PRP and MN in Aesthetics

There has been much written about PRP (platelet rich plasma) and its use during microneedling (the Vampire Facial), with facial fillers (the Vampire Facelift), and other procedures. Briefly, PRP is prepared from the patient's own blood in the physicians' offices using specialized centrifugation and separation equipment. Regardless of what equipment is used (each varies in its efficiency of separating platelets), the objective is to exploit the high content of growth factors and cytokines found within the alpha granules contained in platelets. For their small size, alpha granules contain particularly high concentrations of these important cellular signaling molecules. And, to be fair, the use of PRP after "activation" of the alpha granules to release their bounty of bio-signals is well recognized as having proven medical benefit in a number of applications. These include orthopedics and sports medicine to promote healing and relieve pain e.g. bone defects, tendonitis, arthritis, ligament sprains and tears. It has also found usefulness in urogenital applications including the "O-shot", "P-shot", and penile augmentation. It is injected into the scalp with some success in restoring hair growth in balding patients. There is abundant literature attesting to these uses and others. PRP is the real deal, but not for everything. There are things for which it is less than ideal, and that includes aesthetics.

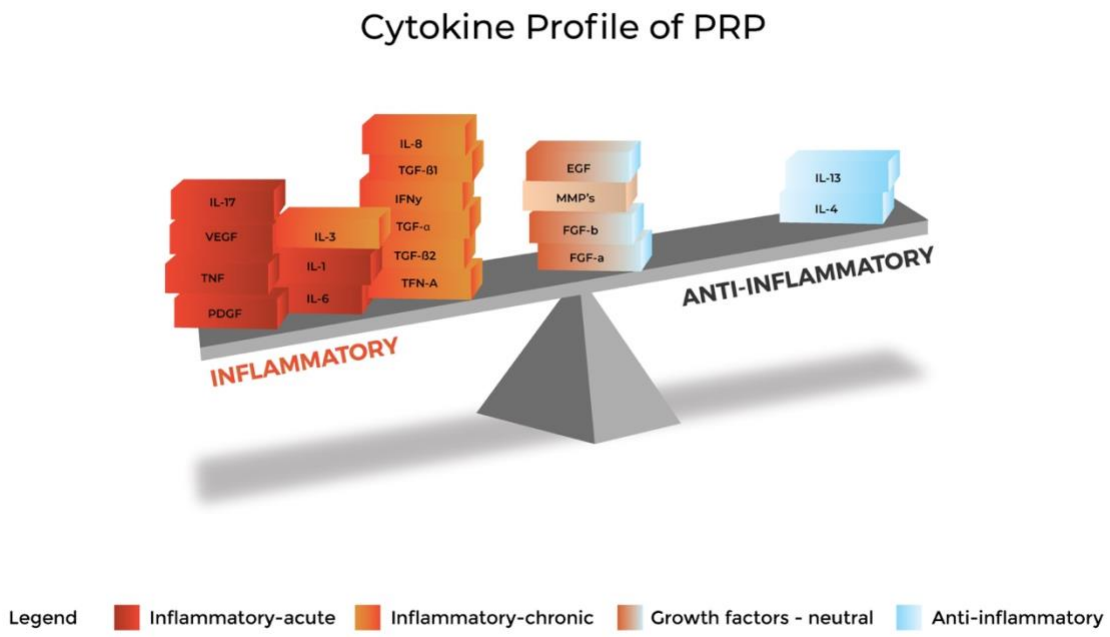
A little history: In the early 2000's, the use of PRP extended into orthopedics to boost healing in bone grafts and fractures. Continued success encouraged its use in sports medicine for connective tissue repair. The first human study published by Mishra and Pavelko, associated with Stanford University, supported the use of PRP for chronic elbow tendinosis in 2006. This study reported a 60% improvement immediately, 81% at 6 months and 93% decrease in pain at the final two year follow up. For injuries where a little boost in inflammatory response to improve vascularity and increase oxygen delivery is good, PRP plays a positive role. Healing in an inflammatory environment promotes fibrosis, or scar tissue. In the context of orthopedics, you would rather have a fibrotic ligament than no ligament at all, right?

