00579 Evaluation of Dental Pulp Stem Cells as a Source of Retinal Neurons in Vitro

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Aims: Stem cell therapy for retinal diseases which cause irreversible blindness currently involves use of human embryonic or induced pluripotent stem cells and is hindered by challenges of immune rejection and genetic instability. Adult stem cells derived from stem cell niches within the adult human body, constitute an exciting new alternative that could overcome these issues. Here we describe the results of our evaluation of adult human dental pulp stem cells (DPSC) as one such source of retinal neurons in vitro.

Methodology: Healthy and non-infected human teeth extracted due to non-functional or orthodontic reasons were collected at the National Dental Center Singapore (NDCS) under ethical approval and informed consent. The teeth were then processed at Singapore Eye Research Institue under sterile conditions, scraped clean of any periodontal ligament residue and split in half. Pulp tissue was isolated, treated to enzymatic digestion to obtain single cell suspensions and placed in culture. Once cultures were established, the cells subjected to retinal differentiating conditions and analysed by microscopy, RT PCR and flowcytometry.

Result: Over a 6 mth period and we were able to set up DPSC cultures from over 95% of teeth collected (n=30). DPSC expand well in culture and show a fibroblastic morphology. RTPCR analysis confirmed their expression of pleuripotent stem cell markers such as OCT3/4, NANOG and SOX2 in baseline conditions. When subjected to retinal differentiation conditions, DPSC upregulate retinal progenitor markers such as LHX2, RAX and OTX2. However, they also express mesenchymal stem cell markers such as CD29 and CD 90, suggesting the heterogenous nature of the cell population.

Conclusion: While dental pulp stem cells have the potential to be pluripotent and differentiate into early retinal progenitors, the heterogeneity of cells within this population currently makes them unsuitable for use as a source of retinal cells for replacement therapy.