

The use of platelet-rich plasma after CO₂ laser treatment for skin rejuvenation



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Evidence relating to the impact of Platelet-Rich Plasma (PRP) in dermal applications has come from in vitro studies.

Recently, a study was published in the Tissue Engineering Journal with regard to the impact of PRP on human dermal fibroblast migration and proliferation (Berndt et al., 2019).

The results of this study highlighted the proliferative effect of autologous RegenPRP on normal human dermal fibroblasts obtained from the same patient. This study also demonstrated that RegenPRP could promote other cellular responses like cell-matrix interactions and migration. Immediately after PRP treatment, fibroblasts became "activated", i.e., they decreased their adhesion to matrix proteins in order to proliferate and migrate (Fig.1).

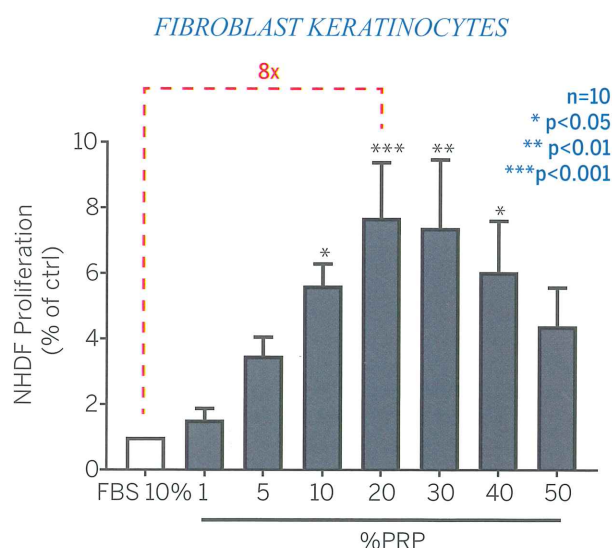


Figure 1 : Assessment of PRP proliferative effect by flow cytometry using CellTrace Violet (vital dye). Proliferative effect of increasing PRP concentrations in comparison (1-50%) with FBS 10% (n=10 different patients) on NHDF for 7 days without medium change in a complete autologous system (cells and PRP from the same patient).

Following this high impact on cell proliferation and cell migration, safety tests such as comparative genomic hybridization and karyotype comparisons were performed to demonstrate that genomic integrity was preserved.

Many studies have been published about the impact of PRP after CO₂ laser treatment, demonstrating a cumulative effect of the two procedures (El-Taieb et al., 2019; Na et al., 2011; Shin et al., 2012).

A preliminary study, not yet published, has been performed by Dr Ross Clevers (Melbourne, FL, USA) on several patients comparing a 1440 nm fractional resurfacing laser (Palomar Artisan) with and without the injection of RegenPRP. The study objective was to evaluate the effect of PRP on the extent of re-epithelialization after laser treatment in the periorbital area.

