Although it had been used for some time in orthopedic medicine and related specialties, platelet rich plasma or PRP entered the national consciousness just a few years ago via celebrity endorsement on social media of its purported aesthetic benefits. With time, aesthetic physicians have grown more familiar with the procedure and a body of evidence has accumulated. Skepticism has yielded to acceptance, and while there are no good statistics on adoption available at this time, it seems a significant proportion of dermatology practices now offers PRP.

Despite a number of studies now showing that PRP provides benefit for multiple aesthetic and/or medical applications, there is no consensus on the appropriate role for PRP in practice, nor are there clear expectations of effect or standardization of technique. However, the procedure is considered safe, with little to no risk associated with it. It has a low cost to the patient and the practice, and it has no downtime.

Ahead is a look at some of the literature on PRP, a review of its applications in dermatology, and an assessment of its current and future role in patient care.

**REGULATION OF PRP**

Some critics dismiss PRP as an “unregulated” procedure, which is technically not true. It is not a drug and it is not subject to the requirements that affect pharmaceutical marketing. The FDA classifies PRP as a biologic product and provides oversight of PRP and devices marketed for use in harvesting PRP through its Center for Biologics Evaluation and Research (CBER).

The FDA defines PRP:

> Platelet rich plasma shall be prepared from blood collected by a single uninterrupted venipuncture with minimal damage to and manipulation of the donor’s tissue. The plasma shall be separated from the red blood cells by centrifugation within 4 hours after completion of the phlebotomy or within the timeframe specified in the directions for use for the blood collecting, processing, and storage system. The time and speed of the centrifugation shall have been shown to produce a product with at least 250,000 platelets per microliter. The plasma shall be stored at a temperature between 20 and 24 deg. C immediately after filling the final container. A gentle and continuous agitation of the product shall be maintained throughout the storage period, if stored at a temperature of 20 to 24 deg. C.

**By the Numbers**

- **5-10x** The concentration of platelets in PRP compared to that typically found in blood
- **30+** The number of bioactive proteins found in platelets
- **7 Fundamental** protein growth factors secreted by platelets
- **3 Proteins** also found in PRP include: Fibrin, fibronectin and vitronectin
- **20-30mL** Amount of blood commonly drawn to harvest PRP for AA injections
- **15 Minutes** needed to centrifuge blood to produce PRP
To date, in-office devices and systems for harvesting and centrifuging blood to create PRP are FDA-cleared based upon the predicate device that was first developed for orthopedic indications. These devices are cleared “for producing platelet-rich preparations intended to be used to mix with bone graft materials to enhance bone graft handling properties in orthopedic practices.” As such, manufacturers of these centrifuge devices are not permitted to market their systems or the plasma they produce for aesthetic indications. When physicians use PRP for non-orthopedic applications, this use is “off-label.”

Of course, dermatologists are comfortable with off-label use, which is fairly common within the specialty. In a spirit of full disclosure and to prevent potential patient confusion, it is common to disclose to patients any time that a procedure or treatment is recommended to them for “off-label” use. Additionally, as with any aesthetic procedure, patients should be educated on potential benefits and risks and sign an informed consent prior to treatment with PRP.

WHAT IS PRP?

PRP was first isolated by hematologists and employed as a treatment for thrombocytopenia. Because of high levels of fibrin in PRP, it soon was adopted into maxillofacial surgery. However, the widest use had probably been in sports injury and related fields. There are four main forms of PRP. Dhurat et al. provide a concise breakdown:

1. Pure Platelet-Rich Plasma (P-PRP) or leucocyte-poor PRP products are preparations without leucocytes and with a low-density fibrin network after activation.
2. Leucocyte- and PRP (L-PRP) products are preparations with leucocytes and with a low-density fibrin network after activation.
3. Pure platelet-rich fibrin (P-PRF) or leucocyte-poor platelet-rich fibrin preparations are without leucocytes and with a high-density fibrin network. These products only exist in a strongly activated gel form, and cannot be injected or used like traditional fibrin glues.
4. Leucocyte- and platelet-rich fibrin (L-PRF) or second-generation PRP products are preparations with leucocytes and with a high-density fibrin network.

