

## Harvesting of Stem Cell in Dental Tissue

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### ABSTRACT

In recent dentistry patients benefit from potentially life-saving therapies derived from a patient's own stem cells obtained from deciduous and permanent teeth. Stem Cells are the master cells they are hemtopoietic or mesenchymal that have potential to differentiate into 220 types of specialized cells. These cells are abundant in deciduous teeth, wisdom teeth, and permanent teeth. Stem cells help to treat number of diseases and disorders by tissue regeneration and repair. The Dental professionals play an important role in use of these stem cells in both Dental and Medical regenerative therapies.

**Key words:** Stem cell, dental tissue, parients, teeth.

### INTRODUCTION

Stem cells, generally harvested from umbilical cord blood or bone marrow, but recently, researchers have discovered that stem cells harvested from deciduous teeth they are unspecialized cells that have potential to differentiate into other types of cells, with specialized functions and help in treating a number of diseases, including diabetes, and brain and spinal cord injuries etc . It is observed the stem cell from the tooth is most powerful cells in human body because compare to the stem cell from other human body tissue the stem cell from tooth replicate at a faster rate and safe for a longer period of time. In elder age the ability to regenerative abilities slow down. Thus stem cells are secured in early life as they are more precious and be used when we needed most.

#### Selection criteria

1. Healthy pulp
2. Intact blood supply
3. Free from tooth decay ,or any pathology
4. Atraumatic
5. Aseptic

#### Selection of tooth

1. Stem cells from the human Deciduous tooth(SHED)
2. Wisdom tooth
3. Permenant tooth
4. Supernumerary tooth
5. Dental papilla
6. Periodontal ligament

#### Advantage

1. Good match for entire family
2. Nonimmunogenic
3. Communicable diseases can be avoided
4. Easy accessibility

Stem cells are not concentrated in particular area , but they are widely spread cellular zone adjacent to the nerve and blood vessels within the healthy pulp<sup>1</sup>.Stem cell is best to collect when patient is young and healthy as stem cells are at their most proliferative stage.

#### Deciduous teeth

Stem cells which are isolated from healthy pulp of deciduous teeth are highly proliferative and

regenerative, even when the pulp is recovered in small quantities<sup>3</sup>.

### Harvest Zone

Canine to canine is ideal for harvesting stem cells in deciduous tooth

### Inclusion criteria

1. Pulp should red in colour represents the blood supply<sup>2</sup>
2. canine or incisor ideal deciduous tooth
3. tooth retained their two-third of the root structure
4. Supernumerary or mesodens
5. Overretained molar
6. molars extracted for orthodontic reasons
7. extracted tooth are preferred

### Exclusion criteria

1. Deciduous molars are not preferred has their pulp chambers obliterated by the erupting premolar and may not adequate for stem cells.
2. exfoliated teeth are excluded as they have been separated from their blood supply before the fallen out pulp become necrotic<sup>3</sup>

### Wisdom teeth

The wisdom teeth with healthy pulp is another good source for stem cells. Developing third molar has greater amount of pulpal tissue than root completed tooth Healthy pulp from third molar can be isolated in good interval time after extraction of whole or sectioned third molar .The ideal age of viable stem cell from wisdom tooth is developmental stage 16-20 years has they have active in formation root and nearby supporting structures.

### Permanent teeth

All permanent teeth will have healthy pulp tissue and are excellent sources of stem cells.

### Inclusion criteria

1. vital tooth
2. premolar extracted for orthodontic purpose

### Exclusion criteria

1. endodontically-treated
2. nonviable teeth
3. teeth with active infections,

4. teeth with severe periodontal disease
5. excessive mobility,
6. deep caries
7. large restorations
8. Sclerosing or calcified pulp chambers.

### Stem cell banking

Banking stem cells is easy and simple procedure and following for many years <sup>9</sup>. Instead of throwing away the extracted tooth, the dentist will send those tooth to the laboratory. In Lab the tooth will be processed and the stem cells preserved frozen. If needed in future it can be obtained from lab.

### Procedure for harvesting the stem cells

#### Collection of tooth

#### Preoperative Procedure

Extraction of the tooth done under sterile environment

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Prophylactic antibiotic should be given one hour before

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Antiseptic mouthwash just before the procedure

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Betadine prepping around the skin.

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#### Extraction

#### Postoperative Procedure

Transfer to tube I (70% ethanol) and wash the tooth

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Transfer to tube II (100 IU/ml penicillin and 100 µg/ml streptomycin) by dipping it 5-7 mins this procedure to wash out the ethanol

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Transfer tube III (2ml of TPC –tooth preservation cocktail) for 5 mins

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Seal the tube with paraffin film with proper lable

↓

Transport the tube to lab before 48 hours in room temperature.

### Stem cell isolation

After receiving the tooth, the stem cells are isolated from the tooth, then the viability of stem cells analysed.

**Storage of stem cells**

The stem cells are preserve in cryopreservation, the samples are transfer into more cryo tube each samples are stored in separate cryo-genic system later the cells are stored in liquid nitrogen vapour at a temperature of less than -150C. This preserves cells maintains their potential potency.

**Different types of tooth stem cells.<sup>1,5,6</sup>****Adipocytes**

Adipocytes have successfully used to repair damage to the heart muscle because there is also data to shows these can be used to treat cardiovascular disease, orthopaedic conditions and spine, Crohn's disease, congestive heart failure, and to be used in plastic surgery.

**Chondrocytes and Osteoblasts<sup>8</sup>**

Chondrocytes and Osteoblasts have been

used to grow cartilage and bone help for transplant. And also used to grow intact teeth in animals.

**Mesenchymal**

Mesenchymal stem cells have been used to repair spinal cord injury and to restore movement in paralyzed patients. Also used to treat neuronal degenerative disorders such as Alzheimer's and Parkinson's diseases, cerebral palsy, etc. Mesenchymal stem cells have more therapeutic potential than any other type of stem cells.

**CONCLUSIONS**

One day stem cells can be used to repair craniofacial bone or even repair or regenerate teeth<sup>4,7</sup>. Thus the cell given a promising results in the generation of a complete tooth with all dental structures including cells and extracellular matrix deposition. Thus banking stem cells can useful in many clinical application in future.

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