Aesthetic physicians jumped on the bandwagon a few years later. But does the evidence favor the use of PRP in aesthetics? Unfortunately, no.

If you inherently understand the fundamentals of aging you know that when it comes to anti-aging and facial aesthetics, the growing opinion is that inflammation is not desirable. In fact, it is something to be avoided whenever possible. That's why we are not fans of products containing pro-inflammatory ingredients such as fat stem cell conditioned media. Applying products on a daily basis that promote inflammation is not anti-aging, it's the opposite.

Although there are a great many different growth factors and cytokines contained within the alpha granules of platelets, there are five that predominate, regardless of the method of isolation. In the reference that follows, the five major bio-signals are identified as: VEGF (vascular endothelial growth factor), PDGF-BB (platelet derived growth factor), TGF-β1 (transforming growth factor beta-1), IGF-1 (insulin-like growth factor-1), bFGF (basic fibroblast growth factor). But that is just the beginning. There are many others of significance including: interleukins 1, 3, 4, 6, 8, 13 and 17; TGF-a, TGF- β2, TNF-a, IFN-a, EGF, aFGF and MMP

(matrix metalloproteinases.) It is the sum of the collective effects of bio-signals that determines whether the pattern is pro-inflammatory or anti-inflammatory. The summary effect of PRP as depicted above is obvious: strongly inflammatory.



The effect then of applying PRP during microneedling is to exacerbate inflammation to jumpstart healing. Remember, inflammation when accentuated, persistent, or chronic, is what leads to fibrosis (scarring) and excess pigmentation in susceptible individuals. As you can see, we're not fans of PRP although we do know it is popular (remember, the physician gets paid handsomely for using it.) Though PRP does initiate healing, it is not the type of healing our skin wants or needs. In fact, the data suggests PRP with MN for facial aesthetics actually adds nothing of value…so why bother?

So, what to do? Several years ago, we developed a family of microneedling solutions that are used exactly how PRP is used, at the time of and immediately after microneedling. Our products are based on our old friend, bone marrow mesenchymal stem cell conditioned media and hyaluronic acid. These are highly effective in quenching the inflammatory response and promoting regenerative healing. Hundreds of thousands of treatments have utilized these products without reports of an adverse event, and scores of success stories.

Additional PRP info:

While many specialists say patients will recover from Vampire Facials in just one day, many find that their skin has not fully recovered even five days later. Bruising (especially under the eyes),

burning, intense itching, swelling, dryness, puffiness, and redness are results of the "facial" that can continue for up to a week after the procedure (1). Many claim the results are long-lasting (up to two years) but at the same time, they encourage a regimen of monthly treatments for three to four months and after that, on an annual or biannual basis. If treatments are so long-lasting, why would they need to be performed every month and every year?

The Truth about PRP

Claim: PRP Facials are regenerative because your platelets accelerate healing and vitality.

The Truth: This statement is more marketing than biology. Cell survival and interaction with parent cells are scientifically relevant, but insufficiently understood elements of platelets in their function of healing and revitalizing tissue (2). There are not reliable studies showing that platelets are useful in healing tissue. PRP's original function as a sports injury therapy has still not been proven effective. Doctors say they're still not sure if it helps with chronic or acute injuries. Studies show that PRP may be more effective when compared to cortisol injections, but its results do not hold when compared to placebos.

Claim: More platelets means more healing.

The Truth: Dosage is critical with many medicines. Routinely, higher dosage is worse for health. There is no evidence that increased platelets will speed up healing.

Claim: PRP is a natural treatment; it's safe and healthy because there's nothing foreign going into your body.

The Truth: There are lots of things in your body that are not beneficial to be extracted, increased in potency, and then returned to your system. Many hormones are part of the same healing process as platelets, but having too many will harm you.

Following the logic that having more of something natural is better, you would think that having more red blood cells is healthier, to give an example. Red blood cells are essential to life and provide vitality and healing. Yet hemochromatosis is a disease—an excess of iron—caused by the presence of too many red blood cells. In this case, absorbing too much is a problem, not a benefit.

On top of that, injecting materials into muscles is not unequivocally harmless. There's conflicting evidence about PRP being myotoxic, meaning poisonous to muscles (3).

