RECONSTRUCTIVE SURGERY

Platelet gels have global applications in surgery and are especially useful for soft and bony tissue reconstructions encountered in plastic and reconstructive surgery. In these applications their use has been associated with a decrease in operative time, necessity for drains and pressure dressings, and incidence of complications. When applied to bony reconstruction it provides adhesion for the consolidation of cancellous bone and comminuted fracture segments.

When autologous platelet gel is applied to tummy tucks, breast lifts, or breast re-constructions, seroma and hematoma formation are significantly reduced, and flap take is enhanced.

Reconstructive surgery is comprehensive discipline having to do with skin, muscles, tendons, bones, fat and so on. Please readdress to more specific sections of this website for particular items about the clinical use of Plateltex, platelet-rich plasma, and platelet gel.

PLASTIC AND AESTHETIC SURGERY

By providing supraphysiologic concentrations of platelets and platelet-derived growth factors, the autologous platelet gel accelerates hemostasis to limit bleeding complications and enhances wound healing and tissue repair.

FACIAL PLASTIC SURGERY

Platelet gel hastens hemostasis, accelerates epidermal and epithelial regeneration, promotes angiogenesis, increases recollagenation, enhances wound strength, improves tissue regeneration, decrease dermal scarring, and facilitate remodeling.
Before accepting cosmetic surgery, patients identify scarring, healing, pain, and outcome as major concerns. The treatment with platelet gel eliminates a lot of these worries. Platelet gels has been known to improve the healing of surgical wounds, minimizing infection, swelling, pain, bruising, and scarring. PRP does all this while hastening the closure of the wound and improving incision lines. Patients experienced less pain and edema in the postoperative period; the discomfort and hassle normally associated with the cosmetic surgery is minimized if not eliminated.
Many hundred patients undergoing various surgical procedure such as skin resurfacing, blepharoplasty, facelift, forehead lift, cervicofacial liposuction and rhinoplasty have experienced the benefit of using the autologous platelet gel. There is plenty of evidence that autologous platelet gel significantly reduces intraoperative bleeding and oozing, minimizes bruising, decreases postoperative pain, speeds healing and hastens reepithelialization in laser skin resurfacing. Patient recovery times are reduced up to 40%. Patient acceptance levels are high.

The use of platelet gel in cosmetic procedures such as endoscopic brow lifts, midface lifts, lipotransfer procedures, and laser resurfacing is highly effective. Furthermore, the batroxobin activated platelet-poor solution can be used as an additional hemostatic agent. The regular prophylactic use of the platelet gel and of the activated platelet-poor fraction (using **Plateltex® PREP** the platelet-poor plasma is the supernatant fraction obtained after the second centrifugation) one can nearly eliminate the need for drains, pressure dressings, and endonasal packing. The benefit for the patients, the reduced healing rate, the cost saving for drains, dressing, and medication, definitely counterbalances the cost of the disposable materials required to obtain the platelet concentrate. Furthermore, at present **Plateltex®** is the cheapest disposable in the market.
Ameliorating facial wrinkles with IPL, RF, LED and non-ablative fractional resurfacing requires many interval treatments, is labour intensive and results are usually modest and variable. Hyaluronic fillers are popular for periorbital and perioral fine line rejuvenation. Nevertheless, results are mostly short lived and skin granulomas forming lumps are a big draw back. Non-invasive face rejuvenation devices are unable to affectively address, jowls, midface ptosis, sagging and creasing of the forehead and neck. Autologous PRP offers the patient a one-off biologic treatment that lasts for 6-8 months. Results from Japan, Chorea, Thailand, Europe, England and South Africa indicate that the aesthetic use of PRP is safe and efficacious. Reversible minor bruising, swelling and

erythema may follow treatment with PRP. All persons injected respond subjectively with positive improvement of skin complexion. Platelet gel dressing after laser resurfacing significantly eliminates the weeping, reduces bleeding, swelling, post-operation pain, and speeds the healing and the recovery time.
Recently it has been maintained (Du Toit et al. The Specialist Forum 2008;8:15-23) that "autologous platelet-rich plasma administered in the form of dermalfacial mesotherapy can be used as stand alone therapy or other non-ablative therapy to treat modest facial wrinkling. The post-PRP outcomes are enhanced by application of vitamin-A creams or phototherapy. **Post-PRP mesotherapy shows quantitative improvement of wrinkle micro-relief, skin biometrics, and epidermal morphology**. This includes improvement of peak-trough amplitude and anisotropy/topography. PRP alone renders better results than hyaluronic filler on digital scanning".

