Galectin-3

Galectin-3 is a protein that in humans is encoded by the LGALS3 gene.

Galectin-3 is a member of the lectin family, of which 14 mammalian galectins have been identified.

Galectin-3 is approximately 30 kDa and, like all galectins, contains a carbohydrate-recognition-binding domain (CRD) of about 130 amino acids that enable the specific binding of β-galactosides.

Galectin-3 (Gal-3) is also a member of the beta-galactoside-binding protein family that plays an important role in cell-cell adhesion, cell-matrix interactions, macrophage activation, angiogenesis, metastases, apoptosis.

Galectin-3 is encoded by a single gene, LGALS3, located on chromosome 14, locus q21–q22.

Galectin-3 is expressed in the nucleus, cytoplasm, mitochondrion, cell surface, and extracellular space.

Post-stroke neurological deficits and mortality are often associated with vascular disruption and neuronal apoptosis. Galectin-3 (Gal3) is a potent pro-survival and angiogenic factor. However, little is known about its protective role in cerebral ischemia-reperfusion injury.

Wesley et al. showed significant up-regulation of Gal3 in the post-stroke rat brain, and that blocking of Gal3 with neutralizing antibody decreases the cerebral blood vessel density. The current study demonstrates that intracerebral local delivery of the Gal3 into the rat brain at the time of reperfusion exerts neuroprotection. Ischemic lesion volume and neuronal cell death were significantly reduced as compared with the vehicle-treated MCAO rat brains. Gal3 increased vessel density and neuronal survival after I/R in rat brains. Importantly, Gal3-treated groups showed significant improvement in motor and sensory functional recovery. Gal3 increased neuronal cell viability under in vitro oxygen-glucose deprivation conditions in association with increased phosphorylated-Akt, decreased phosphorylated-ERK1/2, and reduced caspase-3 activity. Gene expression analysis showed downregulation of pro-apoptotic and inflammatory genes including Fas-ligand, and upregulation of pro-survival and pro-angiogenic genes including Bcl-2, PECAM, and occludin. These results indicate a key role for Gal3 in neuro-vascular protection and functional recovery following ischemic stroke through modulation of angiogenic and apoptotic pathways [1].

1)
Wesley UV, Sutton IC, Cunningham K, Jaeger JW, Phan AQ, Hatcher JF, Dempsey RJ. Galectin-3 protects against ischemic stroke by promoting neuro-angiogenesis via apoptosis inhibition and Akt/Caspase regulation. J Cereb Blood Flow Metab. 2021 Apr;41(4):857-873. doi: 10.1177/0271678×20931137. Epub 2020 Jun 17. PMID: 33736511.

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