Skin infections can also occur between multiple PRP Facial sessions, with a higher risk posed to those with sensitive skin.

Claim: Studies have shown that PRP is effective.

The Truth: The only good news is coming from isolated or scientifically flawed studies. Reliable, randomized controlled trials are largely inconclusive. "The observed trend towards benefit with PRP use still remains questionable" (4). The first rigorous study testing the effectiveness of platelet injections finds they are no more effective than injecting saltwater (5).

1. Maria Del Russo, "The Cold, Bloody, (Kind of Disgusting) Truth About Vampire Facials," http://www.refinery29.com/2016/10/128208/prp-treatment-vampire-facelift-review, October 31, 2016.

2. Vogel S M Gawaz, "Platelets in tissue repair: control of apoptosis and interactions with regenerative cells." *Blood* 122, no. 15 (October 2013):2550–4. PubMed #23963043.

3. "Myotoxicity of Injections for Acute Muscle Injuries: A Systematic Review." *Sports Medicine* 44, no. 7 (July 2014): 943-956, https://link.springer.com/article/10.1007/s40279-014-0186-6.

4. Dhillon RS, Schwarz EM, and Maloney MD, "Platelet-rich plasma therapy—future or trend?", *Arthritis Res Ther.* 14, no. 4 (August 2012):219, https://www.ncbi.nlm.nih.gov/pubmed/22894643.

5. Gina Kolata, "Popular Blood Therapy May Not Work," *New York Times*, (New York, NY), January 12, 2010.

MORE EVIDENCE/DATA

Vet J. 2017 Jun;224:76-84. doi: 10.1016/j.tvjl.2017.04.005. Epub 2017 May 2.

Comparison of autologous bone marrow and adipose tissue derived mesenchymal stem cells, and platelet rich plasma, for treating surgically induced lesions of the equine superficial digital flexor tendon.

Abstract

Several therapies have been investigated for equine tendinopathies, but satisfactory long term results have not been achieved consistently and a better understanding of the healing mechanism elicited by regenerative therapies is needed. The aim of this study was to assess the separate effects of autologous bone marrow (BM) and adipose tissue (AT) derived mesenchymal stem cells (MSCs), and platelet rich plasma (PRP), for treating lesions induced in the superficial digital flexor tendon (SDFT) of horses. Lesions were created surgically in both SDFTs of the forelimbs of 12 horses and were treated with BM-MSCs (six tendons), AT-MSCs (six tendons) or PRP (six tendons). The remaining six tendons received lactated Ringer's solution as control. Serial ultrasound assessment was performed prior to treatment and at 2, 6, 10, 20 and

45 weeks post-treatment. At 45 weeks, histopathology and gene expression analyses were performed. At week 6, the ultrasound echogenicity score in tendons treated with BM-MSCs suggested earlier improvement, whilst all treatment groups reached the same level at week 10, which was superior to the control group. Collagen orientation scores on histological examination suggested a better outcome in treated tendons. Gene expression was indicative of better tissue regeneration after all treatments, especially for BM-MSCs, as suggested by upregulation of collagen type I, decorin, tenascin and matrix metalloproteinase III mRNA. Considering all findings, a clear beneficial effect was elicited by all treatments compared with the control group. Although differences between treatments were relatively small. **BM-MSCs resulted in a better outcome than PRP and AT-MSCs.**

J Dermatolog Treat. 2017 Aug 7:1-18. doi: 10.1080/09546634.2017.1365111. [Epub ahead of print]

Skin microneedling plus Platelet-Rich Plasma versus skin microneedling alone in the treatment of atrophic post acne scars: a split face comparative study.

Abstract

INTRODUCTION:

Acne scarring is a permanent disfiguring sequel, which can take varied morphological forms. Many therapeutic measures have been performed to improve acne scarring such as microneedling. Our objective is to evaluate the efficacy and safety of microneedlingalone versus microneedling in combined with platelet rich plasma in the treatment of post acne Methods: The study included 35 patients with mild to severe post acne atrophic scar. All the patients received four sequential treatments of skin microneedling alone on the right side of the face and skin microneedling followed by topical application of PRP on the left side of the face with an interval of 3 weeks. Two blinded dermatologists evaluated the clinical response according to qualitative global acne scarring system grading of Goodman & Baron. Patients are queried about their satisfaction with the treatment outcomes.

