

Significance of Cell/Stem Cell Therapy in Wound Care Management

Muhammad Irfan-Maqsood*

JCMR Office, Department of Biology, Faculty of Science, Ferdowsi University of Mashhad, Mashhad, Iran

Summary

Wound care management is a continuous challenging task for researchers and tissue engineers. Skin substitutes (synthetic and natural) have been introduced as emergency replacements/grafts to the damaged skin and a number of problems such as infection, graft rejection, inadequate healing, short shelf life etc. have reduced their clinical importance as being the ideal skin substitutes. A number of novel ideas have been presented in last decades which have focused on the applications of stem cells as ideal candidate in the development of ideal skin substitutes.

Keywords: Cell Therapy, Stem Cell Therapy, Wound Healing, Wound Management

Introduction

Skin grafting processes starting from 1871 by Reverdin, up till now has been considered as a challenging task for researchers and tissue engineers and a number of skin substitutes, containing degradable synthetic or biological components have been introduced and are being considered as emergency replacements/grafts to the damaged skin for example, Biobrane®, Integra®, OrCel®, Suprathel® etc are available for clinical utilization (Irfan-Maqsood and Hemmati Sadeghi, 2013). There are a number of post grafting problems including infection, graft rejection, inadequate healing, short shelf life etc. associated with currently available skin substitutes. This necessitates the need for development of innovative tissue engineering approaches based on biological scaffolds and clinical grade stem cells could be an attractive alternative for available skin substitutes. Reliable and xenobiotic-free keratinocyte culture techniques (Hannigan et al., 1996), better understanding of the molecular mechanisms in the regulation of epidermal stem cells (Li et al., 2007), techniques to accelerate basement membrane formation and vascularization, solution to post grafting problems associated in skin engineering, such as graft contraction, loss of pigmentation and scars formation (Islam and Zhou, 2007; Li et al., 2013; Thiery, 2003) are suggested as main priorities in the field. Graft necrosis,

extensive inflammatory reaction, marked foreign-body reaction (FBR), rapid scaffold degradation, abnormal collagen deposition and remodelling still remain the major issues in skin bioengineering (Nakamura and Tokura, 2011; Yan et al., 2010). Problems associated with chemical scaffolds, perceive the ideas of biological membranes as alternatives (Mohd Hilmi et al., 2013). Application of stem cells, especially mesenchymal stem cells, along with keratinocytes, and identification of specific antigens for keratinocyte grafts would serve as promising elements in skin bioengineering.

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Corresponding authors E-mail:

* muhammadirfanmaqsood@gmail.com

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