Human mesenchymal stromal cells could deliver erythropoietin and migrate to the basal layer of hair shaft when subcutaneously implanted in a murine model.

Mok, P. L. (Universiti Kebangsaan Malaysia)
Cheong, S. K. (Universiti Tunku Abdul Rahman)
Ainoon, O. (Universiti Sains Islam Malaysia)
Chua, K. H. (Universiti Kebangsaan Malaysia)
Leong, CF (Universiti Kebangsaan Malaysia)

Mesenchymal stromal cells (MSC) are an attractive cell-targeting vehicle for gene delivery. MIDGE (an acronym for Minimalistic, Immunologically Defined Gene Expression) construct is relatively safer than the viral or plasmid expression system as the detrimental eukaryotic and prokaryotic gene and sequences have been eliminated. The objective of this study was to test the ability of the human MSC (hMSC) to deliver the erythropoietin (EPO) gene in a nude mice model following nucleofection using a MIDGE construct. hMSC nucleofected with MIDGE encoding the EPO gene was injected subcutaneously in Matrigel at the dorsal flank of nude mice. Subcutaneous implantation of nucleofected hMSC resulted in increased hemoglobin level with presence of human EPO in the peripheral blood of the injected nude mice in the first two weeks post-implantation compared with the control groups. The basal layer of the hair shaft in the dermal layer was found to be significantly positive for immunohistochemical staining of a human EPO antibody. However, only a few basal layers of the hair shaft were found to be positively stained for CD105. In conclusion, hMSC harboring MIDGE-EPO could deliver and transiently express the EPO gene in the nude mice model. These cells could be localized to the hair follicle and secreted EPO protein might have possible role in hair regeneration. (C) 2012 Elsevier Ltd. All rights reserved.

Mesenchymal Stromal Cells; Nucleofection; MIDGE; Erythropoietin; Hemoglobin; Hair Regeneration