C-6. Isolation and functional characterization of PDLs22 (UNCL) in tooth periodontium

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Background

Although biological functions of the PDL have been extensively investigated, little is known about the genes or molecules uniquely expressed in the tissue. Genes uniquely expressed by human periodontal ligament fibroblasts are likely to be associated with specific functions of the PDL. Using subtractive hybridization between cultured periodontal ligament fibroblasts and gingival fibroblasts, we isolated the cDNA fragments of PDLs22 (a *perio*d*o*ntal *l*igament-*s*pecific) as a periodontal ligament-specific cDNA that is not expressed in gingival fibroblasts. In this study, we aimed to investigate the expression and to uncover the function of PDLs22 during periodontium formation and tooth movement *in vivo* and *vitro*.

Methods

Total RNAs from PDL fibroblasts and gingival fibroblasts were isolated and a multi-tissue blot from 14 different rat tissues was also purchased from Seegene. Protein and total RNA was collected from cultured human PDL fibroblasts after 0, 4, 7, and 14 days for northern and western analysis. Tissue sections from prenatal and postnatal rats and cultured human PDL fibroblasts were analyzed by immunohistochemistry and immunofluorescence using anti-PDLs22 polyclonal antibody. Experimental tooth movement was performed for 2 and 6 days by the application of orthodontic force.

Results

The 777kb human PDLs22 cDNA encoded a 259 amino acid protein that was expressed in a wide variety of tissues with highest mRNA levels in PDL, brain, kidney, testis and placenta. PDLs22 mRNA and protein were expressed at the confluent stage and multilayer stage but decreased during the mineralization stage *in vitro*. PDLs22 was also exhibited a nuclear rim staining pattern in cultured PDL cells using immunofluorescent technique. PDLs22 mRNA and protein were strongly expressed not only in PDL fibroblasts but also precementoblasts and preosteoblasts during rat periodontium development *in vivo*. PDLs22 expression was increased after 6 days of tooth movement in rat periodontium.

Conclusion

The results suggest that PDLs22, human homologue of unc-50 related protein, may play important roles in the initial differentiation of cementum and alveolar bone of the periodontium and also in remodeling and regeneration of PDL cells during tooth movement.

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