

L1CAM

Neural cell adhesion molecule L1

Gene

L1CAM

Transmembrane protein member of the L1 protein family, encoded by the L1CAM gene. This protein, of 200-220 kDa, is a neuronal cell adhesion molecule with a strong implication in cell migration, adhesion, neurite outgrowth, myelination and neuronal differentiation.

It also plays a key role in treatment-resistant cancers due to its function. It was firstly identified in 1984 by Melitta Schachner who found the protein in post-mitotic mice neurons.

Mutations in the [L1CAM](#) gene are associated with X-linked hydrocephalus, a form of [congenital hydrocephalus](#). This gene is important for neuronal adhesion and migration, and its mutation can disrupt normal brain development.

Tai et al. (2019) identified the cell adhesion molecule L1CAM as integral to the mechanism by which chandelier cells establish subcellular compartment-specific innervation of pyramidal neurons in the mammalian cerebral cortex ¹⁾.

Unclassified

2: Date P, Ackermann P, Furey C, Fink IB, Jonas S, Khokha MK, Kahle KT, Deniz E. Visualizing flow in an intact CSF network using optical coherence tomography: implications for human congenital hydrocephalus. *Sci Rep*. 2019 Apr 17;9(1):6196. doi: 10.1038/s41598-019-42549-4. PubMed PMID: 30996265.

3: Sasaki A, Hirato J, Hirose T, Fukuoka K, Kanemura Y, Hashimoto N, Kodama Y, Ichimura K, Sakamoto H, Nishikawa R. Review of ependymomas: assessment of consensus in pathological diagnosis and correlations with genetic profiles and outcome. *Brain Tumor Pathol*. 2019 Mar 30. doi: 10.1007/s10014-019-00338-x. [Epub ahead of print] PubMed PMID: 30929114.

4: Emmert AS, Vuong SM, Shula C, Lindquist D, Yuan W, Hu YC, Mangano FT, Goto J. Characterization of a novel rat model of X-linked hydrocephalus by CRISPR-mediated mutation in L1cam. *J Neurosurg*. 2019 Feb 8:1-14. doi: 10.3171/2018.10.JNS181015. [Epub ahead of print] PubMed PMID: 30738385.

5: Choi E, Kim SI, Won JK, Chung CK, Kim SK, Choi SH, Choi S, Han B, Ahn B, Im SW, Park SH. Clinicopathological and molecular analysis of multinodular and vacuolating neuronal tumors of the cerebrum. *Hum Pathol*. 2019 Apr;86:203-212. doi: 10.1016/j.humpath.2018.11.028. Epub 2018 Dec 11. PubMed PMID: 30550736.

6: Erhart F, Blauensteiner B, Zirkovits G, Printz D, Soukup K, Klingensbrunner S, Fischhuber K, Reitermaier R, Halfmann A, Lötsch D, Spiegl-Kreinecker S, Berger W, Visus C, Dohnal A. Gliomasphere marker combinatorics: multidimensional flow cytometry detects CD44+/CD133+/ITGA6+/CD36+ signature. *J Cell Mol Med*. 2019 Jan;23(1):281-292. doi: 10.1111/jcmm.13927. Epub 2018 Nov 22. PubMed PMID: 30467961; PubMed Central PMCID: PMC6307809.

7: Wachowiak R, Krause M, Mayer S, Peukert N, Suttikus A, Müller WC, Lacher M, Meixensberger J, Nestler U. Increased L1CAM (CD171) levels are associated with glioblastoma and metastatic brain tumors. *Medicine (Baltimore)*. 2018 Sep;97(38):e12396. doi: 10.1097/MD.00000000000012396. PubMed PMID: 30235708; PubMed Central PMCID: PMC6160187.

8: Yoon MS, Koh CS, Lee J, Shin J, Kong C, Jung HH, Chang JW. Injecting NMDA and Ro 25-6981 in insular cortex induce neuroplastic changes and neuropathic pain-like behaviour. *Eur J Pain*. 2018 Oct;22(9):1691-1700. doi: 10.1002/ejp.1254. Epub 2018 Jul 2. PubMed PMID: 29862605.

