

January 28-29, 2019

Barcelona, Spain

J Den Craniofac Res 2019, Volume 4
DOI: 10.21767/2576-392X-C1-015

Odonto/osteogenic differentiation and cytokine production by human stem cells of the apical papilla induced by biomaterials: A comparative study

Eshagh Ali Saberi

Zahedan University of Medical Sciences and Health Services, Iran

Introduction: Clinical applications of bioactive materials are increasing in biomedical tissue engineering. This study was sought to assess the effect of calcium enriched mixture (CEM) cement, biodentine, mineral trioxide aggregate (MTA), octacalcium phosphate (OCP) and Atlantik on proliferation, odontogenic/osteogenic differentiation and pro-inflammatory cytokine production by human stem cells of the apical papilla (SCAPs).

Methods: The SCAPs were cultured and exposed to CEM cement, Biodentine, MTA, OCP, Atlantik and no biomaterial (control group). Proliferation of SCAPs treated with different biomaterials was evaluated using trypan blue exclusion test and flow cytometry. Differentiation of cells was evaluated using alkaline phosphatase (ALP) activity, alizarin red staining and reverse transcription polymerase chain reaction (RT-PCR). The expression of genes of pro-inflammatory cytokines was also evaluated using RT-PCR.

Results: The SCAPs treated with 20 mg/mL CEM cement, 2 mg/mL Biodentine, 200 µg/mL OCP/MTA and 20 µg/mL Atlantik showed significantly higher proliferation, increased

ALP activity, higher number of calcified nodules and up-regulation of genes related to odontogenic/osteogenic markers [including ALP, runt-related transcription factor 2 (RUNX2), osterix (OSX), osteocalcin (OCN), bone sialoprotein (BSP) and dentin sialophosphoprotein (DSPP)] compared to the control group. The expression of pro-inflammatory cytokines namely interleukin (IL)-1 α , IL-1 β , IL-6 and tumor necrosis factor (TNF)- α significantly increased in all groups compared to the control group. The highest expression on day seven belonged to IL-1 α and IL-1 β in SCAPs treated with MTA, IL-6 in SCAPs treated with CEM cement, and TNF- α in SCAPs treated with Atlantik and OCP.

Conclusion: CEM cement, Biodentine, MTA, OCP and Atlantik can induce odontogenic/osteogenic differentiation in SCAPs. MTA had a greater potential to induce differentiation of SCAPs to odontoblast like cells while OCP had higher potential to induce differentiation of SCAPs to osteoblast-like cells.

drsamiyazied@gmail.com