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The effect of calcium silicate-based cements on viability and differentiation of human stem cells from the dental apical papilla.

Future aspects in endodontic regeneration.

Lahood Abdalla, Bagir Soltani
Principal Supervisor: Nelly Romani Vestman
Co-supervisor: Olena Rakhimova



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Abstract

Introduction:

Pulp necrosis in immature permanent teeth stops root development and may lead to higher risk of cervical fractures and a challenging treatment. Regenerative endodontic treatment (RET) aims to continue tooth development and implies the use of calcium silicate-based cements, such as Mineral trioxide aggregate (MTA) and Biodentine to seal the root canal. However, its effect on stem cells has been poorly explored.

Aims: Examine the effect of two different calcium silicate-based cements on the viability and the odonto-/osteogenic potential of Stem Cells from Apical Papilla (SCAP).

Material and method:

Isolated SCAPs from three healthy donors (donor I, II and III) were used and exposed for different concentration extracts of ProRoot® MTA and Biodentine™ for 21 days. Cell viability was studied using the neutral red cytotoxicity test. Osteogenic differentiation was analyzed by the alkaline phosphatase test (ALP).

Results:

No difference in SCAPs viability was detected by the type of cements used, Biodentine or ProRoot MTA. However, material concentration could be associated with cells cytotoxicity. Osteogenic differentiation was not based on the type of cement used but the environment conditions (aerobic/anaerobic) and the genetical background.

Conclusions:

The type of cement used in RET, Biodentine or MTA, showed similar effect on SCAPs viability and differentiation potential *in vitro*. Further studies should be performed to analyze their effect *-in -vivo*.