9: Abe K, Katsuno H, Toriyama M, Baba K, Mori T, Hakoshima T, Kanemura Y, Watanabe R, Inagaki N. Grip and slip of L1-CAM on adhesive substrates direct growth cone haptotaxis. *Proc Natl Acad Sci U S A*. 2018 Mar 13;115(11):2764-2769. doi: 10.1073/pnas.1711667115. Epub 2018 Feb 26. PubMed PMID: 29483251; PubMed Central PMCID: PMC5856512.

10: Malgulwar PB, Nambirajan A, Pathak P, Faruq M, Rajeshwari M, Singh M, Suri V, Sarkar C, Sharma MC. C11orf95-RELA fusions and upregulated NF-KB signalling characterise a subset of aggressive supratentorial ependymomas that express L1CAM and nestin. *J Neurooncol*. 2018 May;138(1):29-39. doi: 10.1007/s11060-018-2767-y. Epub 2018 Jan 22. PubMed PMID: 29354850.

11: Wallis M, Baumer A, Smaili W, Jaouad IC, Sefiani A, Jacobson E, Bowyer L, Mowat D, Rauch A. Surprisingly good outcome in antenatal diagnosis of severe hydrocephalus related to CCDC88C deficiency. *Eur J Med Genet*. 2018 Apr;61(4):189-196. doi: 10.1016/j.ejmg.2017.12.002. Epub 2017 Dec 7. PubMed PMID: 29225145.

12: Kim SI, Lee Y, Kim SK, Kang HJ, Park SH. Aggressive Supratentorial Ependymoma, RELA Fusion-Positive with Extracranial Metastasis: A Case Report. *J Pathol Transl Med*. 2017 Nov;51(6):588-593. doi: 10.4132/jptm.2017.08.10. Epub 2017 Nov 15. PubMed PMID: 29161788; PubMed Central PMCID: PMC5700879.

13: Onishi S, Yamasaki F, Nakano Y, Takayasu T, Amatya VJ, Kolakshyapati M, Takeshima Y, Hirose T, Ichimura K, Sugiyama K, Kurisu K. RELA fusion-positive anaplastic ependymoma: molecular characterization and advanced MR imaging. *Brain Tumor Pathol*. 2018 Jan;35(1):41-45. doi: 10.1007/s10014-017-0301-0. Epub 2017 Oct 11. PubMed PMID: 29063976.

14: Hirose T, Nobusawa S, Sugiyama K, Amatya VJ, Fujimoto N, Sasaki A, Mikami Y, Kakita A, Tanaka S, Yokoo H. Astroblastoma: a distinct tumor entity characterized by alterations of the X chromosome and MN1 rearrangement. *Brain Pathol*. 2018 Sep;28(5):684-694. doi: 10.1111/bpa.12565. Epub 2017 Nov 9. PubMed PMID: 28990708.

15: Garbuzova-Davis S, Ehrhart J, Sanberg PR. Cord blood as a potential therapeutic for amyotrophic lateral sclerosis. *Expert Opin Biol Ther*. 2017 Jul;17(7):837-851. doi: 10.1080/14712598.2017.1323862. Epub 2017 May 8. Review. PubMed PMID: 28443372.

16: Oprych K, Cotfas D, Choi D. Common olfactory ensheathing glial markers in the developing human olfactory system. *Brain Struct Funct*. 2017 May;222(4):1877-1895. doi: 10.1007/s00429-016-1313-y. Epub 2016 Oct 7. PubMed PMID: 27718014; PubMed Central PMCID: PMC5406434.