RESULTS:

The study included 35 patients with a mean age of 24.7±6.8 years. There was a significant improvement in the degree of scar severity before and after treatment on both sides. Regarding patient's satisfaction grades there was a significant improvement after both treatment modalities with insignificant differences between both treatment modalities.

CONCLUSION:

Both microneedling and microneedling in combined with PRP showed satisfactory results. ***PRP adds NOTHING to microneedling...so why bother?***

Am J Sports Med. 2012 Jun;40(6):1274-81. doi: 10.1177/0363546512442334. Epub 2012 Apr 10.

Comparison of the acute inflammatory response of two commercial platelet-rich plasma systems in healthy rabbit tendons.

Dragoo JL1, Braun HJ, Durham JL, Ridley BA, Odegaard JI, Luong R, Arnoczky SP.

Author information

Abstract

BACKGROUND:

Numerous studies have shown platelet-rich plasma (PRP) preparations differ with respect to the inclusion of certain blood components, which may affect the host's cellular response.

HYPOTHESIS:

This study evaluated the inflammatory effect of Biomet GPS III leukocyte-rich PRP (LR-PRP) versus MTF Cascade leukocyte-poor PRP (LP-PRP) after intratendinous injection in an animal model. The authors anticipated that LR-PRP would incite a greater acute inflammatory response than LP-PRP.

STUDY DESIGN:

Controlled laboratory study.

METHODS:

A total of 17 skeletally mature New Zealand White rabbits were tested. In all cases, healthy patellar tendons were treated. In the control animals, one patellar tendon was injected with 2 mL autologous whole blood, and the other was injected with 2 mL sterile saline. Seven total tendons were injected with whole blood, and 7 tendons were injected with saline. In the experimental animals, one patellar tendon was injected with 2 mL LR-PRP, and the other was injected with 2 mL LP-PRP. Ten tendons were injected with LR-PRP, and 10 tendons were injected with LP-PRP. Animals were euthanized at 5 or 14 days after injection. Tendons were harvested and stained using hematoxylin and eosin and scored semi-quantitatively for total white blood cells (WBCs), mononuclear cells (macrophages and lymphocytes), polymorphonuclear cells (PMNs), vascularity, fiber structure, and fibrosis.

RESULTS:

At 5 days after injection, tendons treated with LR-PRP had significantly greater overall tendon scores (6.3 ± 1.79 vs 1.8 ± 1.64, P = .012), as well as mean scores for fiber structure (1.4 ± 0.22 vs 0.50 ± 0.50, P = .012), denoting disrupted composition, total WBCs (1.1 ± 0.89 vs 0.10 ± 0.22, P = .014), mononuclear cells (macrophages and lymphocytes) (0.80 ± 0.45 vs 0.10 ± 0.22, P = .014), vascularity (1.7 ± 0.27 vs 0.80 ± 0.16, P = .008), and fibrosis (1.0 ± 0.35 vs 0.3 ± 0.45, P = .037) compared with tendons treated with LP-PRP. Otherwise, there were no significant differences in mononuclear cells (P = .590), PMN cells (P = 1.00), total WBCs (P = .811), vascularity (P = .650), or total tendon score (P = .596) in any of the treatment groups at 14 days.

CONCLUSION:

Compared with leukocyte-poor Cascade PRP, leukocyte-rich GPS III PRP causes a significantly greater acute inflammatory response at 5 days after injection. There is no significant difference in the inflammatory response or cellularity regardless of the injection type at 14 days after intratendinous injection.

CLINICAL RELEVANCE:

Platelet-rich plasma injections are frequently prepared using commercial systems and are administered for clinical treatment of chronic tendinopathy. It is important to characterize the cellular responses elucidated by different injection preparations to further understand their effect on tissue healing and aid clinical decision making. Future investigations are necessary to apply these findings to the clinical setting. ***HIGHLY INFLAMMATORY***

Arthroscopy. 2019 Oct;35(10):2885-2886. doi: 10.1016/j.arthro.2019.06.015.

