

White Paper

A Novel Approach to Treating Infraorbital Dark Circles Using a Combination of Cynergy™ MultiPlex™ and PicoSure® with Focus™

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CYNOSURE®

A: Over 70% of infraorbital dark circles in Asia are complicated with excessive vascular dilatation and proliferation.

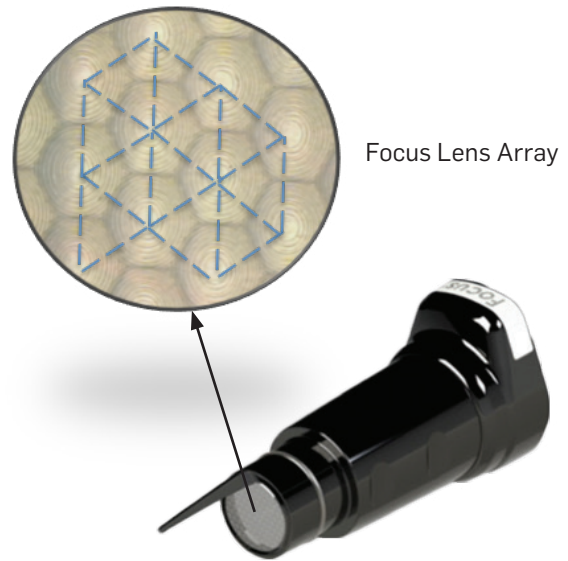
Bimodal approach with 1064 and 585 nm wavelengths of Cynergy™ MultiPlex™ effectively clears deep and superficial infraorbital unwanted vessels.

Infraorbital dark circles (DC) refer to conditions that represent dark shadowing in the lower eyelid. Histological characteristics of infraorbital darkening suggest that they are caused by multiple etiologic factors that include dermal melanin deposition, post-inflammatory hyperpigmentation, superficial location of vasculature complicated with periorbital edema, and shadowing due to intimately underlying orbicularis oculi muscle and skin laxity. The most frequent factors contributing to DC in Asia include very thin/lax skin with prominent infraorbital venous-capillary complex and dermal melanosis. Clinically, based on dominance of etiology, it may be divided into 4 types: vascular, pigmentary, structural and mixed type. For vascular type, it often discloses bluish to purplish shadowing of the eyelid. Prominent venous-capillary plexus distributing laterally to medially make dark hues visible. Only clearance of capillary vessels treated by PDL usually achieves subtle improvement and easily recurs; instead, an approach starting from the veins, feeding vessels, then the capillary loop could achieve much improvement devoid of fast recurrence. Cynergy MultiPlex, a platform with 1064 and 585 nm wavelengths and a wide range of pulse durations, can effectively treat both veins and telangiectasia making resolving vessels of DC in one device possible.

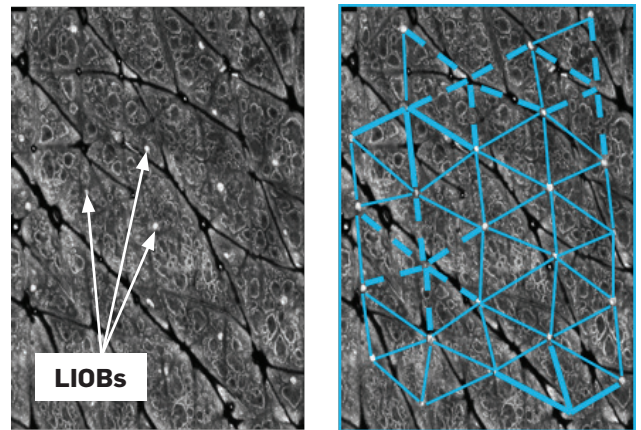
Pigmentary type DC is also difficult to treat with pigment lasers in the nano- to millisecond domain such as Q-switched Nd:YAG, ruby, alexandrite and IPL or fractional lasers. Inconsistent results with high incidence of pigmentary alteration implicated with prominent thermal injury make most physicians hesitant to treat. The 755 nm PicoSure®, a revolutionary picosecond alexandrite laser, brings a paradigm shift in treating such a challenging pigment indication. With the optimal wavelength of 755 nm and pulse duration ranging from 550 to 750 picoseconds, pigmentation can easily be disrupted with less downtime and pigmentary alteration. Furthermore, rejuvenation effect could be obtained with concomitant collagen remodeling in skin when the Focus™ optic is applied.

