Portrait PSR Technology

MULTIPLE CONDITIONS EFFECTIVELY TREATED WITH THE PLASMA SKIN REGENERATION SYSTEM

By Christopher B. Zachary, M.D.

The impact of the economic crash in 2008 was felt by many of us, both personally and professionally. Some of what happened was predictable, most was unforeseen. One unexpected turn of events in the aesthetic market was the loss of a new treatment technology, namely the use of plasma energy (Portrait® Plasma Skin Regeneration, PSR).

PSR treats many aspects of chronic sun damage and various other skin conditions and has delivered effective cosmetic outcomes based on an extensive series of preclinical and IRB-controlled studies.

PSR characteristically treats many aspects of chronic sun damage and various other skin conditions, including superficial and deep wrinkles, dyschromia, actinic keratoses, some benign skin lesions, and acne scarring, while improving skin tone, texture, and elasticity. PSR had achieved significant success in the market with its distinctive mechanism for treating skin architecture to achieve cosmetic improvement using a completely different technology from the traditional laser, light, and RF technologies. Unfortunately, the company that introduced PSR hit the perfect economic storm and had to pull out of the market after three years, even though several hundred systems were sold to physicians in the U.S. and 30 other countries and after treating an estimated 40,000 patients.[1]

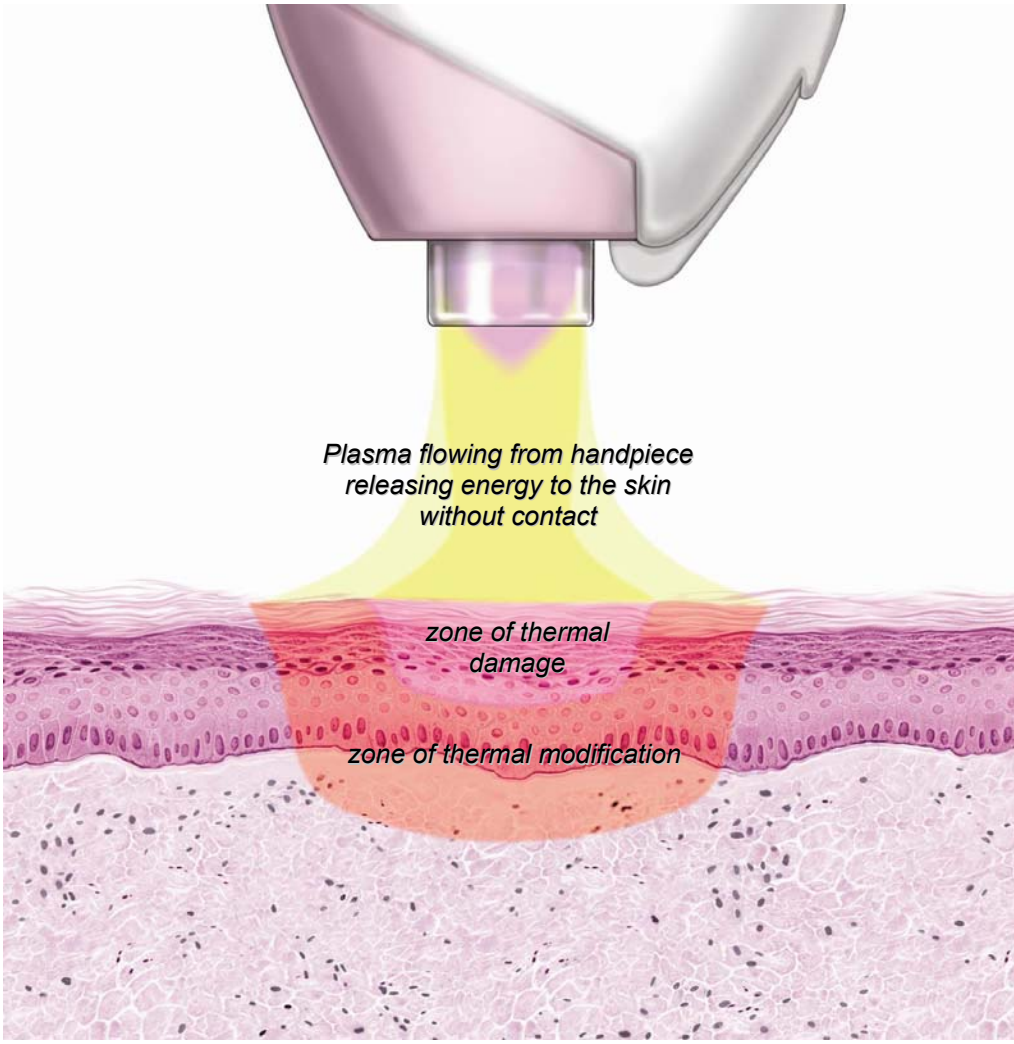
However, PSR has recently been reintroduced by Energist Group and Energist North America. This is positive news for those who purchased this system, as the plasma technology offers additional treatment options for patients. As a new technology, PSR actually delivered effective cosmetic outcomes that were claimed, as they were based on an extensive series of preclinical and IRB-controlled studies by reputable physicians across several aesthetic specialties. Furthermore, now there are proven long-term patient results out over five years.