The process for harvesting autologous PRP typically consists of these steps:

• Blood collection
• Initial centrifugation to separate red blood cells
• Subsequent centrifugations to concentrate platelets, and other components
• Potentially addition of a platelet agonist.

The precise mechanisms through which PRP confers benen-

NON-DERMATOLOGIC APPLICATIONS OF PRP

Multiple studies in the literature show beneficial effects of PRP when used in orthopedic and sports medicine applications. Typically for these applications, either PRP is applied to the site of injury via injection or the surgical site is bathed in PRP at the time of a procedure. Use of PRP in these spe-
Potential applications for PRP in dermatology encompass both traditionally medical and aesthetic conditions. Among the former are melasma, acne scarring, and androgenetic alopecia.

A review of the literature specific to knee and hip osteoarthritis concluded, based on 26 studies, that the evidence supports use of PRP, which is, “proven to temporarily relieve pain and improve function of the involved joint with superior results compared with several alternative treatments.”

More recently, Hussain, et al. concluded that the evidence was favorable for use of PRP to provide some benefit in patients who present with knee osteoarthritis or lateral epicondylitis. Evidence was inconsistent or less robust for use of PRP in rotator cuff repair, patellar and Achilles tendinopathies, hamstring injuries, anterior cruciate ligament (ACL) repair, and medial epicondylitis. This analysis also noted that there is “limited confidence in the conclusions from the published meta-analyses due to issues with statistical pooling, and limited subgroup analyses exploring the substantial heterogeneity across studies.”

PRP IN DERMATOLOGY

Potential applications for PRP in dermatology encompass both traditionally medical and aesthetic conditions. Among the former are melasma, acne scarring, and androgenetic alopecia. PRP may be applied topically to the skin, usually after microneedling or fractional resurfacing, or via injection.

A systematic review of articles published between 2006 and 2015 looked at 22 clinical studies and case reports for platelet-rich plasma alone and/or in combination with fat grafting for facial rejuvenation, acne scarring, or androgenic alopecia. Researchers concluded that the majority of studies reported positive results for all indications evaluated. However, the authors noted it was challenging to compare
“While clinicians would welcome additional controlled trials for common applications, such as AA, acne scarring, and facial rejuvenation, the available data support use of PRP for these conditions. Further research may uncover additional applications for this convenient, pain-free, no-downtime intervention.”

studies due to lack of standardized method for preparation and application of PRP.7

When researchers compared the effects of PRP application using microneedling versus microinjections for the management of melasma, they found that PRP provided a statistically significant improvement in the appearance of skin discoloration with no significant difference in the degree of improvement between the two application approaches.8

A total of 40 patients participated in a split-face trial of autologous PRP and subcision against subcision alone in acne scars. Platelet-rich plasma and subcision showed greater improvement (32.08 percent) in post-acne scars compared to subcision alone (8.33 percent). There was a slightly higher rate or response in rolling acne scars, followed by box-type scars.9

For management of AA, PRP provided via injection has been widely adopted, often in conjunction with hair transplantation or other modalities. Multiple clinical trials have demonstrated beneficial effects of PRP on hair density, count, and thickness, as well as a lack of identifiable complications and a high level of convenience.10 A clinical trial assessed each of four possible interventions in a series of patients: No treatment, PRP injection, suture embedding, and combined PRP injection/suture-embedding. PRP injection was shown to produce increased diameter of the hair (P = 0.034), and the combined PRP injection/suture-embedded treatments had a significant effect on scalp thickness, blood flow through the scalp, and diameter of the hair.11

In another prospective, randomized, single-blinded trial among 40 patients with moderate AA, participants received subdermal PRP injections according to one of two protocols. At six months, both groups demonstrated statistically sig-

nificant increases in hair count. However, the improvement occurred more rapidly and more profoundly for those subjects receiving three monthly sessions with a booster three months later, compared to those undergoing two treatment sessions every three months. Patient satisfaction was high.12

Research, which is still in its early stages, has identified several growth factors thought to have a positive effect on hair growth. These are

- Platelet-derived growth factor (PDGF)
- Epidermal growth factor (EGF)
- Fibroblast growth factor 2 (FGF2)
- Insulin-like growth factor 1 (IGF-1)
- Vascular endothelial growth factor (VEGF).2

There is some speculation that transforming growth factor beta (TGF-beta) may inhibit hair growth.