- 17: Morales DM, Silver SA, Morgan CD, Mercer D, Inder TE, Holtzman DM, Wallendorf MJ, Rao R, McAllister JP, Limbrick DD Jr. Lumbar Cerebrospinal Fluid Biomarkers of Posthemorrhagic Hydrocephalus of Prematurity: Amyloid Precursor Protein, Soluble Amyloid Precursor Protein α , and L1 Cell Adhesion Molecule. *Neurosurgery*. 2017 Jan 1;80(1):82-90. doi: 10.1227/NEU.0000000000001415. PubMed PMID: 27571524; PubMed Central PMCID: PMC5326702.
- 18: Winston CN, Goetzl EJ, Akers JC, Carter BS, Rockenstein EM, Galasko D, Masliah E, Rissman RA. Prediction of conversion from mild cognitive impairment to dementia with neuronally derived blood exosome protein profile. *Alzheimers Dement (Amst)*. 2016 May 7;3:63-72. doi: 10.1016/j.dadm.2016.04.001. eCollection 2016. PubMed PMID: 27408937; PubMed Central PMCID: PMC4925777.
- 19: Burgett ME, Lathia JD, Roth P, Nowacki AS, Galileo DS, Pugacheva E, Huang P, Vasanji A, Li M, Byzova T, Mikkelsen T, Bao S, Rich JN, Weller M, Gladson CL. Direct contact with perivascular tumor cells enhances integrin $\alpha v \beta 3$ signaling and migration of endothelial cells. *Oncotarget*. 2016 Jul 12;7(28):43852-43867. doi: 10.18632/oncotarget.9700. PubMed PMID: 27270311; PubMed Central PMCID: PMC5190064.
- 20: Ortega E, Muñoz RI, Luza N, Guerra F, Guerra M, Vio K, Henzi R, Jaque J, Rodriguez S, McAllister JP, Rodriguez E. The value of early and comprehensive diagnoses in a human fetus with hydrocephalus and progressive obliteration of the aqueduct of Sylvius: Case Report. *BMC Neurol*. 2016 Apr 11;16:45. doi: 10.1186/s12883-016-0566-7. PubMed PMID: 27067115; PubMed Central PMCID: PMC4828774.
- 21: Liu H, Song Z, Liao D, Zhang T, Liu F, Zheng W, Luo K, Yang L. miR-503 inhibits cell proliferation and invasion in glioma by targeting L1CAM. *Int J Clin Exp Med*. 2015 Oct 15;8(10):18441-7. eCollection 2015. PubMed PMID: 26770450; PubMed Central PMCID: PMC4694350.
- 22: Li C, Zhang YX, Yang C, Hao F, Chen SS, Hao Q, Lu T, Qu TY, Zhao LR, Duan WM. Intraventricular administration of endoneuraminidase-N facilitates ectopic migration of subventricular zone-derived neural progenitor cells into 6-OHDA lesioned striatum of mice. *Exp Neurol*. 2016 Mar;277:139-149. doi: 10.1016/j.expneurol.2015.12.017. Epub 2015 Dec 24. PubMed PMID: 26724216.
- 23: Yamasaki M, Kanemura Y. Molecular Biology of Pediatric Hydrocephalus and Hydrocephalus-related Diseases. *Neurol Med Chir (Tokyo)*. 2015;55(8):640-6. doi: 10.2176/nmc.ra.2015-0075. Epub 2015 Jul 31. Review. PubMed PMID: 26227058; PubMed Central PMCID: PMC4628154.
- 24: Kubelt C, Hattermann K, Sebens S, Mehdorn HM, Held-Feindt J. Epithelial-to-mesenchymal transition in paired human primary and recurrent glioblastomas. *Int J Oncol*. 2015;46(6):2515-25. doi: 10.3892/ijo.2015.2944. Epub 2015 Mar 31. PubMed PMID: 25845427.
- 25: Stumpel C, Vos YJ. L1 Syndrome. 2004 Apr 28 [updated 2015 Mar 5]. In: Adam MP, Ardinger HH, Pagon RA, Wallace SE, Bean LJH, Stephens K, Amemiya A, editors. *GeneReviews®* [Internet]. Seattle (WA): University of Washington, Seattle; 1993-2019. Available from <http://www.ncbi.nlm.nih.gov/books/NBK1484/> PubMed PMID: 20301657.
- 26: Wang TC, Luo SJ, Lin CL, Chang PJ, Chen MF. Modulation of p75 neurotrophin receptor under hypoxic conditions induces migration and invasion of C6 glioma cells. *Clin Exp Metastasis*. 2015 Jan;32(1):73-81. doi: 10.1007/s10585-014-9692-z. Epub 2014 Dec 20. PubMed PMID: 25527128.
- 27: Maheu ME, Davoli MA, Turecki G, Mechawar N. Amygdalar expression of proteins associated with neuroplasticity in major depression and suicide. *J Psychiatr Res*. 2013 Mar;47(3):384-90. doi: 10.1016/j.jpsychires.2012.11.013. Epub 2012 Dec 20. PubMed PMID: 23260340.