NITROGEN PLASMA
A Unique Energy Source for Treating the Skin

PSR delivers millisecond pulses of nitrogen (gas) plasma to the skin's surface that initiates a somewhat unique regeneration response in the skin's architecture.[2] Gas plasma is different from other

plasma sources used previously in dermatology or cosmetic surgery. Nitrogen plasma is generated when electrons are stripped from the diatomic nitrogen atoms by employing pulses of ultra-high-frequency energy to ionize the gas in the handpiece rather than at the tissue surface. Hence the plasma transfers its thermal energy without contact by the handpiece.

Plasma energy flowing from handpiece

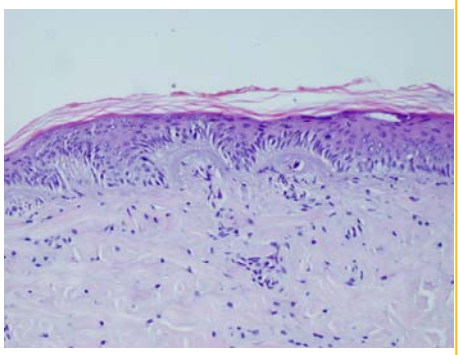


The thermal energy given up by the plasma produces short-lived, rapid elevations in the skin's surface temperature that creates a uniform distribution of thermal energy transfer into the dermis, the depth depending on the amount of energy used in treatment. The result is an efficient and even delivery of energy to the whole skin architecture. This is very different from lasers, light sources, and ablative lasers in that it is not dependent on chromophore interaction to create the thermal effect and does not vaporize tissue. This plasma energy treats the whole skin architecture, which is different from some popular fractionated treatments. Upon treatment, intact desiccated stratum corneum and epidermal layers are left in place (the depth of this zone of thermal damage is dependent on the energy setting), which acts as a natural biologic dressing to promote wound healing and rapid recovery. Below this zone, a zone of thermal modification is created, with thermal depths reaching 500 to 600 microns at high energy settings. The temperatures created at these depths fall just below the threshold for damaging collagen, causing neocollagenesis to occur and decreasing elastosis.

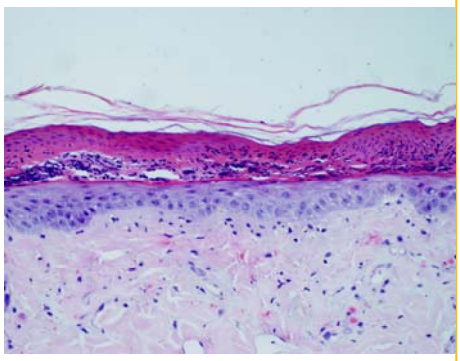
HISTOLOGICAL REVIEW

In histological studies[2] the juncture of the zones of thermal damage and modification forms the line of cleavage where the desiccated, thermally damaged tissue sheds naturally after 4-5 days, only after the formation of a newly regenerated healthy skin architecture. The depth of the line of cleavage is energy-dependent. Long-term histological studies performed on plasma resurfacing patients have confirmed that collagen production, reduction of elastosis, and progressive skin rejuvenation continue beyond one year after treatment.