Editorial Commentary: Platelet-Rich Plasma or Profit-Rich Placebo: Variability of Composition, Concentration, Preparation, and Many Other Yet-Unknown Factors Determine Effectiveness.

Hohmann E.

Abstract

Platelet-rich plasma (PRP) frequently is used in orthopaedics, and its application is supported by clinical studies for a variety of conditions. For knee osteoarthritis, it is more effective than hyaluronic acid, providing significant better pain relief and functional improvement. However, different compositions of PRP, absolute platelet counts, and many other physiological and demographic variables will influence the effectiveness. Variability of the composition of the ingredients of PRP surely has a substantial influence on outcome.

Even in orthopedics the benefits are highly questioned.

The LARGEST meta-analysis of all the literature on PRP/aesthetics suggest no benefit.

J Dermatolog Treat. 2016;27(3):285-9. doi: 10.3109/09546634.2015.1094178. Epub 2015 Oct 14.

Applications of platelet-rich plasma in dermatology: A critical appraisal of the literature.

Lynch MD[1], Bashir S[1].
Author information

Abstract

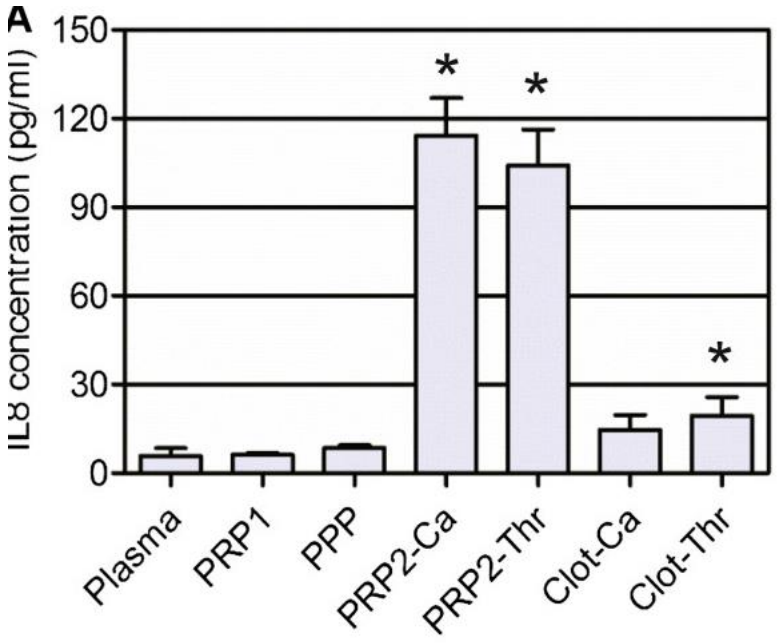
Platelet-rich plasma (PRP) is an autologous blood-derived product enriched in platelets, growth factors, chemokines and cytokines. Initial applications were predominantly in musculoskeletal and maxillofacial fields, however in recent years, it has been used for a range of dermatological indications including wound healing, fat grafting, alopecia, scar revision and dermal volume augmentation. Here, we critically appraise the literature relating to the usage of PRP within Dermatology. We have evaluated in vitro data, preclinical animal studies and human trials. **We conclude that, whilst the literature may be consistent with a modest benefit for specific indications, there is not sufficient evidence supporting the efficacy of PRP to justify a role in routine dermatological practice at the present time**. However, since PRP is generally well tolerated with few reported complications, further study may be justified in the context of organized trials.

