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Editorial

Regeneration Therapy: Editorial Note

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Necrosis of the root periapex and pulp is the usual consequence of carious decay. Its involves endodontic treatment. Recently, root and pulp regeneration were promoted. Indeed, a number of STEM cells may penetrate the canal, sliding from the periapex toward the lumen of the canal. Bone marrow mesenchymal stem cells (BMMSCs) give rise to osteogenic, chondrogenic, and adipogenic SC. In addition, myogenic, neurogenic and tenogenic cells may derived from BMMSCs. Markers that are consistently reported are STRO-1, CD73, CD90, CD105, CD146, Oct4, Nanog, beta2 integrin, whereas CD14, CD34, CD45, and HLA-DR display negative expression. Investigations of dental pulp regeneration have been published [1], isolating a side population (SP) of cells from dental pulp based on the efflux of fluorescent dye Hoechst 33342. These SP cells, derived from porcine dental pulp, differentiate into odontoblasts in response to BMP-2. Dental pulp stem cells (DPSC) are obtained from deciduous or exfoliated tooth, or from permanent teeth (SHED), from the apical papilla (SCAP), from cementum-like cells, from the periodontal ligament (PDL), and SC of the dental follicular sac. SC may differentiate and give rise to odontoblasts, dental follicle, periodontal ligament, osteoblasts, adipocytes, and neurons [2]. Despite most of the pulp canal cells are no more alive, the few that survive may dedifferentiate and contribute to pulp regeneration. Thickening of the dentin layer occurs within the root walls, together with the apical SC which contribute to the closure in an immature tooth. Apexogenesis provide lengthening of the root, and better anchorage inside the bonny socket (alveolar bone). Apexification induce the closure of the apex and contribute to heal and regenerate the pulp. MTA, calcium hydroxide, and/or Biodentine improve the mechanical properties of the dental root. From the multipotent mesenchymal stem cells a root-like structure with periodontal-ligament (PDL)-like tissue may be formed in a HA/TCP cylinder loaded with stem cells from the apical papilla (SCAP) and with PDL stem/progenitor cells. Showing the usefulness of DPSCs to produce putative dentin/cementum, PDL and alveolar bone complex. Scaffolds, growth factors such as the Basic Fibroblast Growth Factor, Transforming Growth Factor -β, Nerve Growth Factor, Platelet-Derived Growth Factor, Bone Morphogenetic Proteins and Stem Cells constitute tools for regeneration. Odontogenic differentiation of hDPSCs and periodontal ligament cells may be promoted when cultured on a decellularized extracellular matrix scaffold. Characterization of the ECM scaffold showed that it contains a rich source of matrix proteins, matrix metalloproteases and growth factors, having the capacity to regenerate roots and/or the radicular pulp. Subcutaneous implantation of these ECM scaffolds containing DPSCs showed the formation of dental pulp-like tissue with cells expressing DSP and dentin phosphophoryn (DPP). Angiogenesis and vasculogenesis acting as scaffolds, leads to regenerate the apical part of the tooth. This is also the case with IPS cells. These later express markers, forming embryoid bodies *in vitro* and teratoma *in vivo* [3].

Conclusion

Regeneration therapy is a promising tool and a potential substitute to endodontic treatment.

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