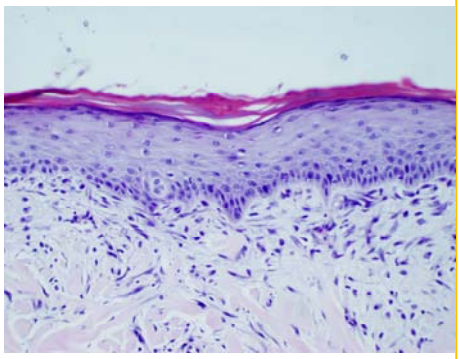
TREATMENT HISTOLOGIES



Immediately post-treatment at 3.5J showing an intact epidermis and vacuolation of epidermal cells at the DE junction initiating skin regeneration (above).



Regeneration of a new epidermis is just below the epidermis and upper dermis which are being shed. The depth at which shedding occurs is energy dependent and comprises the zone of thermal damage (above).



Completed skin regeneration where the thermally modified dermis is undergoing intense fibroblast activity, regenerating a healthy natural skin architecture (above).

TREATMENT OPTIONS

The PSR technology has FDA clearances for treatment of rhytides (both face and off-face), acne scars, superficial skin lesions, actinic keratosis, viral papillomata and seborrhoeic keratosis. A range of protocols with variable energy settings allows the physician to choose an appropriate treatment depth based on the severity of sun damage, wrinkles, skin conditions, and laxity. Energy is delivered from 1 to 4 joules (J) with repetition rates of 1-2.5Hz (very low energy of 0.65J can be delivered using a 25mm spacer).

These treatment choices allow an approach tailored to fit a patient's lifestyle and expected outcome.[3] Recovery time can vary from a slight redness, as with a "lunchtime" treatment, to a week or somewhat longer, with differing degrees of peeling for a few days with higher-energy treatments. Since no open wound is created (as there would be with ablative lasers) recovery is often easier, with peeling occurring only after healthier, regenerated epidermis and reticular dermis emerges, showing intense fibroblast activity, neocollagenesis, neoelastogenesis and neovascularization as seen in the histology slides to the left.

SAFETY STUDY REVIEW

Drs. R. Fitzpatrick & K. Rothaus performed a retrospective analysis of the safety profiles comparing Portrait plasma single high-energy treatments in their practices over two years to literature reports of CO_2 laser procedures. Incidence rates of hypopigmentation, hyperpigmentation, persistent erythema, scarring, and bacterial and viral infection were assessed.[4]

No permanent hyperpigmentation, prolonged erythema, or demarcation lines were noted in the PSR-treated patients. There was transient hyperpigmentation in 4% of patients. Herpes simplex occurred in one patient who did not prophylax with antiviral medication, and bacterial infection was noted in 4 patients. With PSR, no patients developed hypopigmentation, a complication generally observed in 8-20% of CO_2-resurfaced patients. Average initial recovery time for traditional high energy, short pulse CO_2 laser treated patients was 2 weeks. However, erythema lasting 2-6 months was typical, with the most common adverse effects being hyperpigmentation (transient and other, 21-34%), bacterial and viral infection (7-8%), and prolonged

A range of protocols with variable energy settings allows the physician to choose an appropriate treatment depth based on the severity of sun damage, wrinkles, skin conditions, and laxity.

erythema. Scarring was rare. This study reported that PSR approaches CO_2 results in terms of wrinkle reduction and tightening, with PSR patients showing further improvement in the tone and texture of the skin.

