

Systemic environment regulates central nervous system regeneration

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Central nervous system (CNS) inflammation causes severer neurological dysfunction due to the damage of neuronal network. Regeneration of neuronal network is important to recovery from neurological dysfunction, but the mechanism of neuronal regeneration is not fully elucidated. Remyelination is the essential process of regeneration of neuronal network in the CNS, and we recently reported that remyelination is regulated by the circulating factors which leaks into the CNS after injury. In this talk, I will introduce our recent research that systemic environment promotes oligodendrocyte maturation, which is the last process of remyelination. We found that circulating Transforming growth factor (TGF)-beta1, which is present in higher levels compared with that in the CNS, stimulates oligodendrocyte maturation. TGF-beta mainly expresses in spleen and platelet. In the toxin-induced demyelination model, we revealed that treatment with neutralizing antibodies against TGF-beta prevents spontaneous remyelination. Also, platelet depletion experiments shows the inhibition of spontaneous remyelination in same demyelination model. We found that TGF-beta treatment promotes expression of myelin-associated proteins in human oligodendrocyte culture. These data suggest the possibility that circulating TGF-beta is beneficial for treating demyelinating diseases.