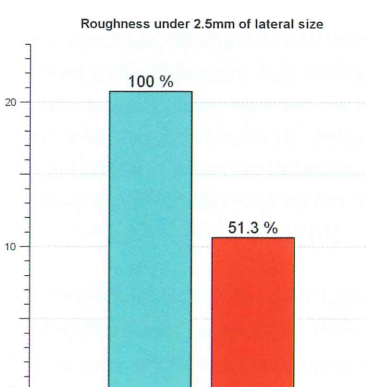
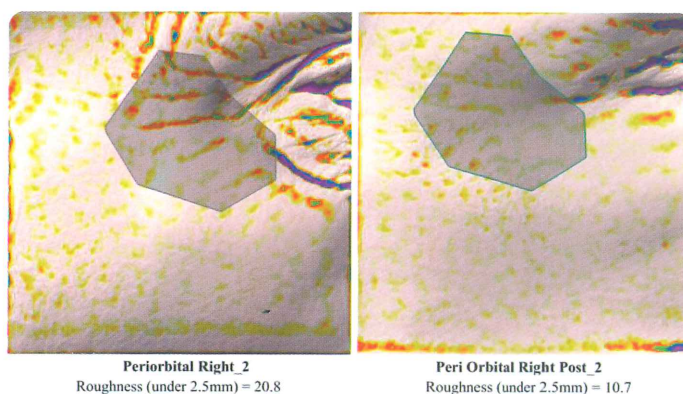
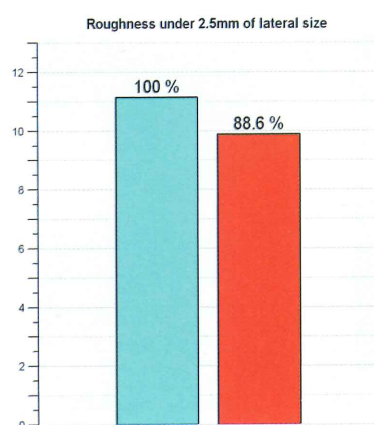
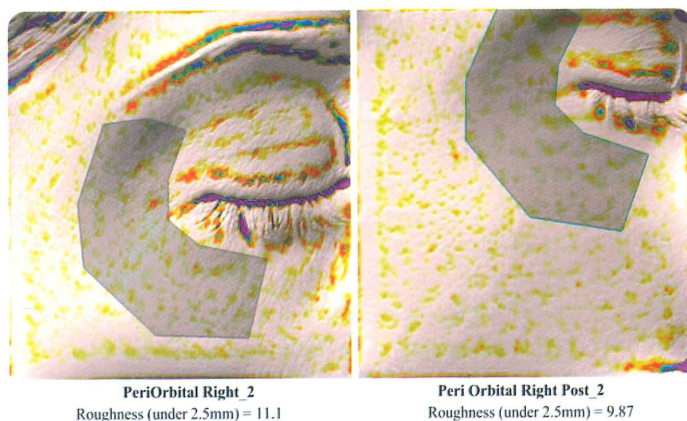


Figure 2:
Skin roughness under 2.5mm of lateral size, 4 weeks after the combined Laser-RegenPRP treatment

Promising results were obtained from patients treated with laser and who received superficial injections of RegenPRP. Representative data from one patient show a reduction of up to 50% reduction in terms of skin roughness on periorbital wrinkles four weeks after treatment (Fig. 2).

In contrast, a patient treated with laser only (no post-treatment with RegenPRP) showed only a slight decrease (11.4%) in skin roughness (Fig. 3). These preliminary results show that the recovery and the improvement in the appearance of wrinkles is clearly enhanced by the use of RegenPRP following the laser procedure.

Further clinical evaluations need to be done to confirm these results.



*Figure 3:
Skin roughness under
2.5mm of lateral size,
4 weeks after a laser
only treatment*

Regarding the use of biological combinations such as PRP combined with fat tissue; we know that auto-transplantation of adipose tissue is commonly used for the treatment of tissue defects in plastic and reconstructive surgery. Reduced survival of a large part of the transplanted adipose tissue remains an unsolved issue. This is at least in part due to accelerated apoptosis of the implanted pre-adipocytes (D'Esposito et al., 2015).

Recently, there has been increased interest in the co-application of PRP and fat grafts. It has been hypothesized that adding PRP to the fat preparation may be a reliable way to bring appropriate nutrients at the early stage of transplantation, improve fat survival during soft tissue reconstruction and finally makes the end result more predictable.

Platelet-released growth factors stimulate angiogenesis, cell differentiation and proliferation leading to regeneration of the 3-D matrix that allows the rearrangement of adipocytes into the correct 3-D structure (Modarressi, 2013). In vitro studies have demonstrated that PRP can significantly induce the proliferation of adipose tissue-derived stem cells (Atashi et al., 2015).

Another innovation in terms of combination was the mixture between hyaluronic acid (HA) and PRP directly in a one-step procedure (Cellular Matrix technology, RegenLab SA, CH) for the management of skin aging.

Cellular Matrix is a breakthrough in regenerative medicine. A unique combination of 2 ml of un-crosslinked HA at a concentration of 20 mg/mL, thus 40 mg of HA mixed with 3 ml of PRP. This combination allows the creation of an environment that facilitates stem cell proliferation and differentiation. Finally, and according to some clinical evidence, this combination can repair the extracellular matrix and have a clear impact on skin firmness and elasticity (Hersant et al., 2017).

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