

Elucidation of neurite outgrowth by Wnt5a Ca^{2+} -dependently produced in periodontal ligament cells

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Sensory nerves in the periodontal ligament (PDL) sense the occlusal pressure, and contribute to adjust the occlusal force. The occlusal mechanical stimulation is necessary for nerve maturation in the PDL (Miki et al., 2015). Since there is no report on the regulatory mechanisms of peripheral nerve elongation in PDL, we focused on the neurotrophic factors and axon guidance proteins produced from the mechanically stimulated PDL cells.

The primary rat PDL cells were seeded on silicon chamber, and loaded with periodic mechanical stimulation (0.5 Hz, 15% expansion). The supernatant media of the mechanically stimulated rPDL cells elongated the neurite of the mouse primary TG and Me5 cells which are primary afferents from the PDL cells. The qPCR analysis of the mechanical stimulated PDL cells revealed that the expression level of *Wnt5a* was increased. The depletion of extracellular Ca^{2+} and the addition of Cd^{2+} suppressed the increase of *Wnt5a*. Besides, the PDL cells expressed the TRP C family, TRPV1, 2, 4 and Piezo1/2. Ruthenium Red inhibited the increase of *Wnt5a*. These results suggest that the mechanically stimulated PDL cells produce Wnt5a in a Ca^{2+} dependent manner, and the Wnt5a elongates the axon.