

Introduction to PRP (Platelet Rich Plasma)

Richard Weiss, MD March 14, 2017

PRP is being widely used by itself and in combination with laser skin rejuvenation to reduce facial wrinkles and improve the tone and texture of the skin. Within the last six months, I have incorporated this technique into my practice. Having seen many 'fads' come and go in this field, I am cautious about the evaluation of new methods. In the case of PRP, because the results are frequently less than 100% (in other words, we really can't make 60 year-old skin look like a 20 year-old – at least, not in everyone!) it is especially important to have a healthy skepticism about excessive claims.

In the case of the PRP technique, I thought it might be interesting for me to explain exactly what PRP does, and to quote some of the scientific evidence in peer-reviewed publications that has convinced me that PRP is an important new addition to rejuvenation procedures. I often mention to my patients that I am also a scientist with 2 patented inventions and many published papers. With that in mind, I'd like to summarize some of the data that supports my clinical impression (based on my patient's improvements) that PRP works – my evidence-based conclusion – by quoting some peer-reviewed scientific studies.

What are platelets?

Platelets are a blood component whose main function is to stop bleeding. We all have platelets. It turns out that platelets also have granules that, when activated, release more than 10 growth factors (GFs) that not only attract more platelets to the area but also stimulates new collagen production and many other processes that are beneficial to healing and healthy youthful skin appearance. "Platelet derived growth factors' main functions are to stimulate cell replication (mitogenesis) of healing capable stem cells." (1) Platelets contain α granules, which comprise cytokines, growth factors and bioactive proteins essential for tissue repair and healing.

What is PRP therapy?

"In recent years, autologous platelet-rich plasma (PRP) has been proven to promote wound and soft tissue healing and collagen regeneration." (2) This progressive non-surgical healing treatment "has been used successfully in orthopedic, vascular, oral and maxillofacial procedures, as well as cosmetic skin improvement. (4) It has also been used in Ophthalmology for years to speed epithelial wound healing of the cornea.

"Because PRP also enhances soft tissue mucosal and skin healing, it is used in connective tissue grafts, palatal grafts, gingival grafts, mucosal flaps together with Alloderm (BioHorizons, Birmingham, AL) for root coverage, skin graft donor and recipient sites, dermal fat grafts, face lifts, blepharoplasty, and laser resurfacing surgery." (8)

PRP contains growth factors that have a unique role in stimulating biochemical pathways that promote skin repair and regeneration. PRP is widely used in aesthetics, where the natural components of the body are harnessed to promote skin rejuvenation. By stimulating collagen, elastin and cellular growth, as well as by improving local blood supply and hydration, the skin texture and tone should gradually improve and lead to a younger looking skin.

This treatment can improve skin texture and tone, refine wrinkles and reduce scars such as acne or stretch marks while preserving a natural appearance.

“Skin aging is a common and complex biological process, characterized by wrinkles, epidermal and dermal atrophy, rough texture, pigmentation, telangiectasia, and skin laxity. PRP plays a vital role in the process of wound healing through secretion of a large number of growth factors (GFs). These can stimulate cellular migration, proliferation, and angiogenesis. PRP as a natural reservoir of GFs, is able to facilitate collagen of fibroblasts, keratinocyte proliferation, and hyaluronic acid generation to increase dermal elasticity, and may have a positive effect in facial rejuvenation. We inferred that using PRP in ultra-pulsed fractional CO2 laser therapy may accelerate tissue repair and relieve pain.” (2)

