

## Tooth Regeneration with Stem Cell Sources

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#### Introduction:

During the last decade, advances in tissue engineering and stem cell-based tooth regeneration have provided realistic and attractive means of replacing lost or damaged teeth. The first adult stem cells isolated from dental tissues were dental pulp stem cells (DPSCs). When transplanted with hydroxyl apatite/tri calcium phosphate (HA/TCP) powder, they formed a dentin-like structure lined with odontoblast-like cells that surrounded a pulp-like interstitial tissue. DPSCs could differentiate in vitro into other mesenchymal cell derivatives such as odontoblasts, adipocytes, chondrocytes, and osteoblasts and could also differentiate into functionally active neurons. Mesenchymal stem cells (MSCs) have also been isolated from the dental pulp of human deciduous teeth. When these cells are transplanted mixed with HA/TCP in vivo, they can form dentin and bone but not dentin-pulp complexes. Stem cells from the apical papilla (SCAPs) are found in the papilla tissue in the apical part of the roots of developing teeth. The third molars and teeth with open apices are an important source of SCAPs. Transplantation of SCAPs and periodontal ligament stem cells (PDLSCs) into tooth sockets allowed the formation of dentin and periodontal ligament. Dental follicle stem cells (DFSCs) have also been isolated from the follicles of developing third molars. They can differentiate into osteoblasts, adipocytes, and nerve-like cells in vitro and form cementum and periodontal ligament in vivo.

#### Results:

Future therapeutic approaches for the restoration of damaged dentin, pulp, cementum, and periodontal ligaments may make use of autologous stem cells that have been stored after removal from the patient.

**Conclusion:**With regard to clinical application, these stem cells share the common obstacles of ethical concern arising from their embryonic origin, the risk of tumorigenesis, and the possibility of immune rejection after allogeneic transplantation.

**Keywords:** Tooth Regeneration, Stem Cell.

### Poster Presentation

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