CLINICAL RESULTS AND STUDIES SUMMARY

Holcomb, et al[5] evaluated the safety and efficacy of aesthetic facial surgery with concurrent PSR treatment at three centers over a 28-month period, during which time 272 concurrent facial plastic procedures in 475 concurrent treatment areas (forehead, periorbital, mid-face, and perioral) were performed in 95 patients. Various treatment combinations were well tolerated at all anatomical sites. Although perioperative complications did not negatively affect results, they included erythema with acneiform eruption (2 patients), brief healing delay and PIH (1 patient each). No wound dehiscence or flap necrosis was observed. It was reported that the treatment combinations were synergistic and that PSR did not seem to increase the risk of dermatologic or surgical complications for the procedures.

At the other end of the spectrum, Bernstein[6] treated mild cutaneous sun damage using a very low-energy (0.65J), no-downtime protocol. Three procedures were performed at 3-week intervals and were well tolerated by all 12 subjects; most reported applying make-up or shaving within 1 day of treatment. Physician-evaluated wrinkle severity score improved by an average of 33% and the patient-reported average improvement was 48%. Eleven out of twelve subjects would recommend the procedure to a friend.

In a study evaluating use of a single full-face treatment at high energy (3-4J) for more severely sun-damaged patients, Kilmer, et al.[7] demonstrated an overall improvement range of 40-70% in wrinkles, skin tone, texture, and dyschromia. At high energies, patients developed erythema and edema shortly after treatment, with no immediate epidermal loss or charring. Epidermal loss occurred in the subsequent 24-48 hours, followed by epidermal recovery in approximately 7 days. Histological investigation showed regenerative epidermal and dermal architecture. Further follow-up[8] reported improvement in skin quality scored 8 out of 10, with progressive improvement noted histologically.

PSR may be utilized to treat non-facial skin including the neck, chest, and hands. Significant reductions in wrinkle severity and hyperpigmentation, and increased skin smoothness were achieved in a study by Alster.

Bogle, et al[9] studied low-energy (1.2-1.8J), 3-treatment protocol for sun-damaged patients. Investigators reported 37% reduction in facial rhytides, and study participants noted a 68% improvement in overall facial appearance. One patient developed localized hyperpigmentation after the first treatment, which resolved by follow-up at day 30. No scarring or hypopigmentation occurred. Histological evaluation 3 months after treatment revealed a band of new collagen at the dermoepidermal junction with a reduction in elastotosis in the upper dermis.

PSR may be utilized to treat non-facial skin including the neck, chest, and hands. A study by Alster[10] used low-energy settings (1-1.8J) to treat and evaluate skin texture, pigmentation, and wrinkle severity. Mean clinical improvements of 57%, 48%, and 41% were observed in chest, hands, and neck sites, respectively; significant reductions in wrinkle severity and hyperpigmentation, and increased skin smoothness were achieved.

Gonzalez et al[11] investigated the safety and efficacy of single-treatment, high-energy, double-pass PSR for the treatment of acne scarring. On average, patients reported 34% improvement in their acne scarring at 3 months and 33% improvement at 6 months. Blinded physician ratings of patient photos demonstrated 19% improvement at 3 months and 34% at 6 months. Re-epithelialization was complete 4-6

days after treatment, and no serious adverse events were encountered.

In looking at the treatment of traumatic scars in 20 Asian patients utilizing lower energies (2-3J) with 3 treatments one month apart, Kono et al[12] observed that 9 of 20 patients showed more than 50% improvement. Post inflammatory hyperpigmentation was observed in 4 patients and disappeared within 3 months. Hypopigmentation and worsening of scarring were not observed.

SUMMARY

There is a preponderance of evidence from well-controlled, long-term studies that PSR technology provides a highly effective mechanism for patients requiring skin rejuvenation across a spectrum of indications. This technology is safe, reliable and effective. I am personally delighted to see this technology back in harness.

