

## Molecular Physiology of the Synapse

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### DESCRIPTION

The Molecular Physiology of the Synapse Laboratory is focused on understanding the organization 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 behavior. Furthermore, we pursue to understand how disruption of normal molecular synaptic physiology can contribute to certain disorders, particularly cognitive disorders such as Intellectual Disability or Autism.

### MAIN LINES OF RESEARCH

- Molecular and cellular analyses of the vertebrate synapse.
- Molecular and cellular dysfunctions underlying intellectual disability and autism.
- Research into animal models of mental and behavioral disorders.
- Development of new biochemical methods to study the synapse.

### SCIENTIFIC CHALLENGES

- Characterize 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.

## 5.1.3 Neurological Diseases, Neuroscience &amp; Mental Health Area

- Study the reversibility after birth of neurodevelopmental disorders affecting cognition.

**ACTIVE GRANTS**

- Bayes 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: 2022-2025. 181.500,00 €.
- Bayes Puig, Alejandro. Lithium as a Treatment to Improve Core Behavioural and Cognitive Symptoms of the Neurodevelopmental Disorder Caused by SYNGAP1. Asociación SYNGAP1 España. Duration: 2023-2023. 10.000,00 €.

**GRANTS AWARDED**

- Bayes 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 €.
- Tristan Noguero, Alba. EMBO Scientific Exchange Grant. Reference: 10326. Duration: 2023-2024. (UB).
- Tristan Noguero, Alba. Estancias de movilidad en el extranjero José Castillejo para jóvenes doctores. Reference: CAS22/00117. Duration: 2023-2024. (UB).

**SCIENTIFIC PRODUCTION**

- Adam AR, Martínez JA, van der Spek SJF, Sullivan PF, Smit AB, Hjerling J, Achsele T, Andrés M, Bagni C, ALEX B, Biederer T, Brose N, Chua J, Coba MP, Cornelisse LN, de Juan J, Goldschmidt HL, Gundelfinger ED, Haganir RL, Imig C, Jahn R, Jung HJ, Kaeser PS, Kim E, Koopmans F, Kreutz MR, Lipstein N, MacGillavry HD, McPherson PS, O'Connor V, Pielot R, Ryan TA, Sala C, Sheng MR, Smalla KH, Thomas PD, Toonen RF, van JRT, Verhage M, Verpelli C, SYNGO C. Transcriptional diversity in specific synaptic gene sets discriminates cortical neuronal identity. *Biology Direct*. 2023; 18(1):22. DOI:10.1186/s13062-023-00372-y. PMID:37161421. IF:5,500 (Q1/2D). Document type: Article.