Adiponectin Stimulates Differentiation and Calcification in Preodontoblasts

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Abstract: Adiponectin is an adipocyte-specific hormone that plays an important role in glucose regulation via its receptors 1 (AR1) and 2 (AR2). Recently, it has been reported that adiponectin is expressed in primary osteoblasts and promotes cellular proliferation and differentiation. In this study, we investigated the role of adiponectin in the differentiation and calcification of preodontoblasts (MDPC-23) in order to examine the usefulness of adiponectin as a dental pulp capping agent. Expressions of adiponectin, AR1 and AR2, were observed in MDPC-23. Addition of adiponectin into medium significantly increased the proliferation and alkaline phosphatase (ALP) activity compared to those of control cells, and upregulated the expression of bone formation-related genes, such as osteocalcin and osteopontin. Furthermore, accelerated calcified nodule formation was found in adiponectin-treated cells after 8 days. Pretreatment with mitogen-activated protein (MAP) kinase inhibitors, SB20358 and SP600125, suppressed the increase of ALP activity, suggesting that the differentiation to odontoblasts is mediated via p38 and JNK signal transduction pathways. These results suggest that adiponectin stimulates the differentiation of preodontoblasts into odontoblasts via MAP kinase cascade and might be useful as a dental pulp capping agent.

Key words: Adiponectin, Odontoblasts, Calcification