# Dental Pulp Stem Cells Applications and its Functions

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Commentary

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## ABOUT THE STUDY

The soft living tissue inside teeth known as the dental pulp contains stem cells known as Dental Pulp Stem Cells (DPSCs). They are pluripotent because they can grow into formations that resemble Embryoid Bodies (EBs) in a lab setting and teratoma-like forms when injected into naked mice. DPSCs have the ability to differentiate *in vitro* into tissues that resemble the mesoderm, endoderm, and ectoderm layers. It was discovered that DPSCs can develop into neural-like cells and adipocytes. Researchers now have a non-invasive way to collect stem cells from teeth, including postnatal teeth, wisdom teeth, and deciduous teeth. DPSCs have thus been viewed as a very potential source of cells for endogenous tissue engineering.

According to studies, DPSCs proliferate at a rate that is 30% higher than that of other stem cells, such as Bone Marrow Stromal Stem Cells (BMSSCs). The primary cause of these DPSC traits is the presence of increased levels of cell cycling molecules, including Cyclin-Dependent Kinase 6 (CDK6), which is found in the dental pulp tissue. Furthermore, DPSCs are shown to be less immunogenic than MSCs.

A methodology for isolating and identifying the subpopulations of Dental Pulp Pluripotent-like Stem Cells (DPPSC). Based on genomic analysis using a newly described CGH approach, these cells have the following characteristics: $SSEA4^+$, $OCT3/4^+$, $NANOG^+$, $SOX2^+$, $LIN28^+$, $CD13^+$, $CD105^+$, $CD34^-$, $CD45^-$, $CD90^+$, $CD29^+$, $CD73^+$, $STRO1^+$, and $CD146^-$. They exhibit genetic stability *in vitro*.

The function of regenerative dentistry of the human mouth is susceptible to severe injuries, microbial infections, and craniofacial deformities. Although successful partial regeneration of dental tissues has been achieved in preclinical and clinical settings, it is still not yet viable to grow a full tooth from DPSCs.

### Distraction osteogenesis

A technique for bone regeneration known as Distraction Osteogenesis (DO) is frequently utilized in the surgical correction of significant craniofacial deformities. During surgery, the defect-containing area is intentionally shattered, given a brief period of healing, and then the bone segments are gradually separated until the defect has sufficiently healed. In a 2018 some researchers discovered that sirtuin-1 (SIRT1)-transfected DPSCs in rabbits were more successful at promoting bone growth during DO. After osteogenic development *in vitro*, SIRT1-modified DPSCs accumulated noticeably more calcium, pointing to DPSCs' potential contribution to improving DO effectiveness.

### Calcined tooth powder

Burning extracted teeth to make Calcine Tooth Powder (CTP) eliminates any potentially infectious material present in the tooth, leaving behind tooth ash. Bone repair has been demonstrated to be aided by tooth ash. Despite the fact that proliferative effects of Calcine Tooth Powder-Culture Media (CTP-CM) have not been demonstrated recently, these investigations have revealed that DPSCs grown in CTP-CM have much higher levels of osteo/odontogenic markers.

### Human exfoliated deciduous teeth stem cells

Human Exfoliated Deciduous Teeth (SHED) stem cells and Dental Pulp Stem Cells (DPSCs) are related in that both are derived from the dental pulp, but SHED is derived from baby teeth and DPSCs from adult teeth. As deciduous teeth either naturally shed or is surgically removed to allow for the appropriate establishment of permanent teeth, SHED are a population of multipotent stem cells that are simple to harvest. *In vitro*, these cells can develop into chondrocytes, odontoblasts, adipocytes, and osteoclasts. Recent research has demonstrated that SHED's proliferative powers are superior to those of dental pulp stem cells.