

Periostin in a negative regulator of mineralization in the dental pulp tissue

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Abstrak

The dental pulp tissue is encased in hard tissue and surrounded by hard tissue-forming cells, but remains in a non-mineralized state itself, suggesting the presence of regulatory mechanisms precluding pulp mineralization. This study aimed to reveal the regulatory function of periostin (Postn), which is essential for osteoblast differentiation, for odontoblast differentiation/mineralization. We evaluated the effects of Postn overexpression and RNAi-mediated suppression in mouse dental papilla cells (MDPs) on the expression of odontoblastic markers and Notch signaling molecules, and on the formation of mineralized nodules. Localization of Postn in the dental pulp tissue of normal and cavity-prepared molars was observed immunohistologically. Enforced overexpression of Postn in MDPs induced down-regulation of odontoblastic markers and in vitro mineralization. Conversely, silencing of Postn mRNA in MDPs induced up-regulation of odontoblastic markers and ALP activity. Up- and down-regulation of Postn caused increased and decreased expression, respectively, of Notch signaling molecules. Postn expression was minimal in normal dental pulp, but was rapidly and globally increased in the whole pulp tissue of molar teeth at 1 day after cavity preparation, decreasing thereafter. These results indicate that Postn may be a negative regulator of odontoblast differentiation/mineralization, and that may exert its actions via Notch signals.