Molecular Physiology of the Synapse

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DESCRIPTION

The Molecular Physiology of the Synapse Laboratory is focused on understanding the organisation and dynamics of the proteome from synapses of the forebrain, particularly excitatory synapses from the cortex and hippocampus. We want to unravel how synaptic proteome physiology orchestrates synaptic plasticity, ultimately contributing to cognition and behaviour. Furthermore, we aim to understand how disruption of normal molecular synaptic physiology can contribute to specific disorders, particularly cognitive disorders such as Intellectual Disability or Autism.

MAIN LINES OF RESEARCH

- Molecular and cellular analyses of the vertebrate synapse (Bayés Puig, Alejandro).
- Molecular and cellular dysfunctions underlying intellectual disability and autism (Bayés Puig, Alejandro).
- Research into animal models of mental and behavioural disorders (Bayés Puig, Alejandro).
- Development of new biochemical methods to study the synapse (Bayés Puig, Alejandro).

SCIENTIFIC CHALLENGES

- Characterise the molecular roots of cognition and behaviour.
- Identify the synaptic molecules and mechanisms involved in mental and behavioural disorders, mainly intellectual disabilities and autism spectrum disorders.

- Identify drugs which might help treat mental and behavioural disorders.
- Study the reversibility of neurodevelopmental disorders affecting cognition after birth.

ACTIVE & AWARDED GRANTS

- Bayés Puig, Alejandro. La Sobre-activación de Camk2 Sustentaría las Disfunciones Sinápticas Observadas en la Encefalopatía Epiléptica SYNGAP1. PID2021-124411OB-I00. Ministerio de Ciencia e Innovación (MICINN). Duration: 2022-2026. 181.500,00 €
- Bayés Puig, Alejandro. Grup De Senyalització Sinàptica. 2021 SGR 01005. Agència de Gestió d'Ajuts Universitaris i de Recerca (AGAUR). Duration: 2022-2025. 40.000,00 €.
- Bayés Puig, Alejandro. Blood Cells as a New Resource for Clinical Research in SYNGAP1-realted Disorders. SEEDGRANT 2024. SynGAP Research Fundation. Duration: 2024-2025. 25.000,00 €

SCIENTIFIC PRODUCTION

- Jung K, Tristán A, Altankhuyag A, Belénguer DP, Prestegård KS, Fernández I, Baldeshi AC, Bondarenko MS, García A, Consiglio A, Martínez A. Tetrahydrobiopterin (BH₄) treatment stabilizes tyrosine hydroxylase: Rescue of tyrosine hydroxylase deficiency phenotypes in human neurons and in a knock-inmouse model. JOURNAL OF INHERITED METABOLIC DISEASE. 2024; 47(3). DOI:10.1002/jimd.12702. PMID:38196161. IF:4,200 (Q1/2D). Document type: Article.
- Ribeiro J, Tristán A, Calvo FFM, Ibañez S, Segura JLP, Ramos JM, Chicano MDM, León RC, Insuga VS, Alguacil EG, Davila CV, Fernández A, Plans L, Camacho A, Visa N, Blázquez MDMT, Paredes F, Martí I, Hernández A, Davi MT, Sánchez MC, Herraiz LC, Pita PF, González TB, O'Callaghan M, Santa Polonia F, Cazorla MR, Lucas MTF, González A, Sala J, Macaya A, Lasa A, Cueto AM, Parraga FV, Plana JC, Serrano M, Alonso X, Del Castillo D, Schwartz M, Illescas S, Camacho AR, Capdevila OS, García A, ALEX B, Alonso I. Developmental outcome of electroencephalographic findings in SYNGAP1 encephalopathy. Frontiers in Cell and Developmental Biology. 2024; 12:1321282. DOI:10.3389/fcell.2024.1321282. PMID:38505260. IF:4,600 (Q1/2D). Document type: Article.