Table 5

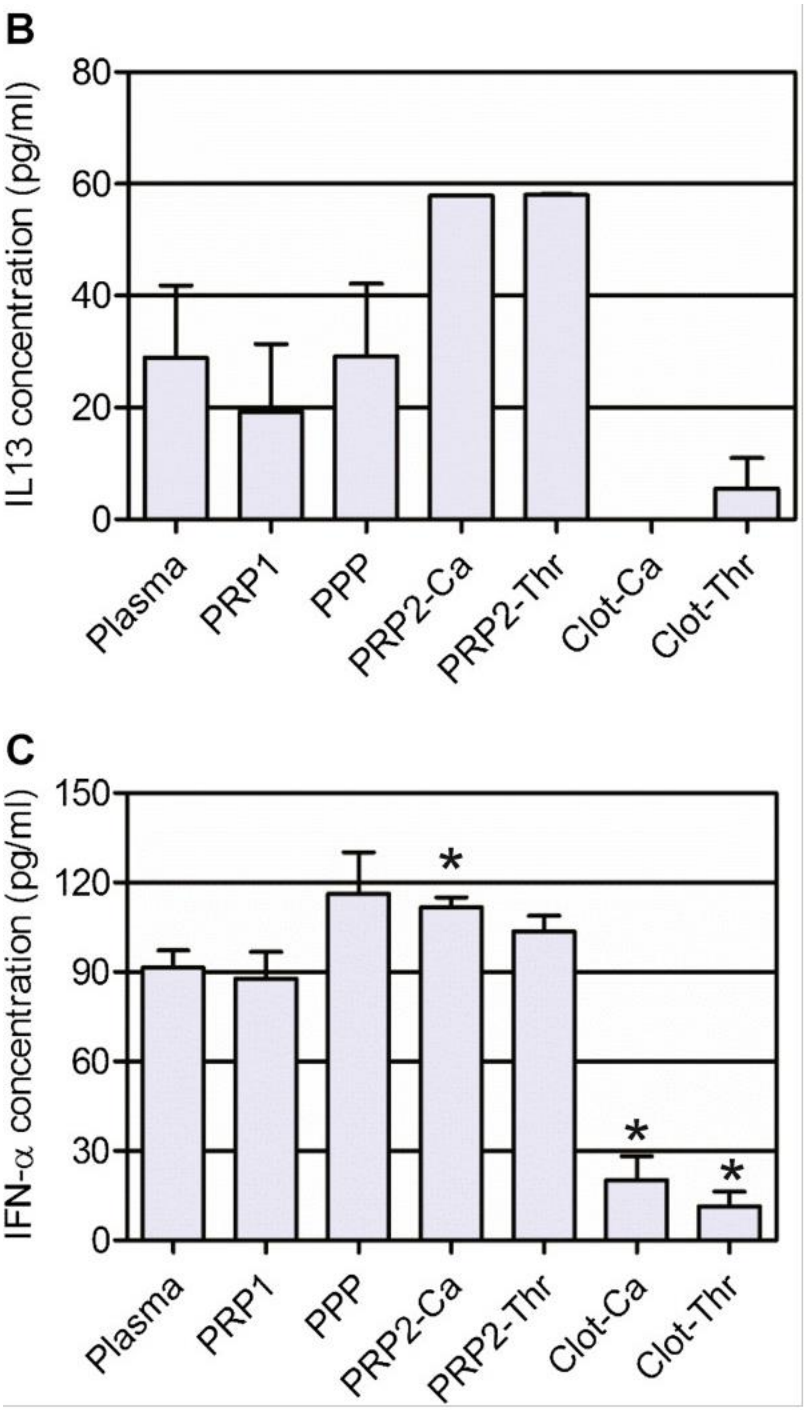
Statistical comparison (q-values) of cytokine concentration between plasma and activated PRP2

Cytokine	PRP2-Ca	PRP2-Thr	Result
PDGF-AA	**6.674**	**5.931**	**Platelet-secreted factor**
PDGF-AB	**9.352**	**9.556**	**Platelet-secreted factor**
PDGF-BB	**8.072**	**7.886**	**Platelet-secreted factor**
IGF-1	0.038	0.302	Plasmatic factor
TGF-β1	**5.912**	**4.143**	**Platelet-secreted factor**
TGF-β2	**5.574**	**3.850**	**Platelet-secreted factor**
TGF-β3			Not detected
EGF	**9.243**	**8.386**	**Platelet-secreted factor**
IL-5	2.568	2.539	Plasmatic factor
IL-6	0.303	0.388	Plasmatic factor
Eotaxin	5.829	6.169	a

IL-8 is HIGHLY INFLAMMATORY



OTHERS IN THE SAME CATEGORY BELOW



CONCLUSION: PRP adds NOTHING beneficial to MN.