

Metabolizing SHED Cell Survival in Dental Pulp Tissue Engineered Constructs

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1 Introduction

The objective of this research was to patho-histometrically assess *in vitro* cell survival in tissue constructs created by using Stem cells from Human Exfoliated Deciduous teeth (SHED).

2 Materials and Methods

SHED cells were grown to confluence and seeded on three different types of 3-dimensional tissue engineering scaffolds: i) A natural Collagen composite scaffold manufactured from bovine hide. ii) A synthetic Open-Cell D,D-L,L-Polylactic Acid (OPLA) scaffold. iii) A Calcium Phosphate scaffold manufactured from mineralized calcium phosphate bioceramic (all supplied by BD Biosciences, Franklin Lakes, NJ). The tissue constructs (n = 60) were submerged in Dulbecco's Minimal Essential Media (DMEM) containing 10% fetal calf serum and antibiotics. During culture, 0.0016 % neutral red dye (JT Baker, Phillipsburg, NJ) was added to the DMEM in order to stain the metabolically active cells dark red. The DMEM was changed every two days. The dental pulp tissue constructs were maintained at 37 C in a 5% CO₂ atmosphere for 1, 3, 7, 10, and 14 days. The specimens were fixed in formalin, dehydrated, and processed for light microscopy. A patho-histometric analysis of the sections included the staining intensity of the SHED cells, as a measure of cell survival, as well as cell location. The data were analyzed with Chi-square statistics.

3 Results

SHED cell survival appeared to be more optimal in

the OPLA and Collagen scaffolds compared with the Calcium Phosphate scaffolds ($p < 0.05$), especially over the longer time-periods ($p < 0.05$). The SHED cell distribution was not even throughout the scaffolds.

4 Conclusion

The survival of metabolizing SHED cells within 3-dimensional scaffolds provides some evidence that the creation of functional dental-pulp constructs may be possible in the future. More extensive research is however needed to optimize the creation of tissue engineered pulp construct. Sponsored by the American Association of Endodontists Foundation, Chicago, Illinois, US.

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