Analysis of the in vitro and in vivo endothelial differentiation and angiogenic potential of human neonatal foreskin-derived stromal cells

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Occasion of cell differentiation is rigorously controlled and is essential for regular development and stem cell differentiation. In the past 10 years, several studies have confirmed that the human neonatal foreskin stromal cells (hNSSCs) have multidifferentiation potential. Recently, we confirmed hNSSCs to possess angiogenic capability via differentiation into endothelial-like cells in vitro, However, their angiogenic ability in vivo has not been addressed thus far.

hNSSCs were derived using explant culture of neonatal foreskin tissue. Their phenotype was analysed using flow cytometry, followed by CFU-F analysis. The multilineage differentiation potential of hNSSCs was assessed through differentiation into adipocytes, osteoblasts and endothelial-like cells, using respective inducer materials which were subsequently confirmed using immunofluorescence, cytchemistry and qRT-PCR. The In vivo angiogenic potential of hNSSCs was assessed using chick chorioallantoic membranes (CAM) assay. The transplanted cells were subsequently characterized using immunohistochemistry with respective human specific antibodies to show their angiogenic differentiation/augmentation.

Concordant with our previous mesenchymal stem cell (MSCs) studies, hNSSCs showed similar morphology, phenotype, and were able to differentiate into osteoblasts and adipocytes. Using an endothelial induction combined with an in vitro matrigel angiogenesis assay, hNSSCs exhibited the highest tube forming capability. When hNSSCs were seeded onto CAM, human von Willebrand factor, CD31, Smooth muscle actin and Factor XIIIa positive cells were observed in the engraftment. CAMs transplanted with differentiated hNSSCs had a greater number of regular vessels and more incorporated cells compared to undifferentiated hNSSCs.

Our data is the first to reveal that hNSSCs can be differentiated into endothelial lineage both in vitro and in vivo. Therefore, hNSSCs might represent a novel source of stromal cells for tissue regeneration and the vascularization of engineered tissues.

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Biography
May Al-Nbaheen have completed her Ph.D. and postdoctoral studies from University of Bath, U.K. She is the laboratory Director of Stem Cell Unit, King Saud University, and Vice-Dean of Prep year of human health Science College in Saudi Electronic University. She has published more than 25 papers in reputed journals and serving as an Editorial Board Member of so many International and National Journals.

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