1P-17
Analysis of the role of caspase-14 in ameloblast differentiation
Agasa Miyazono, Tetsuo Suzawa, Matsuo Yamamoto, Ryutaro Kamijo
1Department of Biochemistry, 2Department of Periodontology, Showa University School of Dentistry, Tokyo, Japan
*Contact author: agasa@dent.showa-u.ac.jp
Keywords: Caspase-14, Ameloblasts, Cell differentiation

Objective: Epithelial-derived cells of the enamel organ, ameloblasts, synthesize enamel. Little is known about the characteristics of ameloblasts themselves or the regulatory mechanism of ameloblast differentiation. Here we analyzed the gene expression profile with DNA microarray to identify the genes responsible for ameloblast differentiation.

Methods: The enamel epithelium was isolated from the lower incisors of 7-day old mice. After 3 days culture, ameloblasts were purified by EDTA, and the time point of this separation was considered to be day 0 of the ameloblast culture. cRNA prepared from these cells was applied to the DNA microarray system to analyze the gene expression profile. RT-PCR and real-time PCR analysis were performed to investigate time-dependent changes in the expression level of genes that are expressed specifically in ameloblasts.

Results: In DNA microarray analysis, we found that several genes related to keratinocyte differentiation were specifically expressed at high levels in the ameloblasts. Among them, the expression level of caspase-14 was markedly increased during the culture of ameloblasts, in parallel with the up-regulation of kallikrein 4 (KLK-4), a marker for mature ameloblasts, and down-regulation of amelogenin, a marker for immature ameloblasts. Furthermore, the expression level of caspase-14 was strongly up-regulated by vitamin D3. The expression level of amelogenin was suppressed by vitamin D3, whereas the expression of KLK-4 was enhanced by vitamin D3. Caspase-14 is a nonapoptotic caspase family member whose expression in the epidermis is confined to the suprabasal layers, which consist of differentiating keratinocytes. As reported previously, vitamin D3 treatment results in inhibition of proliferation and the induction of caspase-14 expression in keratinocytes. As ameloblasts are derived from undifferentiated epithelial cells, the differentiation of ameloblasts will likely behave identically to that of keratinocytes.

Conclusions: These results suggest that caspase-14 is likely to be involved in the differentiation and the cellular functions of ameloblasts.