In important cosmetic centers, platelet gel is routinely used in **facelift** surgery. Many hundred patients have been treated accordingly in total facelift program thus reducing bruising, swelling, drains, and pain and cutting the healing time in half.
In an experimental trial on **rhytidectomy (face-neck lift),** subjects receiving platelet gel treatment had significantly decreased surgical drain fluid levels over the first 24 hours postoperatively compared with subjects who did not receive the treatment (Brown SA et al. Plast Reconstr Surg 2006118:1019-1025). In another trial on deep-plane rhytidectomy platelet gel prevented/improved edema and ecchymosis in the early phases of recovery (Powell DM et al Arch. Facial Plast Surg.2001; 3:245). Similar results were reported in a cohort of patients treated with plastic surgery procedures including **face lifts, neck lifts, breast augmentation, breast reduction** (Man D et al. Plast Reconstr Surg 2001;107:229).

In some cosmetic procedures autologous fat is used such as filler. Also in this case platelet gel has been documented to be useful. For **autologous fat grafting**, fat is removed through traditional liposuction techniques and the PRP may then be added directly to the graft material in a gel form. Studies have shown that the PRP enhanced grafts have a higher potential for graft acceptance and retention than traditional fat grafting techniques, along with decreased swelling and bruising in the donor sites. Patients showed continued results for as much as one to two years after autologous fat grafting with PRP.

RHINOPLASTY
After **rhinoplasty** patients experience several discomforts. Swelling subsides in 4-6 weeks, but subtle swelling may persist for 6-12 months. Most bruising last for up three weeks. Nasal breathing may be difficult for 2-3 weeks after surgery due to swelling inside the nose. Decongestive nasal sprays may actually cause damage to the nose and impair healing. All these symptoms are strongly reduced by using platelet gel during surgery. Many hundred patients experienced this benefit so that a common patient's comment is "*no one could believe how quickly my swelling and bruising healed*!".

KELOIDS AND HYPERTROPHIC SCARS
Keloids and hypertrophic scars are characterized by an accumulation of excess collagen. Collagen remodelling during the maturation phase depends on continued collagen synthesis in the presence of collagen destruction. Collagenases and matrix metalloproteinases in the wound assist removal of excess collagen while synthesis of new collagen persists. During remodeling, collagen becomes increasingly organized.Type III collagen is replaced by type I collagen. Remodeling begins approximately 21 days after injury and may continue indefinitely. Peak tensile strength of a wound occurs approximately 60 days after injury. A healed wound only reaches approximately 80% of the tensile strength of unwounded skin. **Keloids** grow beyond the borders of the original wound and do not tend to resolve spontaneously. **Hypertrophic scars** stay within the limit of the original

wound and do tend to regress spontaneously. Hypertrophic scars are generally seen soon after tissue injury, whereas keloids can form as late as a year after injury. Type III collagen is prevalent, suggesting a failure in scar maturation.

Little is known about the etiology of keloid and hypertrophic scar formation. The prevalence of post-lesion keloids is 1-16% depending on age and racial groups. Children younger than 11 y.o. are virtually free of keloid formation; blacks are more prone to keloid formation. Genetic predisposing factors are supposed.

The study of fetal wound healing is intriguing. Wounds occurring in fetuses of early gestational age can heal without any scar formation. Proposed contributing factors to scarless healing in fetal wounds are the presence of fewer neutrophils and more monocytes during the inflammatory period, **different concentrations of cytokines**, and a greater proportion of type III collagen in contrast to adult wounds. In addition, fibronectin is more abundant in fetal wounds.
In healthy individuals, **platelet-rich plasma** may accelerate wound closure in full-thickness dermal wounds. Albeit platelet gel is used since a decades and more, there is no clinical evidence published of an increase risk of keloid or hypertrophic scar formation with this treatment based on topical delivery of high-dose platelet-derived factors. Moreover, **physicians who have used platelet gel in large series of patients observed reduced rate of keloid and hypertrophic scar formation**. In spite of this shared perception, no large clinical trial has been published demonstrating reduced keloid formation after treatment with platelet gel. Just a recent study performed on a small series of patients has evidenced no keloid formation in patients treated with the platelet gel in Achille tendon surgery, compared with the evidence of keloid formation in some patients belonging to the control group (Sanchez M et al. AJSM 2007;35:245-251). It is likely that platelet-gel, providing fibronectin and hyperconcentrated platelet-derived growth factors, might **modulate the inflammation and proliferation phases of the wound-healing process thus reducing the risk of keloid and hyperthrophic scar formation**.