- 28: Sharma A, Pollett MA, Plant GW, Harvey AR. Changes in mRNA expression of class 3 semaphorins and their receptors in the adult rat retino-collicular system after unilateral optic nerve injury. *Invest Ophthalmol Vis Sci*. 2012 Dec 19;53(13):8367-77. doi: 10.1167/iovs.12-10799. PubMed PMID: 23139269.
- 29: Held-Feindt J, Schmelz S, Hattermann K, Mentlein R, Mehdorn HM, Sebens S. The neural adhesion molecule L1CAM confers chemoresistance in human glioblastomas. *Neurochem Int*. 2012 Dec;61(7):1183-91. doi: 10.1016/j.neuint.2012.08.011. Epub 2012 Aug 28. PubMed PMID: 22948185.
- 30: Tang X, Yao Y, Zhu J, Jin K, Wang Y, Mao Y, Zhou L. Differential proliferative index of cancer stem-like cells in primary and recurrent medulloblastoma in human. *Childs Nerv Syst*. 2012 Nov;28(11):1869-77. doi: 10.1007/s00381-012-1856-z. Epub 2012 Jul 20. PubMed PMID: 22814953.
- 31: Torre ER, Gutekunst CA, Gross RE. Expression by midbrain dopamine neurons of Sema3A and 3F receptors is associated with chemorepulsion in vitro but a mild in vivo phenotype. *Mol Cell Neurosci*. 2010 Jun;44(2):135-53. doi: 10.1016/j.mcn.2010.03.003. Epub 2010 Mar 16. PubMed PMID: 20298787; PubMed Central PMCID: PMC2862895.
- 32: Madison RD, Sofroniew MV, Robinson GA. Schwann cell influence on motor neuron regeneration accuracy. *Neuroscience*. 2009 Sep 29;163(1):213-21. doi: 10.1016/j.neuroscience.2009.05.073. Epub 2009 Jun 6. PubMed PMID: 19505536; PubMed Central PMCID: PMC2728180.
- 33: Marino P, Norreel JC, Schachner M, Rougon G, Amoureux MC. A polysialic acid mimetic peptide promotes functional recovery in a mouse model of spinal cord injury. *Exp Neurol*. 2009 Sep;219(1):163-74. doi: 10.1016/j.expneurol.2009.05.009. Epub 2009 May 13. PubMed PMID: 19445935.
- 34: Zhang B, Wang RZ, Lian ZG, Song Y, Yao Y. Neurogenesis by activation of inherent neural stem cells in the rat hippocampus after cerebral infarction. *Chin Med Sci J*. 2009 Mar;24(1):41-5. PubMed PMID: 19382423.
- 35: Nakakimura S, Sasaki F, Okada T, Arisue A, Cho K, Yoshino M, Kanemura Y, Yamasaki M, Todo S. Hirschsprung's disease, acrocallosal syndrome, and congenital hydrocephalus: report of 2 patients and literature review. *J Pediatr Surg*. 2008 May;43(5):E13-7. doi: 10.1016/j.jpedsurg.2007.12.069. Review. PubMed PMID: 18485929.
- 36: Song M, Kojima N, Hanamura K, Sekino Y, Inoue HK, Mikuni M, Shirao T. Expression of drebrin E in migrating neuroblasts in adult rat brain: coincidence between drebrin E disappearance from cell body and cessation of migration. *Neuroscience*. 2008 Mar 27;152(3):670-82. doi: 10.1016/j.neuroscience.2007.10.068. Epub 2008 Jan 19. PubMed PMID: 18304746.
- 37: Runyan SA, Roy RR, Zhong H, Phelps PE. L1 cell adhesion molecule is not required for small-diameter primary afferent sprouting after deafferentation. *Neuroscience*. 2007 Dec 19;150(4):959-69. Epub 2007 Oct 18. PubMed PMID: 18022323; PubMed Central PMCID: PMC2267744.
- 38: Bexell D, Gunnarsson S, Nordquist J, Bengzon J. Characterization of the subventricular zone neurogenic response to rat malignant brain tumors. *Neuroscience*. 2007 Jul 13;147(3):824-32. Epub 2007 Jun 20. PubMed PMID: 17583435.
- 39: Kanemura Y, Okamoto N, Sakamoto H, Shofuda T, Kamiguchi H, Yamasaki M. Molecular mechanisms and neuroimaging criteria for severe L1 syndrome with X-linked hydrocephalus. *J Neurosurg*. 2006 Nov;105(5 Suppl):403-12. PubMed PMID: 17328266.

