



Human Amniotic Membrane as a Matrix for Endothelial Differentiation of VEGF-Treated Dental Stem Cells

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Abstract

Introduction Endothelial cells cover the surface of the capillary wall and literature review has cemented its angiogenic roles in wound healing and tissue regeneration. However, the angiogenic in vitro models available are inadequate to understand the endothelial differentiation process. Methods A construct was made using human amniotic membrane (HAM) as a matrix to assist the dental stem cells to differentiate into endothelial-like cells. This study aimed to assess the biological interaction between stem cells from human exfoliated deciduous teeth (SHED) and the stromal side (SS) of the glycerol-preserved HAM in angiogenic-induced environment media using VEGF. The changes were evaluated through cell morphology, migration, as well as gene expression level. Results There were morphological changes observed in SHED in angiogenic-induced media. SHED appeared to be differentiated from fibroblast-like cells to a new structure, mimicking endothelial-like structure through microscopy analysis. Besides, the cross-section of the construct revealed that the cells seeded on the matrix were able to maintain its monolayer structure at day 1, 7 and 14 but infiltrated into the HAM at day 21, suggesting cell migration. The cells were also able to maintain its stemness (Nestin, Nanog and CD29) and at the same time express the angiogenic markers (IL-8, VEGF and MMP-2). Conclusion HAM promotes SHED proliferation, migration and has the potential as a differentiating matrix for endothelial-like cells.

Keywords

Author Keywords: Angiogenic; Endothelial differentiation; Extracellular matrix; Regenerative medicine; Stem cells from human exfoliated deciduous teeth; Vascular endothelial growth factor
KeyWords Plus: EXFOLIATED DECIDUOUS TEETH; MESENCHYMAL STROMAL CELLS; PULP; INTERLEUKIN-8; ANGIOGENESIS; SURVIVAL; ADHESION; BIOLOGY; GROWTH; NANOG

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