Vascular endothelial growth factor C

Emergence of dysmorphic neurons is the primary pathology in focal cortical dysplasia (FCD) associated pediatric intractable epilepsy; however, the etiologies related to the development and function of dysmorphic neurons are not fully understood.

Previous studies revealed that the expression of vascular endothelial growth factor-C (VEGF-C) and corresponding receptors VEGFR-2, VEGFR-3 was increased in the epileptic lesions of patients with tuberous sclerosis complex or mesial temporal lobe epilepsy.

Shen etal. showed that the expression of VEGF-C, VEGFR-2, and VEGFR-3 was increased at both mRNA and protein levels in patients with cortical lesions of type I, IIa, and IIb FCD. The immunoreactivity of VEGF-C, VEGFR-2 and VEGFR-3 was located in the micro-columnar neurons in FCD type I lesions, dysplastic neurons (DNs) in FCD type IIa lesions, balloon cells (BCs) and astrocytes in FCD type IIb lesions. Additionally, the amplitude of evoked-EPSCs (eEPSC) mediated by NMDA receptor, the ratio of NMDA receptor- and AMPA receptor-mediated eEPSC were increased in the dysmorphic neurons of FCD rats established by prenatal X-ray radiation. Furthermore, NMDA receptor mediated current in dysmorphic neurons was further potentiated by exogenous administration of VEGF-C, however, could be antagonized by ki8751, the blocker of VEGFR-2. These results suggest that VEGF-C system participate in the pathogenesis of cortical lesions in patients with FCD in association with modulating NMDA receptor-mediated currents [1)].

1)
Shen KF, Duan QT, Duan W, Xu SL, An N, Ke YY, Wang LT, Liu SY, Yang H, Zhang CQ. Vascular endothelial growth factor-C modulates cortical NMDA receptor activity in cortical lesions of young patients and rat model with focal cortical dysplasia. Brain Pathol. 2022 Mar 8:e13065. doi: 10.1111/bpa.13065. Epub ahead of print. PMID: 35259773.