J Tissue Sci Eng 2018, Volume 9
DOI: 10.4172/2157-7552-C2-049

Hypoxia increase the function of adipose tissue-mesenchymal stem cells (AT-MSCs)-derived extracellular vesicles (EVs) in wound healing

Yulanda Antonius, Vuong Cat Khanh and Osamu Ohneda
University of Tsukuba, Japan

Mesenchymal stem cells (MSCs) ameliorate the impaired wound healing by secreting cytokines, and small particles included extracellular vesicles (EVs). EVs are fragments membrane containing of nucleic acids and proteins which can be transferred to the target cells. Recent studies reported MSC-derived EVs (MSC-EVs) had potency to enhance the recovery process of injuries as the parental cells; therefore EVs-based therapeutics become attractive strategy in clinical application to avoid the immunorejection. In addition, it is reported that wound healing ability of MSCs is induced by hypoxic pretreatment. However, up to now, the effect of hypoxia on MSC-EVs for wound healing function had not been clarified yet. Therefore, we analyzed the effects of hypoxia on adipose tissue-MSCs (AT-MSCs) derived EVs by comparing the characteristics and wound healing functions of EVs under normoxic (20% O2) or hypoxic (1% O2) condition. Results showed hypoxia induced expression of wound healing-related genes in EVs. Compared to normoxia-treated EVs, hypoxia-treated EVs showed higher ability to support the wound healing functions in recipient cells, including MSCs and endothelial progenitor cells (EPCs). MSCs or EPCs co-cultured with hypoxia-treated EVs showed increased migration ability and upregulation of CXCR4, SDF-1, and VEGF expression. Of note, transplantation of hypoxia-treated EVs significantly reduced the wound area in diabetic mice compared to mice with normoxia-treated EVs. In conclusion, our study revealed that hypoxia enhanced the wound healing ability of EVs through paracrine effects on MSCs and EPCs. Therefore, hypoxia-treated EVs can be considered as a candidate for delayed wound healing of various metabolic diseases.