- 40: Zhang B, Wang RZ, Lian ZG, Song Y, Yao Y. Experimental study on plasticity of proliferated neural stem cells in adult rats after cerebral infarction. *Chin Med Sci J*. 2006 Sep;21(3):184-8. PubMed PMID: 17086742.
- 41: Yamashima T, Popivanova BK, Guo J, Kotani S, Wakayama T, Iseki S, Sawamoto K, Okano H, Fujii C, Mukaida N, Tonchev AB. Implication of "Down syndrome cell adhesion molecule" in the hippocampal neurogenesis of ischemic monkeys. *Hippocampus*. 2006;16(11):924-35. PubMed PMID: 16983647.
- 42: Liu BF, Gao EJ, Zeng XZ, Ji M, Cai Q, Lu Q, Yang H, Xu QY. Proliferation of neural precursors in the subventricular zone after chemical lesions of the nigrostriatal pathway in rat brain. *Brain Res*. 2006 Aug 23;1106(1):30-39. doi: 10.1016/j.brainres.2006.05.111. Epub 2006 Jul 14. PubMed PMID: 16843444.
- 43: Seidenfaden R, Desoeuvre A, Bosio A, Virard I, Cremer H. Glial conversion of SVZ-derived committed neuronal precursors after ectopic grafting into the adult brain. *Mol Cell Neurosci*. 2006 May-Jun;32(1-2):187-98. Epub 2006 May 30. PubMed PMID: 16730456.
- 44: Izumoto S, Yoshimine T. [Role of neural cell adhesion molecule L1 in glioma invasion]. *Nihon Rinsho*. 2005 Sep;63 Suppl 9:74-8. Review. Japanese. PubMed PMID: 16201503.
- 45: Emery DL, Fulp CT, Saatman KE, Schütz C, Neugebauer E, McIntosh TK. Newly born granule cells in the dentate gyrus rapidly extend axons into the hippocampal CA3 region following experimental brain injury. *J Neurotrauma*. 2005 Sep;22(9):978-88. PubMed PMID: 16156713.
- 46: Runyan SA, Roy R, Zhong H, Phelps PE. L1 CAM expression in the superficial dorsal horn is derived from the dorsal root ganglion. *J Comp Neurol*. 2005 May 16;485(4):267-79. PubMed PMID: 15803510.
- 47: Suzuki T, Izumoto S, Fujimoto Y, Maruno M, Ito Y, Yoshimine T. Clinicopathological study of cellular proliferation and invasion in gliomatosis cerebri: important role of neural cell adhesion molecule L1 in tumour invasion. *J Clin Pathol*. 2005 Feb;58(2):166-71. PubMed PMID: 15677537; PubMed Central PMCID: PMC1770574.
- 48: Kumar R, Hayat S, Felts P, Bunting S, Wigley C. Functional differences and interactions between phenotypic subpopulations of olfactory ensheathing cells in promoting CNS Axon regeneration. *Glia*. 2005 Apr 1;50(1):12-20. PubMed PMID: 15599940.
- 49: Kapoor GS, Kapitonov D, O'Rourke DM. Transcriptional regulation of signal regulatory protein alpha1 inhibitory receptors by epidermal growth factor receptor signaling. *Cancer Res*. 2004 Sep 15;64(18):6444-52. PubMed PMID: 15374953.
- 50: Zhang B, Wang RZ, Li GL, Yao Y, Dou WC, Li SF, Tian SQ, Yin J. [Experimental study on the proliferation and plasticity of neural stem cells in situ in adult rats after cerebral infarction]. *Zhongguo Yi Xue Ke Xue Yuan Xue Bao*. 2004 Feb;26(1):8-11. Chinese. PubMed PMID: 15052766.
- 51: Messina DJ, Alder L, Tresco PA. Comparison of pure and mixed populations of human fetal-derived neural progenitors transplanted into intact adult rat brain. *Exp Neurol*. 2003 Dec;184(2):816-29. PubMed PMID: 14769374.
- 52: Emery DL, Royo NC, Fischer I, Saatman KE, McIntosh TK. Plasticity following injury to the adult central nervous system: is recapitulation of a developmental state worth promoting? *J Neurotrauma*. 2003 Dec;20(12):1271-92. Review. PubMed PMID: 14748977.

