Editorial

New Perspectives and Therapies in Regenerative Medicine

Letizia Trovato

Antonio Graziano

Tissue engineering is emerging as an interdisciplinary field in biomedical engineering that aims to repair diseased or damaged tissues or organs. The skin is the largest organ of the body in vertebrates and represents approximately one-tenth of the body mass in humans. It is composed of the epidermis and dermis with a complex nerve and blood supplying provides vital barrier function. Disruption of epidermal integrity due to trauma, disease, burn or surgery can be fatal, and therefore strategies are needed to enhance the physiological regenerative properties of the skin. Engineering skin substitutes represents a prospective source of advanced therapy in the clinical settings as well as valuable skin surrogates for drug permeability tests and toxicity screening. However, at the present time, there are no models of bioengineered skin that completely replicate the anatomy, physiology, biological stability or aesthetic nature of uninjured skin.

A promising alternative to tissue engineering is represented by stem cells therapy, in fact many studies have been conducted on its use to repair a damaged tissue or organ. The stem cell therapy is mainly based on the use of Mesenchymal Stem Cells (MSCs) which are multipotent adult stem cells with unique biological properties. Several in vitro studies and preclinical animal models reported that MSCs are promising for cell therapy showing the ability to home to sites of inflammation after tissue injury, to differentiate into various cell types and secrete multiple bioactive molecules capable of stimulating recovery of injured cells by inhibiting inflammation by a paracrine effect. MSCs also show the lack of immunogenicity and have the ability to exert immunomodulatory functions. Today, many pathological conditions are treated with MSCs, such as ischemic cardiovascular diseases, critical limb ischemia, bone and cartilage regeneration or neural diseases.

In this special issue, we aim to summarize some of the applications of MSCs, for example in facial aging, maxillo-facial defects and cell cardiomyoplasty. We also display a new approach to isolate specifically this cell population from human connective tissues and create autologous micro-grafts ready to clinical applications. Autologous bone grafting remains in fact a gold standard for the reconstruction for bone defects, mainly in the maxillofacial region, where dental pulp stem cells (DPSC) and bone-marrow mesenchymal stem cells (BMSC) represent the most common source of stem cells used for the building of 3D structures, due to their ability to self-renew and multi-lineage differentiation. In this context, was developed the Rigenera protocol, a new approach for regeneration of human injured tissues through the injection of autologous micro-grafts obtained by innovative medical device designed and produced for surgery. The patient is in fact the donor and acceptor of calibrated micrografts of 50 micron, displaying a high cell viability and an optimal regenerative potential. In the final part of this issue, we briefly show promising results obtained with Rigenera protocol mainly in the dentistry field.

Letizia Trovato, PhD
(Associate Guest Editor)
Department of Medical Sciences
University of Turin
Italy
Tel: +39 011 6709563
Fax: +39 011 6647421
E-mail: letizia.trovato@unito.it

Antonio Graziano, DDS, PhD
(Guest Editor)
Department of Experimental Medicine
Section of Anatomy
University of Pavia Pavia - Italy
SHRO - Temple University
Philadelphia (PA) USA
Tel: +39011535649
E-mail: lab@hbwsrl.com