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Periodontal Ligament Cells can regrow in a Translating Rat Species

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Description

Peridontal tissue is responsible for attaching teeth to the bone tissue of the jaws, as well as establishing homeostasis between tissues surrounding the teeth, which fluctuate with age and are also exposed to morphologic and functional changes caused by the oral environment. Inflammation of gingival pocket regions, followed by loss of periodontal tissues, particularly the periodontal ligament and alveolar bone, are the clinical hallmarks of periodontitis. Various surgical treatments have been recommended for years in order to assure tissue regeneration.

Regardless of the treatment utilised, epithelial tissues always proliferate faster into the defect than the underlying mesenchymal tissues, resulting in lengthy junctional epithelium attachment to the dentin root surface and the periodontal tissues' original shape and functions not being restored. Several studies have been conducted to better understand the process of periodontal regeneration, with results indicating that excluding epithelial and gingival connective tissue cells from the healing area may allow cells derived from the periodontal ligament to repopulate the root surface and regenerate periodontal tissues.

This notion has served as the foundation for the practical implementation of the "directed tissue regeneration" therapeutic paradigm. Dentin root surfaces have been conditioned with different agents to generate an environment suited for selective cell repopulation and subsequent matrix formation. Some growth and differentiation variables have also been studied in their application to root surfaces. However, further study is needed to determine the entire roles of these parameters as well as the procedure's predictability.

Various grafting materials have also been utilised and encouraged for the filling of defects, but their capacity to induce the development of new cementum and periodontal ligament is restricted, making them insufficient to induce periodontal regeneration. Despite decades of animal tests and human trials employing the regenerative techniques mentioned above, all evidence points to their failure to achieve complete and optimal periodontal tissue regeneration. One explanation might be because all therapies rely on cell growth from leftover tissue in the immediate area.

However, because the form of the defect and the quantity of remaining periodontal ligament tissue impact cell growth, full repopulation of the defect may not occur. Prevention of epithelial down growth into the defect and reconstruction of periodontal tissue without relying on cell migration from residual periodontal tissue are expected if cells with the ability to create new periodontal attachment apparatus are used to rapidly establish effective and sustained contact with the root dentin surface.

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For numerous convincing reasons, cells produced from periodontal ligament tissue would be an excellent cell source for periodontal regeneration *via* cell transplantation. First, there is mounting evidence that PDL cells play a key role in supporting periodontal regeneration. Cultured PDL cells have been proven to create a new periodontal tissue apparatus on root dentin surfaces and dental implants when administered in different scaffolds or in suspension.

These findings, however, demonstrate not only the potential for considerable periodontal regeneration, but also the possibility of unanticipated negative consequences, such as ankylosis. Because periodontal tissue is so complicated, direct cell transplantation will almost certainly necessitate more intricate arrangements in the tissue defect. In this paper, we describe a novel strategy for improving cell transplantation.

Using cell culture temperature and a surface-grafted temperature-responsive polymer, poly, we recently disclosed innovative approaches for controlling cell surface adherence. At 37°C, various types of cells attach, disseminate, and proliferate on the grafted surface in the same way they do on ungrafted tissue culture polystyrene surfaces. When the temperature of the culture is dropped below the lower critical solution temperature, however, cells detach and float free [1-5].

Future Prospective

When compared to identical cells recovered by proteolytic treatment, these entire contiguous cell sheets recovered solely by low-temperature treatment can escape trypsinization and preserve related extracellular matrix, cell–cell connections, and highly differentiated activities. PDL cell sheets placed onto denuded root dentin surfaces might potentially establish a new periodontal attachment apparatus. We present a case study of a periodontal regeneration treatment using this innovative cell-harvesting approach.

Conflict of Interest

None.

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