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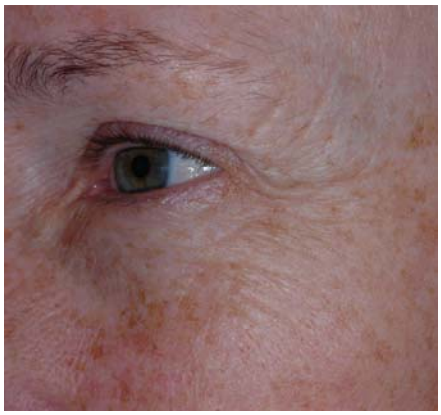

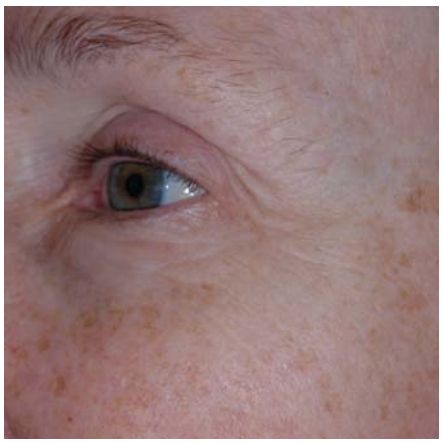

Before (above) and after (below) Portrait periorbital skin regeneration with rhytide reduction and pronounced tightening of the eyelid. Photos courtesy of Brian Biesman, M.D.

NORTH AMERICA ENERGIST SPECIALISTS IN LIGHT TREATMENT SYSTEMS

Before (far left) and after (left) full face skin regeneration with rhytide reduction and marked improvement in tone, texture and Elasticity.

Photos courtesy of Suzanne Kilmer, MD.

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Christopher B. Zachary, M.D.

About the Author

Chrisopher B. Zacharay, M.D., is a Dermatologist specializing in cutaneous oncology and reconstruction, cosmetic, and laser surgery. Dr. Zachary is professor and chair, Department of Dermatology, at the University of California-Irvine. Dr. Zachary is frequently featured as an invited speaker at national and international symposia and is often sought out by the media (eg *NY Times*, CNN, Today Show) for his candid comments. His ability to critique has drawn some ire, but so far his humor and English accent have saved him from his detractors.

His interest in lasers has led to considerable industry supported research in optimal systems for cutaneous laser surgery. He has been the program director for the Mohs College and the American Society for Laser Medicine and Surgery Annual Conferences. He is a past president of the Association of Academic Dermatologic Surgeons. He is an educational innovator, having founded both www.MDlive.net and co-founded www.cme.md. He has written and edited his share of papers and books. Dr. Zachary was born in Yorkshire, England, and educated at Ratcliffe College, Leicester, United Kingdom. Following his medical school education at the Royal Free Hospital, University of London, he subsequently trained in internal medicine and dermatology. During his time at the Institute of Dermatology, Guys and St. Thomas' Hospitals, he gained an interest in dermatologic surgery.

His formal surgical education was received at the Department of Dermatology, University of Michigan, Ann Arbor. He returned to the United Kingdom in 1986 to set up the first Mohs and laser surgery unit in London. In 1988 he was recruited to the Department of Dermatology, University of Minnesota, Minneapolis, as Director of the Cutaneous Surgery and Laser Center where he spent the next 9 years. In 1997 he sold his boat and lakeside cabin, and moved West to UCSF where he spent 8 splendid years with his friend and colleague Roy Grekin, M.D. as clinical professor and co-director of the Cutaneous Surgery and Laser Center, UCSF, San Francisco, California. In 2005, he accepted the position as professor and chair, Department of Dermatology at the University of California-Irvine where he currently resides. This and his family are his main current projects.

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SA6 8QY

T: +44 (0)1792 798768
E: enquiries@energist-international.com

DENMARK
Industriholmen 15A
DK-2650 Hvidovre

T: +45 3634 2300
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Rudendorfer Weg 39
D-96188 Stettfeld

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