Platelet rich plasma enhancement of skin regeneration in an *ex vivo* human experimental model

Giovanni Nicoletti,[1-3] Marco Saler,[1] Laura Villani,[4] Agnese Rumolo,[1] Marco Mario Tresoldi,[1,3] Angela Faga[2]

[1]Plastic and Reconstructive Surgery, Department of Clinical, Surgical, Diagnostic and Pediatric Sciences, University of Pavia, Pavia; [2]Advanced Technologies for Regenerative Medicine and Inductive Surgery Research Center, University of Pavia, Pavia; [3]Plastic and Reconstructive Surgery Unit, Department of Surgery, Istituti Clinici Scientifici Maugeri, Pavia; [4]Pathological Anatomy and Histology Unit, Istituti Clinici Scientifici Maugeri, Pavia, Italy

Abstract

An original *ex vivo* wounded skin culture protocol using autologous Platelet Rich Plasma (PRP) and enriched Dulbecco's Modified Eagle's Medium demonstrated a favourable modulation of the epithelial cells and fibroblasts proliferation, a relevant anti-inflammatory action and a favourable modulation of the re-organization of collagen and elastic fibres. The step by step regenerative effects of PRP on human skin wound repair and regeneration process was observed over a period of 10 days.

Introduction

This study reports on the development of an original, *ex vivo* wounded skin culture protocol using autologous Platelet Rich Plasma (PRP) and enriched Dulbecco's Modified Eagle's Medium (DMEM).[1-5]

Materials and Methods

Human skin samples obtained from specimens harvested during reduction mammoplasty procedures, were injured in their central portion - to create a standard wound - and cultured under three different conditions: i) enriched DMEM with saline solution in the central wound (control); ii) enriched DMEM with the same medium in the central wound; iii) enriched DMEM plus 2.5% autologous PRP, with the same PRP added medium in the central wound.

Morphological analysis was carried out at 0 h (T_0) and on days 1, 3, 5 and 10 (T_1-

Correspondence: Correspondence: Giovanni Nicoletti, Plastic and Reconstructive Surgery, Department of Clinical, Surgical, Diagnostic and Pediatric Sciences, University of Pavia, Pavia, Italy.
E-mail: giovanni.nicoletti@unipv.it

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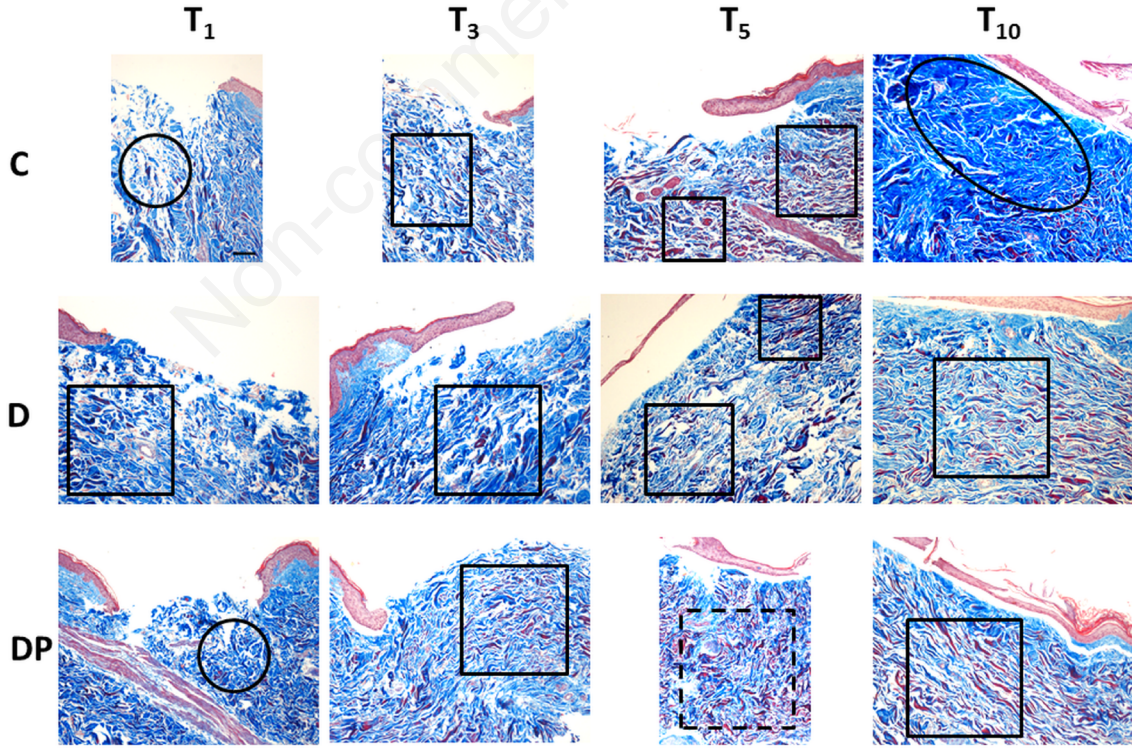

Figure 1. Masson's trichrome staining in the different culture conditions at the different time points (magnification x10; bar 100 µm). Black circle = chaotic reticular collagen fibers' orientation; black oval = hypertrophic dermis; square = parallel reticular collagen fibers' orientation; dotted line square = perpendicular reticular collagen fibers' orientation. Reproduced with permission from Nicoletti *et al.*[6] Copyright © 2019 Nicoletti, Saler, Villani, Rumolo, Tresoldi and Faga.[6]

T_3-T_5-T_{10}) using Hematoxylin and Eosin; Masson's trichrome staining; Weigert staining and Ki-67 staining to identify the skin histological features in the different experimental conditions (Figure 1).[6]

Results

The combination of DMEM and PRP allowed a favorable modulation of the epithelial cells and fibroblasts proliferation, and a relevant anti-inflammatory action. PRP also demonstrated an inhibitory effect on both the collagen and elastic fibers' destructuration and a favourable modulation of the re-organization of these fibers.

Conclusions

The step by step histological and immune-histo-chemical regenerative effects of PRP on human skin wound repair and regeneration process was observed over a period of 10 days.

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