- 53: Hüttmann K, Sadgrove M, Wallraff A, Hinterkeuser S, Kirchhoff F, Steinhäuser C, Gray WP. Seizures preferentially stimulate proliferation of radial glia-like astrocytes in the adult dentate gyrus: functional and immunocytochemical analysis. *Eur J Neurosci*. 2003 Nov;18(10):2769-78. PubMed PMID: 14656326.
- 54: Roonprapunt C, Huang W, Grill R, Friedlander D, Grumet M, Chen S, Schachner M, Young W. Soluble cell adhesion molecule L1-Fc promotes locomotor recovery in rats after spinal cord injury. *J Neurotrauma*. 2003 Sep;20(9):871-82. PubMed PMID: 14577865.
- 55: Morel MP, Dusart I, Sotelo C. Sprouting of adult Purkinje cell axons in lesioned mouse cerebellum: "non-permissive" versus "permissive" environment. *J Neurocytol*. 2002 Sep-Nov;31(8-9):633-47. PubMed PMID: 14501204.
- 56: Marchionini DM, Collier TJ, Camargo M, McGuire S, Pitzer M, Sortwell CE. Interference with anoikis-induced cell death of dopamine neurons: implications for augmenting embryonic graft survival in a rat model of Parkinson's disease. *J Comp Neurol*. 2003 Sep 15;464(2):172-9. PubMed PMID: 12898610.
- 57: Izumoto S, Ohnishi T, Hirano SI, Hiraga S, Arita N. Neural Cell Adhesion Molecule L1 Promotes Regeneration of Injured Optic Nerve of Rats. *Restor Neurol Neurosci*. 1998;12(4):247-254. PubMed PMID: 12671295.
- 58: Rolf B, Lang D, Hillenbrand R, Richter M, Schachner M, Bartsch U. Altered expression of CHL1 by glial cells in response to optic nerve injury and intravitreal application of fibroblast growth factor-2. *J Neurosci Res*. 2003 Mar 15;71(6):835-43. PubMed PMID: 12605410.
- 59: Sato K, Iwai M, Nagano I, Shoji M, Abe K. Changes of localization of highly polysialylated neural cell adhesion molecule (PSA-NCAM) in rat hippocampus with exposure to repeated kindled seizures. *Brain Res*. 2002 Aug 16;946(2):323-7. PubMed PMID: 12137937.
- 60: Mathern GW, Leiphart JL, De Vera A, Adelson PD, Seki T, Neder L, Leite JP. Seizures decrease postnatal neurogenesis and granule cell development in the human fascia dentata. *Epilepsia*. 2002;43 Suppl 5:68-73. PubMed PMID: 12121298.
- 61: Romero MI, Rangappa N, Garry MG, Smith GM. Functional regeneration of chronically injured sensory afferents into adult spinal cord after neurotrophin gene therapy. *J Neurosci*. 2001 Nov 1;21(21):8408-16. PubMed PMID: 11606629.
- 62: Vitry S, Avellana-Adalid V, Lachapelle F, Baron-Van Evercooren A. Migration and multipotentiality of PSA-NCAM+ neural precursors transplanted in the developing brain. *Mol Cell Neurosci*. 2001 Jun;17(6):983-1000. PubMed PMID: 11414788.
- 63: Becker CG, Becker T, Meyer RL. Increased NCAM-180 immunoreactivity and maintenance of L1 immunoreactivity in injured optic fibers of adult mice. *Exp Neurol*. 2001 Jun;169(2):438-48. PubMed PMID: 11358457.
- 64: De Stefano ME, Leone L, Paggi P. Polysialylated neural cell adhesion molecule is involved in the neuroplasticity induced by axonal injury in the avian ciliary ganglion. *Neuroscience*. 2001;103(4):1093-104. PubMed PMID: 11301216.
- 65: Durbec P, Rougon G. Transplantation of mammalian olfactory progenitors into chick hosts reveals migration and differentiation potentials dependent on cell commitment. *Mol Cell Neurosci*. 2001 Mar;17(3):561-76. PubMed PMID: 11273650.

