencia con cuerpos de Lewy. PI24/00968. Instituto de Salud Carlos III (ISCIII). Duration: 2025-2027. 115.000,00 €
- Belbin, Olivia Elizabeth. Synapsing Mental Disorders and Neurodegenerative diseases: Towards more effective diagnosis and management of psychiatric symptoms.101156566. HORIZON-HLTH-2024-DISEASE-03-14-two-stage. European Union. Duration: 2024-2029. 1.014.147,61 €
- Cervantes González, Alba. Contratos PFIS 2022. FI22/00241. Instituto de Salud Carlos III (ISCIII). Duration: 2023-2026. 119.567,00 €
- Cervantes González, Alba. Proteínas sinápticas y lisosomales como biomarcadores en enfermedades neurodegenerativas. MV24/00054. Instituto de Salud Carlos III (ISCIII). Duration: 2025-2025. 20.700,00 €
- Lidon Gil, Laia. Contratos Sara Borrell 2024. CD24/00161. Instituto de Salud Carlos III (ISCIII). Duration: 2025-2027. 95.000,00 €

SCIENTIFIC PRODUCTION

- Fortea J, Pegueroles J, Alcolea D, Belbin O, Dols O, Vaqué L, Videla L, Gispert JD, Suárez M, Johnson SC, Sperling R, Bejanin A, Lleó A, Montal V. APOE4 homozygozity represents a distinct genetic form of Alzheimer's disease. NATURE MEDICINE. 2024; DOI:10.1038/s41591-024-02931-w. PMID:38710950. IF:58,700 (Q1/1D). Document type: Article.
- Jácome D, Cotrufo T, Andrés P, Lidón L, Martí E, Ferrer I, del Río JA, Gavín R. miR-519a-3p, found to regulate cellular prion protein during Alzheimer 's disease pathogenesis, as a biomarker of asymptomatic stages. BIOCHIMICA ET BIOPHYSICA

ACTA-MOLECULAR BASIS OF DISEASE. 2024; 1870(5):167187. DOI:10.1016/j.bbadis.2024.167187. PMID:38653354. IF:4,200 (Q1/2D). Document type: Article.

- Morcillo AO, Zsadanyi SE, Arriola JE, Carmona M, Montal V, Pegueroles J, Aranha MR, Vaque L, Padilla C, Benejam B, Videla L, Barroeta I, Fernández S, Altuna M, Giménez S, González S, Bargallo N, Ribas L, Arranz J, Torres S, Iulita MF, Belbin O, Camacho V, Alcolea D, Lleó A, Fortea J, Bejanin A. Characterization of white matter hyperintensities in Down syndrome. Alzheimers & Dementia. 2024; 20(9). DOI:10.1002/alz.14146. PMID:39087352. IF:13,000 (Q1/1D). Document type: Article.
- Sirisi S, Sánchez E, Belbin O, Lleó A. APP dyshomeostasis in the pathogenesis of Alzheimer's disease: implications for current drug targets. Alzheimers Research & Therapy. 2024; 16(1):144. DOI:10.1186/s13195-024-01504-w. PMID:38951839. IF:7,900 (Q1/1D). Document type: Review.
- Zsadanyi SE, Morcillo-Nieto AO, Aranha MR, Aragón I, Arriola-Infante JE, Vaqué-Alcázar L, Montal V, Pegueroles J, Arranz J, Rodríguez-Baz Í, Blesa LM, Videla L, Barroeta I, Del Hoyo Soriano L, Benejam B, Fernández S, Hernández AS, Bargallo N, González-Ortiz S, Giménez S, Alcolea D, Belbin O, Lleó A, Fortea J, Carmona-Iragui M, Bejanin A. Associations of Microbleeds and Their Topography With Imaging and CSF Biomarkers of Alzheimer Pathology in Individuals With Down Syndrome.Neurology. 2024; 103(4):e209676. DOI:10.1212/WNL.0000000000209676. PMID:39074338. IF:8,400 (Q1/1D). Document type: Article.