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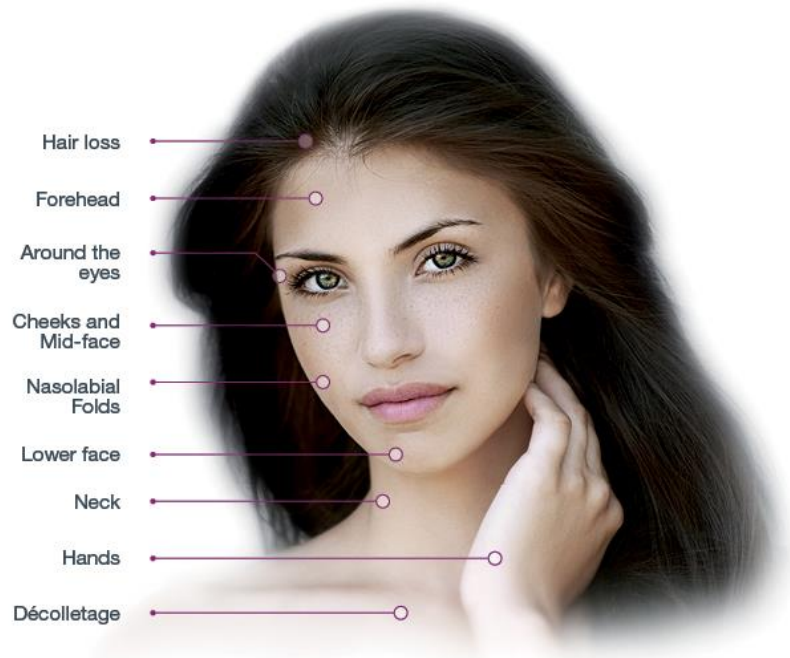
How does CO2 Laser Skin Resurfacing work?

The laser is a beam of light that is absorbed by water molecules in our skin cells. When the water absorbs the light from the laser, it heats up and the water is vaporized. The heat also causes collagen tightening and starts the process of new collagen formation. “Ultra-pulsed fractional CO2 laser can promote fibroblasts metastasis, and collagen regeneration through creation of MTZ [micro-thermal zones]. The thermal effect of MTZ may not only induce hyperplasia and reorganization of collagen fibers, but also accelerate tissue recovery by directly vaporizing pigment group or pigment cells, accelerating skin metabolism, and promoting the regeneration of dermis and epidermis, thereby reducing or eliminating mild to moderate wrinkles, improving skin texture and color, shrinking pores, and relieving skin flabbiness, achieving the immediate and long-term effect of firming skin.” (2)

“CO2 devices heat tissue much more intensely than non-ablative fractionated devices, ablating epidermal and dermal tissue with significant heating of the immediately adjacent dermal collagen. This collateral heating causes thermal alterations in the helical structure of the collagen fibrils and results in tissue shrinkage followed by collagen remodeling and skin tightening.” (5)

What are the benefits of PRP to my patients?

“While it takes six weeks for new collagen synthesis and about six months for the full effect of the treatments, the common response by patients after the initial treatment is that their skin has a “glow” and females wear less make-up and feel more comfortable when they are not wearing make-up.” (1)



What's the evidence that PRP works?

- 1- “Fibroblasts are among the cells that are activated by TGF-beta. When a fibroblast is activated it will under go cell division and produce collagen. Collagen deposition is responsible for plumping the skin and reversing the visible signs of aging.” (1)
- 2- “On the PRP-treated side, the epidermis is thicker, and the stratum corneum is better-organized than in the control specimen, and the collagen density is higher, with better organization of the thicker collagen fiber bundles.” (5)
- 3- “In summary, the results of the present study strongly suggest that the application of autologous PRP could be an effective method for enhancing wound healing, reducing transient unwanted adverse effects, and improving skin tightening after ... skin rejuvenation.” (5)

Summary of selected scientific studies

Study 1- In 14 patients treated with laser skin resurfacing and PRP on just one side, there was roughly a 10% improvement in patient satisfaction in facial wrinkles, skin texture and skin elasticity. "Patient in the experimental (PRP) group had a faster recovery, less duration of adverse events, and better effects than that in the control group. In the process of treatment, patients felt that any discomfort caused by laser therapy was relieved by coating with PRP." (2) Subjective scores of facial wrinkles, skin texture, and skin elasticity were higher than that in control group. Additionally, the total duration of erythema, edema, and crusting was decreased. Synergistic effect on facial rejuvenation, shortening duration of side effects, and promoting better therapeutic effect." (2)

Study 2 – 23 consecutive patients (age range 28-70, average 47) were treated with 3 monthly PRP injections alone. (3) When evaluated one month after the last session with state of the art computer assisted photography, there was an overall 29% improvement in the appearance of the skin. Facial scars including acne scars responded well. Patient satisfaction questionnaire results:

