

BBB-endothelial tight junction response to NG2 in murine model of chronic EAE

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The blood brain barrier (BBB) phenotype of brain endothelial cells (ECs) is the result of the influence and interaction from all the cell components of neurovascular unit (pericytes, astrocytes, oligodendrocytes, microglia, neurons) and basal lamina molecules. Pericyte-associated NG2, a transmembrane chondroitin sulphate proteoglycan, modulates EC proliferation and migration through its interaction with the involved cell growth factors and receptors (Fukushi et al., 2004). Our previous studies carried out on a model of cerebral cortex EAE (experimental autoimmune encephalomyelitis), induced by MOG in C57BL/6 mice, demonstrated the impairment of BBB-microvessels with dismantled tight junction (TJ) strands and scarce perivascular infiltrations (Errede et al., 2012). Interestingly, the datum of a minimal inflammatory infiltrate has been also reported in a model of EAE induced in knock-out mice for the proteoglycan NG2 (Kucharova et al., 2011). On the basis of these data, the present study was carried out on the same model of EAE to clarify the role of NG2 on ECs of brain microvessels, utilizing two groups of mice, wild type (WT) and homozygous NG2 KO (NG2^{-/-}). The expression of two integral proteins of the endothelial TJs, claudin-5 and occludin, the relevance of IBA1 reactive microglia cells and the level of BBB leakage by an exogenous permeability tracer, FITC-Dextran have been analyzed by immunohistochemistry and high resolution confocal microscopy. The results on the junctional staining pattern showed that unlike WT EAE, NG2 KO EAE microvessels were characterized by TJs continuous junctional strands with an unusual distribution of junctional proteins organized in honeycomb-like meshes. These findings suggest that NG2 proteoglycan can be directly implicated in pericyte/EC relations, including the mutual organization of TJ proteins in BBB- microvessels during neurological disease.

References

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Key words

Blood-brain barrier, claudin-5, occludin; NG2; EAE.