- 66: Hoyk Z, Parducz A, Theodosis DT. The highly sialylated isoform of the neural cell adhesion molecule is required for estradiol-induced morphological synaptic plasticity in the adult arcuate nucleus. *Eur J Neurosci*. 2001 Feb;13(4):649-56. PubMed PMID: 11207800.
- 67: Nomura T, Yabe T, Rosenthal ES, Krzan M, Schwartz JP. PSA-NCAM distinguishes reactive astrocytes in 6-OHDA-lesioned substantia nigra from those in the striatal terminal fields. *J Neurosci Res*. 2000 Sep 15;61(6):588-96. PubMed PMID: 10972955.
- 68: Moulding HD, Martuza RL, Rabkin SD. Clinical mutations in the L1 neural cell adhesion molecule affect cell-surface expression. *J Neurosci*. 2000 Aug 1;20(15):5696-702. PubMed PMID: 10908608.
- 69: Zhang Y, Roslan R, Lang D, Schachner M, Lieberman AR, Anderson PN. Expression of CHL1 and L1 by neurons and glia following sciatic nerve and dorsal root injury. *Mol Cell Neurosci*. 2000 Jul;16(1):71-86. PubMed PMID: 10882484.
- 70: Brezun JM, Daszuta A. Serotonin may stimulate granule cell proliferation in the adult hippocampus, as observed in rats grafted with foetal raphe neurons. *Eur J Neurosci*. 2000 Jan;12(1):391-6. PubMed PMID: 10651896.
- 71: Keirstead HS, Ben-Hur T, Rogister B, O'Leary MT, Dubois-Dalcq M, Blakemore WF. Polysialylated neural cell adhesion molecule-positive CNS precursors generate both oligodendrocytes and Schwann cells to remyelinate the CNS after transplantation. *J Neurosci*. 1999 Sep 1;19(17):7529-36. PubMed PMID: 10460259.
- 72: Dusart I, Morel MP, Wehrle R, Sotelo C. Late axonal sprouting of injured Purkinje cells and its temporal correlation with permissive changes in the glial scar. *J Comp Neurol*. 1999 Jun 7;408(3):399-418. PubMed PMID: 10340514.
- 73: Schmidt JT, Schachner M. Role for cell adhesion and glycosyl (HNK-1 and oligomannoside) recognition in the sharpening of the regenerating retinotectal projection in goldfish. *J Neurobiol*. 1998 Dec;37(4):659-71. PubMed PMID: 9858266.
- 74: Aubert I, Ridet JL, Schachner M, Rougon G, Gage FH. Expression of L1 and PSA during sprouting and regeneration in the adult hippocampal formation. *J Comp Neurol*. 1998 Sep 14;399(1):1-19. PubMed PMID: 9725697.
- 75: Becker T, Bernhardt RR, Reinhard E, Wullmann MF, Tongiorgi E, Schachner M. Readiness of zebrafish brain neurons to regenerate a spinal axon correlates with differential expression of specific cell recognition molecules. *J Neurosci*. 1998 Aug 1;18(15):5789-803. PubMed PMID: 9671667.
- 76: Tsuzuki T, Izumoto S, Ohnishi T, Hiraga S, Arita N, Hayakawa T. Neural cell adhesion molecule L1 in gliomas: correlation with TGF-beta and p53. *J Clin Pathol*. 1998 Jan;51(1):13-7. PubMed PMID: 9577364; PubMed Central PMCID: PMC500423.
- 77: Yazaki T, Martuza RL, Rabkin SD. Expression of L1 in primary astrocytes via a defective herpes simplex virus vector promotes neurite outgrowth and neural cell migration. *Brain Res Mol Brain Res*. 1996 Dec 31;43(1-2):311-20. PubMed PMID: 9037547.
- 78: Izumoto S, Yamasaki M, Arita N, Hiraga S, Ohnishi T, Fujitani K, Sakoda S, Hayakawa T. A new mutation of the L1CAM gene in an X-linked hydrocephalus family. *Childs Nerv Syst*. 1996 Dec;12(12):742-7. PubMed PMID: 9118141.
- 79: Izumoto S, Ohnishi T, Arita N, Hiraga S, Taki T, Hayakawa T. Gene expression of neural cell

