

Animal Model

CHL1 $-/-$ mice: a model for studying the function of the close homologue of adhesion molecule L1

Reference Number 21-00013c

Abstract

Challenge

Genetically modified animals are essential research tools in modern neuroscience, since they allow researchers to study the role of specific genes in pathological processes leading to neurodegenerative diseases. The close homologue of L1 (CHL1), a member of the L1 family of cell adhesion molecules, is abundantly expressed by neurons and glia cells in the brain and promotes neurite elongation and neurite survival in vitro. CHL1 has also been shown to interact with synaptic chaperones (Hsc70, CSP, SGT) and may act as a chaperone itself. Furthermore, a single nucleotide polymorphism in CHL1 has been linked to schizophrenia in a Han Chinese population.

Localization of CHL1 in the hippocampus (immunohistochemistry). Red: CHL1. Green: polysialic acid. Yellow: overlay of CHL1 and polysialic acid. Blue: DAPI staining of nuclei.

Technology

CHL1 $-/-$ mice were generated by inactivating the Chl1 gene via homologous recombination in embryonic stem cells and creating transgenic mice. In the brains of CHL1 $-/-$ animals alterations of the hippocampal mossy fiber organization and olfactory axon projections were found. Furthermore, in CHL1 $-/-$ mice the brain ventricle size is increased and the cerebellar structure is subtly altered. Although the knock-out mice did not differ from wild type animals with respect to general behaviour, life span or motor functions, significant differences were found in the open field, elevated plus maze and light-dark avoidance paradigms which indicate alterations in exploratory behaviour for CHL1 $-/-$ mice.

Commercial Opportunity

Breeding pairs are available under a Tangible Property License Agreement.

Further Reading

- Andreyeva et al.: CHL1 is a selective organizer of the presynaptic machinery chaperoning the SNARE complex. PLoS One. 2010 Aug 11;5(8):e12018.
- Montag-Sallaz et al.: Misguided axonal projections, neural cell adhesion molecule 180 mRNA upregulation and altered behavior in mice deficient for the close homolog of L1. Molecular and Cellular Biology, Nov 2002, pp. 7967-7981.
- Heyden et al.: Abnormal axonal guidance and brain anatomy in mouse mutants for the cell recognition molecules CHL1 and NrCAM. Neuroscience 2008 (155), pp. 221-233.
- Chen et al.: Case-control association study of the close homologue of L1 (CHL1) gene and schizophrenia in the Chinese population. Schizophrenia Research 73 (2005): 269-274.