Protocols for use of PRP in AA vary. The International Journal of Trichology published a proposed standard protocol last fall that may be beneficial for further reading.13

One of the authors (Dr. Crutchfield) finds that PRP injec-
tions for hair growth produce about a 75 percent success rate. Having used most systems, he has had the best success with the Selphyl PRP kit, which utilizes active platelets. Figures 1a and 1b show his own scalp after two Selphyl treatments of 8ccs, spaced one month apart. A concentration of 2-4x normal appears to be ideal. Note that some think that higher concentrations are counter productive.

In the aesthetic realm, a comprehensive review of the literature regarding the use of platelet rich plasma in aesthetic surgery identified 38 reports on aging skin (29 percent), scalp alopecia (26 percent), lipofilling (21 percent), fractional laser (13 percent), and facial surgery (11 percent). Ninety-five percent of studies claimed effectiveness, however, it should be noted that roughly half of the reports were cases without controls, and a similar proportion lacked objective measures. Another systematic review looked at a total of 22 manuscripts, this time including post-procedure recovery and treatment of striae distensae. This analysis similarly found generally positive outcomes and noted that the combination of PRP with other therapies is of particular interest.

In a study that compared the aesthetic effects of microneedling via dermaroller to microneedling plus trichloroacetic acid (TCA) peel or microneedling plus PRP, both combinations showed significant improvement compared with dermaroller alone. The researchers note, “Significant increase in epidermal thickness was apparent in studied groups, especially after combined treatment with TCA. Organized collagen bundles with newly formed collagen formation and markedly decreased abnormal elastic fibers were noticed in the three studied groups. However, improvement of dermal structures was better demonstrated after combined treatment of Dermaroller and PRP than Dermaroller and TCA 15%.”

An emerging approach to the use of PRP is coming from Asia where physicians are combining PRP with fillers for injection. A retrospective chart review was performed over a two-year period for 75 Asian participants with a mean age of 43.5 years who underwent injection with an HA-based dermal filler mixed with PRP. Six months after the last injection, 100 percent of participants had improvement. Six months later, 97.3 percent of participants maintained improvement over baseline, and 90.7 percent felt much better or a little better until two years after the injection. There was a low incidence of complications.

Given the novelty of this approach, it may be best to await further study before implementing into practice.

Dr. Crutchfield uses PRP as a component of facial rejuvenation to treat under eye sallowness and crepiness/wrinkles. Using the Selphyl kit, 2ccs are injected under each eye, spaced monthly for four treatments.

For general facial rejuvenation, one PRP treatment is followed a month later with Botox and filler, as needed. Many refer to this as the “liquid facelift.” Figures 2a and 2b and 3a and 3b show patients treated with the liquid facelift protocol, including under the eyes.

**NOW WHAT?**

The evidence thus far shows that PRP is potentially effective and safe. Assuming appropriate handling of human blood products—including proper measures to avoid contamination and to assure PRP is provided only to the original donor—there appears to be little to no risk to the patient. The cost of centrifuge systems is quite reasonable, and the investment of staff and physician time is low. Therefore, practices can provide PRP at a price-point that is attractive to the patient while still worthwhile to the practice.

While clinicians would welcome additional controlled trials for common applications, such as AA, acne scarring, and facial rejuvenation, the available data support use of PRP for these conditions. Further research may uncover additional applications for this convenient, pain-free, no-downtime intervention.

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