

 Content archived on 2024-06-18



Molecular Analysis of Synaptic Dysfunctions Underlying Human Intellectual Disabilities

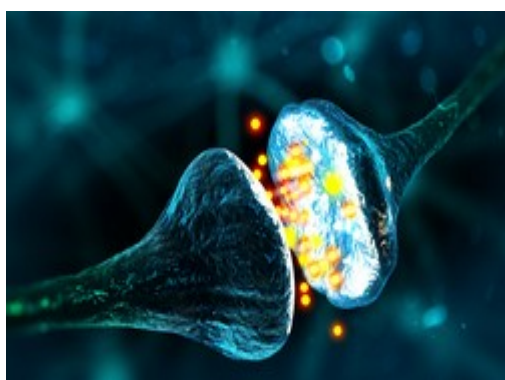
Results in Brief

Synaptic dysfunction and intellectual development

EU-funded scientists have investigated the role of synapse dysfunction in intellectual development and shed more light on the molecular mechanisms behind cognition.



HEALTH



© Andrii Vodolazhskyi, Shutterstock

The aim MASDUHID (Molecular analysis of synaptic dysfunctions underlying human intellectual disabilities) project was to understand the synaptic molecular dysfunction associated with intellectual disorders, especially non-syndromic intellectual disability (NSID).

Researchers attempted to identify proteins that can be used as pharmacological targets to treat intellectual disability and to determine the extent to which mental disorders can be reverted following birth.

A key resource for the project was mouse models of synaptic proteins associated with NSID, which were already available. These were used to study the synapse as a whole biological system and record the changes it undergoes as a result of disease.

Proteomics and bioinformatics were used to quantitatively analyse the synaptic proteome in control and model animals. By characterising disease related molecular disfunction it could be used to identify pharmacological targets and test drugs in animal models for phenotypic recovery.

To achieve these objectives researchers had to develop new techniques that would allow them to look at the synaptic proteome at a much lower scale. Therefore, a microproteomics protocol was developed based on the combined use of laser capture microdissected tissue, biochemical enrichment in synapses of microdissected tissue and mass spectrometry profiling.

These techniques enabled scientists to characterise the postsynaptic proteome of glutamatergic synapses and dentate gyrus in the mouse hippocampus. This enabled those proteins specific to the synapses of these regions to be identified, conferring upon them unique electrophysiological characteristics.

Researchers also studied the model of the autosomal intellectual disability caused by Synaptic Ras GTPase-activating protein 1 (SYNGAP1) haploinsufficiency. They analysed how the hippocampal synaptic proteome responded to reducing SYNGAP protein by half and then recovering it back using a combination of an inducible line and a rescue line of SYNGAP1 conditional knock-out mouse line.

Results from MASDUHID will help to identify the developmental stages from where intellectual recovery is possible. This will be an important factor as pharmacological treatment becomes available.

Keywords

[Synapse](#)

[MASDUHID](#)

[non-syndromic intellectual disability](#)

[microproteomics](#)

[Synaptic Ras GTPase-activating protein 1](#)

Discover other articles in the same domain of application



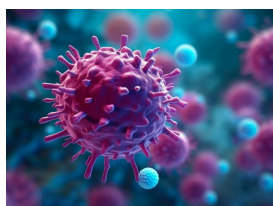
Deep learning to the rescue for chronic lower back pain

6 October 2023



Follow-up and screening to improve the health of children who are born before 32 weeks of pregnancy

6 September 2019



Solving the problem of exhausted cancer-fighting cells

17 November 2023



The ADHD brain retrained

17 September 2018



Project Information

MASDUHID

Funded under

Grant agreement ID: 304111

Project closed

Start date

2 May 2012

End date

1 May 2016

Specific programme "People" implementing the Seventh Framework Programme of the European Community for research, technological development and demonstration activities (2007 to 2013)

Total cost

€ 100 000,00

EU contribution

€ 100 000,00

Coordinated by

INSTITUT DE RECERCA DE
L'HOSPITAL DE LA SANTA CREU
I SANT PAU FUNDACION



Spain

Last update: 17 January 2017

Permalink: <https://cordis.europa.eu/article/id/190889-synaptic-dysfunction-and-intellectual-development>

European Union, 2025