Do you think your general look has improved?	87% YES
Do you think your wrinkles have improved?	52% YES
Do you think your skin tonicity has improved?	82% YES
Please rate you degree of satisfaction with the treatment?	
Excellent improvement	0%
Very good improvement	4%
Good improvement	61%
Mild improvement	30%
No improvement	4%



Caption: Dermacope cheek photo before and after 3 monthly PRP treatments

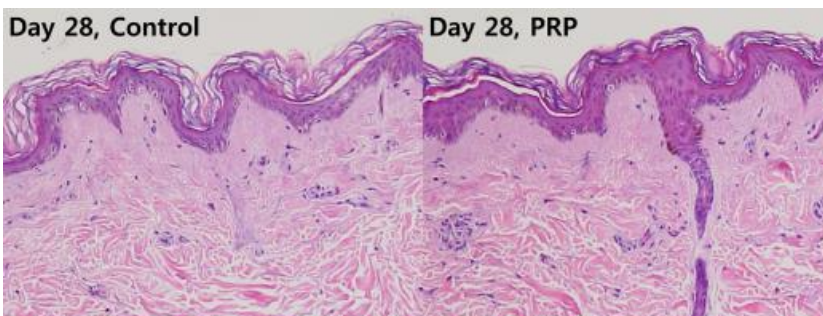


Caption: Scar treatment before and after 3 monthly PRP treatments

Study 3 –Four patients were treated with PRP once in the upper arm, and then had skin biopsies over a 10-week period. “Histologically, at 1 week, activated fibroblasts, new collagen deposition, and angiogenesis in the mid- to deep dermis was evident and were accompanied by focal areas of mild lymphocytic infiltrates” (4)

“As early as 7 days after treatment, activated fibro- blasts and new collagen deposition were noted and continued to be evident throughout the course of the study. Development of new blood vessels was noted by 19 days; also at this time, intradermal collections of adipocytes and stimulation of sub dermal adipocytes.” (4)

Study 4 - Fractional skin resurfacing was performed on the inner arms and single treatment PRP was injected on one side only. Biopsies were taken from 5 patients. The skin healed faster and the redness went away more quickly on the PRP side. Also, thicker collagen bundles were seen on the PRP treated side at one month. The results in the present study demonstrated that faster wound healing after laser treatment could also be achieved with the application of PRP.” (5)



Caption: Notice the thicker epidermis with a better-organized stratum corneum on the PRP side

Study 5 – Sclafani - 15 patients had a single PRP injection to the nasolabial folds with easily seen photographic results continuing for 3 months after treatment. (6) Here is a patient who underwent single treatment of naso-labial folds with PRP, (a) Pretreatment; (b) 2 weeks after treatment .



A - Pretreatment (before any treatment)



B - 2 weeks after single PRP treatment

Study 6 – Shin - 22 Korean women underwent 3 sessions of fractional laser. Half were also treated with PRP. “PRP combined with fractional laser increased subject satisfaction and skin elasticity and decreased the erythema index. PRP also increased the amount of collagen and the number of fibroblasts.” (7)

Study 7 – Zenker – This paper summarized the results of enlisted 172 patients in Japan (38-72 years), 194 patients in the U.K. (42-79 years), and 42 patients in Israel (46-74 years of age). “PRP is a form of biostimulation that is safe and creates an immediate long lasting volumetric effect with natural looking results...and provided a high level of patient satisfaction.” (9)

Conclusions:

“Platelet-rich fibrin matrix injection leads to development of new blood vessels, activation of fibroblasts with neocollagenesis and adipogenesis within the dermis” (4)

“Application of autologous PRP is an effective method for enhancing wound healing and reducing transient adverse effects after FxCR treatment.” (5)

PRP “can provide significant long-term diminution of deep NLFs without the use of foreign materials. PRFM holds significant potential for stimulated dermal augmentation.” (6)

“PRP with fractional laser treatment is a good combination therapy for skin rejuvenation. Keratinocyte and fibroblast proliferation and collagen production can explain the capacity of PRP to increase dermal elasticity.” (7)

Summary

The above evidence strongly suggests that PRP works. However, more studies are needed to determine the optimal amount of treatments needed and how long the results last. For now, though, PRP is a welcome addition to our rejuvenation treatments.

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