

# A new source of stem cells: the dental pulp

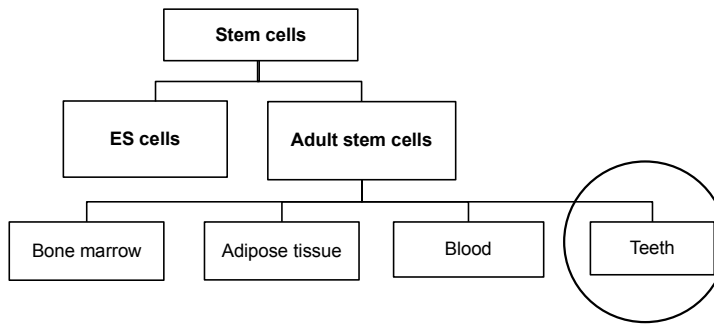
Marina Ollé Hurtado – Bachelor of Biotechnology – Universitat Autònoma de Barcelona

## INTRODUCTION

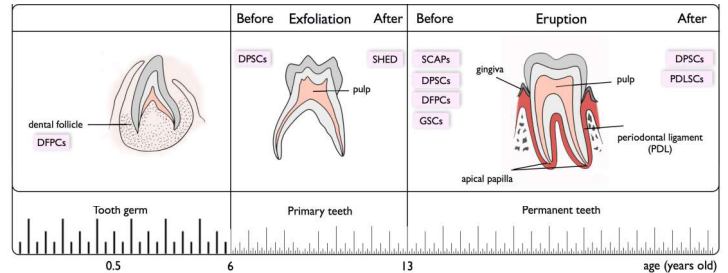
Stem cells are undifferentiated cells capable of self-renew and differentiate themselves into multiple functional cell types. A new type of stem cells obtained from the teeth was discovered in the year 2000. This cells can be obtained from different parts of the tooth and are found forming niches. In a healthy tissue, the stem cell niches maintain a quiescent state. On the other hand, injury stimulates a cascade of signals which cause the progenitor stem cell population to produce high proliferative activity and generation of the differentiated cells.

The main goal of this study is to know what the DPSCs are, where they are obtained and their advantages and disadvantages.

## TYPES OF STEM CELLS



## TYPES OF DENTAL STEM CELLS



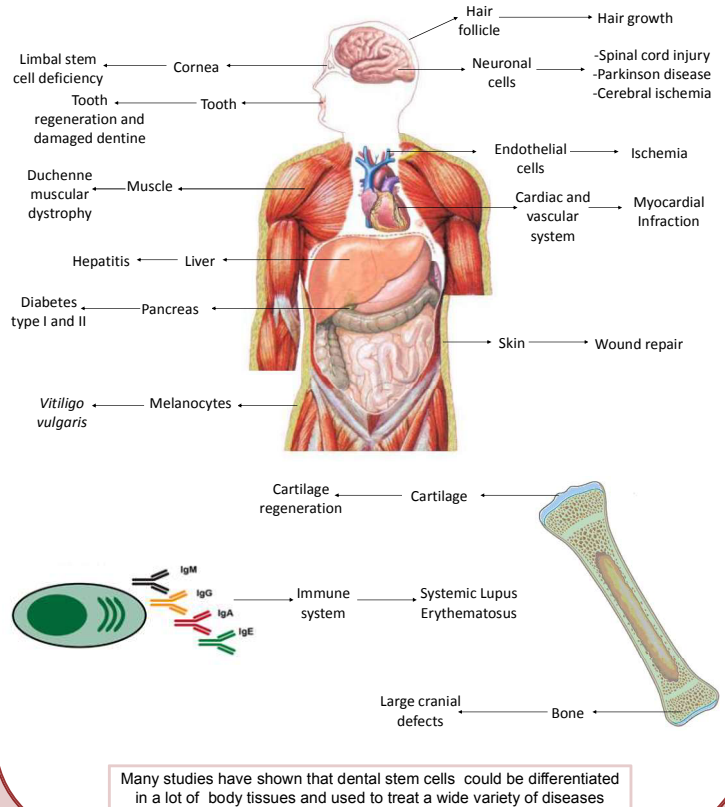
- DFPCs → Dental Follicle Precursor Cells → Dental Follicle
- DPSCs → Dental Pulp Stem Cells → Pulp
- SHEDs → Stem Cells from Exfoliated Deciduous Teeth → Pulp
- SCAPs → Stem Cells from Apical Papilla → Apical Papilla
- PDLSCs → Periodontal Ligament Stem Cells → Periodontal Ligament

Huang et al. J Exp Clin Med 2010;2(3):111-117

## CURRENT DENTAL STEM CELL RESEARCH

Stem cell type	DFPCs	SHEDs	DPSCs	PDLSCs	SCAPs
<b>Differentiation</b>					
Osteogenic	✗	✓	✓	✓	✓
Odontogenic	✓	✗	✗	✗	✓
Cementogenic	✓	✗	✗	✓	✓
Dentinogenic	✗	✓	✓	✗	✗
Adipogenic	✓	✓	✓	✓	✓
Chondrogenic	✓	✓	✓	✓	✓
Myogenic	✓	✓	✓	✓	✓
Neurogenic	✗	✓	✓	✓	✗

## CHALLENGES FOR CLINICAL APPLICATIONS OF DPSCs



Many studies have shown that dental stem cells could be differentiated in a lot of body tissues and used to treat a wide variety of diseases

## ADVANTAGES OF DPSCs

- High proliferative rates
- Few ethical concerns
- Easy to access source
  - Cloning ability
- Capacity of forming mineralized tissues
  - Potential for commercial banking
- Interaction with biomaterials for tissue reconstruction

## DISADVANTAGES OF DPSCs

- Limited number of passages
- Long-term effects completely unknown
- Degradation of the tissue when is cryopreserved
- Patient's body may reject DPSCs when they are transplanted
- No totipotent, only multipotent

## CONCLUSIONS

DPSCs are a great source of stem cells because of their high proliferative rates, their easy way of collection and their ethical concerns. DPSCs are good candidates for transplants, gene therapy, organ transplant rejection and treatment of autoimmune disorders. There are still a lot of studies to do but research on dental stem-cell therapies may someday progress to offer options for tissue repair and regeneration.

## RELEVANT REFERENCES

- Kawashima N. Characterisation of dental pulp stem cells: a new horizon for tissue regeneration? *Archives of oral biology* 2012; 57:1439-1458.
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- Valencia R, Espinosa R, Saadia M, Velasco Neri J, Nario H. Current scenery of stem cells from the pulp of primary and permanent teeth. *RODYB* 2013; 2(2):1-33.