adhesion molecule L1 in malignant gliomas and biological significance of L1 in glioma invasion. Cancer Res. 1996 Mar 15;56(6):1440-4. PubMed PMID: 8640837.

80: Kobayashi S, Miura M, Asou H, Inoue HK, Ohye C, Uyemura K. Grafts of genetically modified fibroblasts expressing neural cell adhesion molecule L1 into transected spinal cord of adult rats. Neurosci Lett. 1995 Mar 31;188(3):191-4. PubMed PMID: 7609906.

81: LaMotte CC, Kapadia SE, Arsenault K, Wolfe M. Deafferentation-induced expression of GAP-43, NCAM, and NILE in the adult rat dorsal horn following pronase injection of the sciatic nerve. Somatosens Mot Res. 1995;12(1):71-9. PubMed PMID: 7571944.

82: Liljelund P, Ghosh P, van den Pol AN. Expression of the neural axon adhesion molecule L1 in the developing and adult rat brain. J Biol Chem. 1994 Dec 30;269(52):32886-95. PubMed PMID: 7806515.

83: Yamanaka R, Tanaka R, Yoshida S. Effects of irradiation on the expression of the adhesion molecules (NCAM, ICAM-1) by glioma cell lines. Neurol Med Chir (Tokyo). 1993 Nov;33(11):749-52. PubMed PMID: 7506810.

84: van den Pol AN, Kim WT. NILE/L1 and NCAM-polysialic acid expression on growing axons of isolated neurons. J Comp Neurol. 1993 Jun 8;332(2):237-57. PubMed PMID: 8331215.

85: Hlavin ML, Lemmon V. Molecular structure and functional testing of human L1CAM: an interspecies comparison. Genomics. 1991 Oct;11(2):416-23. PubMed PMID: 1769655.

86: Tacke R, Martini R. Changes in expression of mRNA specific for cell adhesion molecules (L1 and NCAM) in the transected peripheral nerve of the adult rat. Neurosci Lett. 1990 Dec 11;120(2):227-30. PubMed PMID: 1705682.

87: Martini R, Schachner M. Immunoelectron microscopic localization of neural cell adhesion molecules (L1, N-CAM, and myelin-associated glycoprotein) in regenerating adult mouse sciatic nerve. J Cell Biol. 1988 May;106(5):1735-46. PubMed PMID: 2453520; PubMed Central PMCID: PMC2115039.

88: Sanes JR, Schachner M, Covault J. Expression of several adhesive macromolecules (N-CAM, L1, J1, NILE, uvomorulin, laminin, fibronectin, and a heparan sulfate proteoglycan) in embryonic, adult, and denervated adult skeletal muscle. J Cell Biol. 1986 Feb;102(2):420-31. PubMed PMID: 3511069; PubMed Central PMCID: PMC2114068.

1)

Hamnett R, Kaltschmidt JA. Chandelier Cells Swipe Right for L1CAM. Neuron. 2019 Apr 17;102(2):267-270. doi: 10.1016/j.neuron.2019.03.038. PubMed PMID: 30998894.

From:

<https://neurosurgerywiki.com/wiki/> - **Neurosurgery Wiki**

Permanent link:

<https://neurosurgerywiki.com/wiki/doku.php?id=l1cam>

Last update: **2024/08/13 09:46**

