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The differentiation potential of stem cells isolated from deciduous teeth (SHED) and periodontal ligament stem cells (PDLSCs) in the presence of human platelet lysatet

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Background: New populations of stem cells were isolated from ligament tissue that surrounds the teeth (PDLSCs; Periodontal ligament stem cells) and from remnant pulp of primary teeth (SHED, stem cells from exfoliated deciduous teeth), by the enzymatic dissociation method. These cells are used to generate bio- root complex capable of supporting aporcelain crown, resulting in normal tooth function, repairing other dental tissues and neurons.

Methods: The cells were cultured in a medium containing 5% of platelet lysate (PL), as an alternative source for FBS to enhance the growth of these cells. The proliferation rates for these cells were measured by MTT assay. Cells were then induced for osteogenic, adipogenic, and neurogenic differentiation. Cultures were analyzed for morphology, growth characteristics, mineralization potential (Alizarin red stain method) and differentiation markers (alkaline phosphatase).

Results: Culture medium containing PL, significantly promoted the proliferation rates of SHED and PDLSCs, as indicated by MTT assay at day 72. For SHED, it was 55, 72, and 63% for negative control, FBS and 5% PL, respectively while that for PDLSC 67, 161 and 167%, respectively. These cells SHED and PDLSCs also promoted the mineralized potential by the measurement of alkaline phosphatase activity (0.44% 0.345 ALP unit/ml) respectively and calcium deposition under osteogenic media. These cells were able to form oil droplets as a result of adipogenic differentiation. However, these cells became neuron-like cells with distinct neuronal morphologies.

Conclusion: PL can be used as an alternative source for FBS in the expansion of dental stem cells for clinical use. These cells in reference to their neural crest origin, and their neurogenic differentiation potential, will be used to regenerate neurons.

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