

Amniotic Membrane Enhance the Effect of Vascular Endothelial Growth Factor on the Angiogenic Marker Expression of Stem Cells from Human Exfoliated Deciduous Teeth

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Abstract

Previously, it was reported that human amniotic membrane (AM) induced stem cells from human deciduous exfoliated teeth (SHED) endothelial-like-cell differentiation. This interesting effect of AM matrix on SHED demands further elucidation. Objective of this in vitro work was to study the effect of 24-h VEGF induced on SHED endothelial differentiation when seeded on acellular stromal side (SS) of AM matrix. Stemness of SHED was identified by flow cytometry. Cell attachment and morphological changes towards the matrix was observed by scanning electron microscopy. Protein expression of endothelial marker was examined by Western blot. The expression of stem cells and endothelial-specific gene markers of VEGF-induced SHED cultured on human AM was inspected via reverse transcriptase-polymerase chain reaction. Results showed SHED at both passages retain stemness property. Ang-1 protein was expressed in SHED. Cells treated with VEGF and cultured on AM transformed attached well to AM. VEGF-induced SHED expressed both stem cell and endothelial-specific markers throughout the treatments and timeline. Interestingly, prolonged VEGF treatment increased the expression of Cox-2 and VE-Cadherin genes in all treated groups when compared to SHED. It was concluded that the VEGF-induced SHED showed better expression of endothelial-specific markers when cultured on SS of AM, with prolonged VEGF treatment.

Keywords

Author Keywords: SHED; Human amniotic membrane; VEGF; Angiogenic differentiation; Tissue engineering
KeyWords Plus: PROGENITOR CELLS; TIE2 RECEPTOR; DIFFERENTIATION; ANGIOPOIETIN-1; PRETREATMENT; EFFICACY; LIGAND; REPAIR; NANOG

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Cited References: 43

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- Endothelial Differentiation of SHED Requires MEK1/ERK Signaling** Times Cited: 51

By: Bento, L. W.; Zhang, Z.; Imai, A.; et al.
 JOURNAL OF DENTAL RESEARCH Volume: 92 Issue: 1 Pages: 51-57 Published: JAN 2013
- FUNCTIONAL-PROPERTIES OF HUMAN VASCULAR ENDOTHELIAL CADHERIN (7B4/CADHERIN-5), AN ENDOTHELIUM-SPECIFIC CADHERIN** Times Cited: 230

By: BREVIARIO, F; CAVEDA, L; CORADA, M; et al.
 ARTERIOSCLEROSIS THROMBOSIS AND VASCULAR BIOLOGY Volume: 15 Issue: 8 Pages: 1229-1239 Published: AUG 1995
- Angiogenic and cell survival functions of Vascular Endothelial Growth Factor (VEGF)** Times Cited: 482

By: Byrne, AM; Bouchier-Hayes, DJ; Harmey, JH
 JOURNAL OF CELLULAR AND MOLECULAR MEDICINE Volume: 9 Issue: 4 Pages: 777-794 Published: OCT-DEC 2005
- The human amniotic membrane: a tissue with multifaceted properties and different potential clinical applications** Times Cited: 4

By: Caruso, M; Silini, A; Parolini, O.
 Perinatal Stem Cells Pages: 177-195 Published: 2013
 Publisher: Wiley, Hoboken
- Transplantation of Amniotic Scaffold-Seeded Mesenchymal Stem Cells and/or Endothelial Progenitor Cells From Bone Marrow to Efficiently Repair 3-cm Circumferential Urethral Defect in Model Dogs** Times Cited: 14

By: Chen, Chen; Zheng, Shuxin; Zhang, Xinke; et al.
 TISSUE ENGINEERING PART A Volume: 24 Issue: 1-2 Pages: 47-56 Published: JAN 2018
- Receptor-mediated cell mechanosensing** Times Cited: 41

By: Chen, Yunfeng; Ju, Lining; Rushdi, Muaz; et al.
 MOLECULAR BIOLOGY OF THE CELL Volume: 28 Issue: 23 Special Issue: SI Pages: 3134-3155 Published: NOV 7 2017
- Skin transplantation with a review of 550 cases at the Johns Hopkins Hospital** Times Cited: 226

By: Davis, J.W.
 Johns Hopkins Med. J. Hosp. Rep. Volume: 15 Pages: 307-396 Published: 1910
- Isolation of Angiopoietin-1, a ligand for the TIE2 receptor, by secretion-trap expression cloning** Times Cited: 1,487

By: Davis, S; Aldrich, TH; Jones, PF; et al.
 CELL Volume: 87 Issue: 7 Pages: 1161-1169 Published: DEC 27 1996
- Plastic repair of conjunctival defects with fetal membranes** Times Cited: 253

By: de Rotth, A
 ARCHIVES OF OPHTHALMOLOGY Volume: 23 Issue: 3 Pages: 522-525 Published: MAR 1940