Dental Stem Cells Therapeutic Potential with Parkinson's Disease

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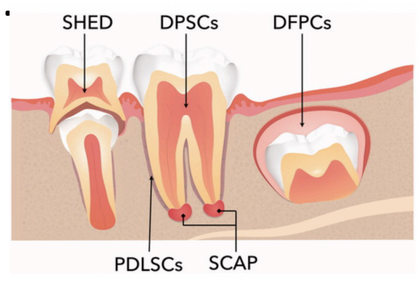
INTRODUCTION

Stem cells are undifferentiated cells capable of self renewal and differentiation. This makes them great candidates for tissue engineering and therapy. Dental stem cells are a type of mesenchymal cell that originates from the neural crest during development. With proper inductive conditions, they are able to be used therapeutically in neuronal based conditions.

TYPES OF DENTAL STEM CELLS

There are 4 types of dental stem cells:

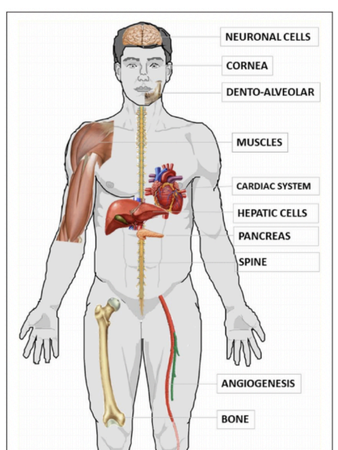
1. Dental Pulp Stem Cells (DPSC): Mesenchymal stem cells in the pulp that have osteogenic and chondrogenic potential in vitro and dentinogenic potential in vivo. They can easily be accessed, regenerate in a short amount of time, and have anti-inflammatory capabilities.
2. Stem Cells from Human Exfoliated Deciduous Teeth (SHED): Stem cells that have high plasticity and can differentiate into adipocytes, neurons, osteoblasts, and odontoblasts. They originate from the pulp tissue of crowns and grow in clusters at a high rate.
3. Stem Cells from Apical Papilla (SCAP): Cells that reside in the apical papilla of immature roots on permanent teeth. They are able to produce dentin, and are a primary source for odontoblasts.
4. Periodontal Ligament Stem Cells (PDLSC): Have the ability to differentiate into osteoblasts and cementoblasts. They have a high rate of proliferation and have progenitors that encourage regeneration and self-renewal.



BENEFITS OF DENTAL STEM CELLS IN HEALTHCARE

Dental stem cells can be applied to various aspects of healthcare.

- Neurological disorders: Allows for neuronal therapy through development, maintenance, survival and repair
- Angiogenesis and Vasculogenesis: Has been applied to studies on Ischemic Heart Disease
- Liver disease: A combined treatment of dental stem cells and melatonin can help manage the levels of albumin and bilirubin

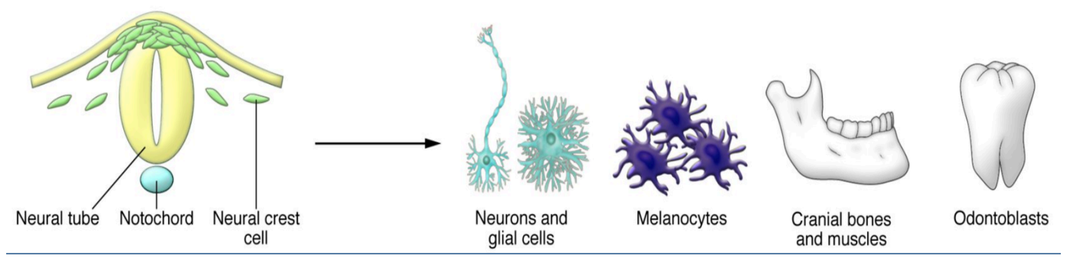


- Diabetes: Stem cells can be used to help beta-cells function in the pancreas
- Regenerative ocular therapy: Have been used to help with corneal blindness
- Bone tissue engineering: Promotes osteogenesis

DENTAL STEM CELL APPLICATION IN PARKINSON'S DISEASE

Parkinson's Disease is a neurodegenerative disorder that affects dopamine-producing neurons in the substantia nigra in the brain. Symptoms of the disease develop slowly over the years but can manifest as tremors, bradykinesia, gait and balance problems.

With dental stem cells originating from neural crest cells and having a high level of differentiation, they can be beneficial with neuronal conditions. They have been shown to encourage endogenous neural stem cells with recruitment, neuroplasticity, and survival. Several in vitro and in vivo studies have shown that DPSC can express various neural markers in various neural mediums.



In an animal study, DPSC grafting improved survival of injured sensory and dopaminergic neurons by secreting growth factors that encouraged neuron survival, and by suppressing growth inhibitors preventing apoptosis. The growth factors also allow the differentiation of endogenous cells to help with injury and regeneration. These findings can not only help improve motor function, but possible slow down the neurodegenerative process.

CONCLUSION

Dental stem cells are the future of regenerative healthcare. With their high level of renewal and differentiation, and non-invasive retrieval, they are able to adapt to almost any site in the body with favorable clinical applications. More research is required to confirm their safety and feasibility but dental stem cells' success as a pioneer in regenerative therapy looks promising.

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