

Adipose derived stem cells as treatment for chronic wounds

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Abstract

The premise of regenerative medicine is to combine stem cells with extracellular matrix scaffolds and inductive growth factors in therapeutic modules to repair damaged tissues like chronic wounds and ulcers. Chronic wounds occur due to infections, trauma or underlying medical conditions such as diabetes. Current treatments consisting of debridement, antibiotics and compression devices fail to cure these wounds. Adipose-Derived Stem Cells (ADSCs) are adult tissue-specific stem cells of mesenchymal origin; they are positioned perfectly to mediate wound healing due to their abundant numbers in fat reservoirs and high accessibility via the minimally-invasive liposuction procedure. Moreover, the multi-potent ADSCs are able to differentiate into multiple lineages such as epithelial and endothelial as well as recruit other cell types to the wound bed such as dermal fibroblasts and endothelial progenitor cells. ADSCs also secrete inductive growth factors including hepatocyte growth factor (HGF), fibroblast growth factor (FGF) and vascular endothelial growth factor (VEGF) in a continuous and interactive fashion. Additionally, ADSCs provide protectants such as free-radicals scavengers and antioxidants, while they themselves can survive under hypoxic conditions. Importantly, undifferentiated ADSCs are considered to be immune-privileged due to their immunomodulatory effects, which facilitate allogeneic treatment options. Taken together, ADSCs can correct for the perpetuating factors in non-healing wounds. Indeed, the application of ADSCs in laboratory animal models of chronic wound resulted in granulation tissue formation, neo-angiogenesis and re-epithelialization leading to enhanced overall wound healing. Clinical trials are underway to evaluate the safety and efficacy of ADSCs in multiple disease targets.

Biography

Hilal Arnouk, MD, Ph.D. is the Director of Research and Development at Cell Constructs, Inc. affiliated with Georgia State University. He has received his education and post-doctorate training at Roswell Park Cancer Institute, Medical College of Georgia and University of Alabama at Birmingham. His major areas of expertise include Cancer Immunotherapy, Biomarker Discovery, Stem Cells and Regenerative Medicine. He recently edited a book on Tumor Immunotherapy and Cancer Vaccines.