METHODS AND RESULTS:

In last two years, we have treated DC completely for more than 600 patients in our clinic. 124 patients with either vascular or pigmentary type were retrospectively reviewed. For vascular type, each patient was treated with long pulsed Nd:YAG once and pulse dye twice in sequence with a 4-6 week interval. The energy profile of long pulsed Nd:YAG ranged from 70 -100 J/cm² with pulse duration from 20-40 ms and was applied based on different size of blue veins infraorbitally. Small red vessels of

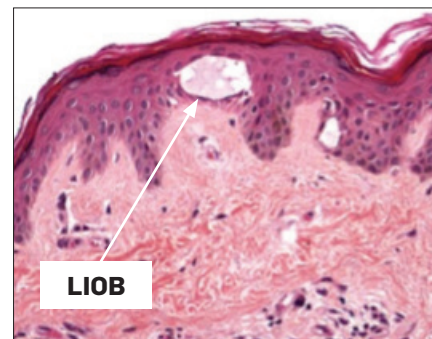


Confocal Microscope showing LIOBs



LIOBs (1 pulse generated by PicoSure Focus)

Histology showing intra-epidermal LIOB generated by PicoSure Focus



telangiectasia were treated with pulse dye at a fluence of 6-14 J/cm² with pulse duration of 0.5-10 ms based on different sizes of vessels. Some medium-sized, red-bluish vessels not being removed by initial Nd:YAG laser nor pulse dye laser were treated with the dye laser immediately followed by the Nd:YAG laser (MultiPlex mode).

The improvement of dark shadowing was scored on a 1-4 scale: 1: 0-25%, 2: 26-50%, 3: 51-75%, 4: 76-100% improvement. The improvement was scored by patients at least one month after the 3rd treatment. In total, 76 patients reviewed, with 45% scoring 1, 35% scoring 2, 16% scoring 3, and 4% scoring 4. With application of the Nd:YAG laser, erythematous swelling was the only adverse effect and typically lasted for a few hours to a few days. When treated with the dye laser, bruising was sometimes noted for 1-2 weeks. No permanent or serious adverse effects such as ophthalmological complications or scarring was noted among the 76 patients.

B: High effectiveness of pigmentation removal with 755 nm PicoSure laser unveils paradigm shift in treating pigmentary dark circles

With PicoTuning technique, almost two thirds of patients experienced more than 50% improvement after 4–8 sessions.

Pigmentary type DC, in the past, was one of the most challenging pigmentary indications to be treated by nanosecond technology. Unpredictable thermal injury from nanosecond to millisecond light based devices tends to cause post inflammatory pigmentary alteration. The revolutionary PicoSure 755 nm alexandrite laser with 550-750 picosecond pulsewidth optimally disrupts melanin in the epidermis and dermis without inducing too much thermal injury, thus subsequently reduces pigmentary alteration. When Focus optic is applied, the collagen remodeling effect could be obtained without collateral injury of dermal-epidermal junction. The combination of disruption of melanin and induction of underlying dermal collagen remodeling, the synergistic effect of picodisruption and picoremodeling, proposed as the PicoTuning effect, succeeds in treating such a challenging indication. Compared to nanosecond technology, the success of the PicoTuning concept in treating pigmentation results from gentle disruption of melanin and concurrent induction of active young fibroblasts to downregulate melanogenesis.

METHODS AND RESULTS:

Forty-eight patients categorized as pigmentary type of DC were retrospectively reviewed and scored. The darkness was treated with the zoom handpiece with spot sizes ranging from 3.4-4.5 mm for one to two passes, followed by either 6, 8, or 10 mm Focus optic for one to two passes. Each patient was treated with PicoTuning technique 4-8 sessions with a one month interval. The improvement of darkness was reviewed and scored on a 1-4 scale: 1: 0-25%, 2: 26-50%, 3: 51-75%, 4: 76-100% improvement. Improvement was scored by patients at least one month after their last treatment. The results demonstrated were: 8% scoring

1, 27% scoring 2, 42% scoring 3, and 23% scoring 4. Among the treated patients, almost two-thirds improved more than 50% after several sessions of treatments. Increased baseline pigmentation led to an observation of increased improvement. Five patients suffered from transient hyperpigmentation for 1-2 months. Two patients had a few spots of hypopigmentation which disappeared after 2 and 3 months, respectively.

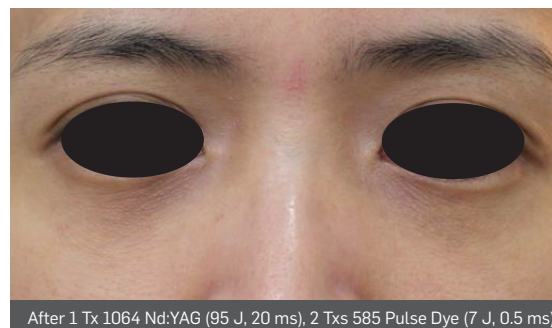
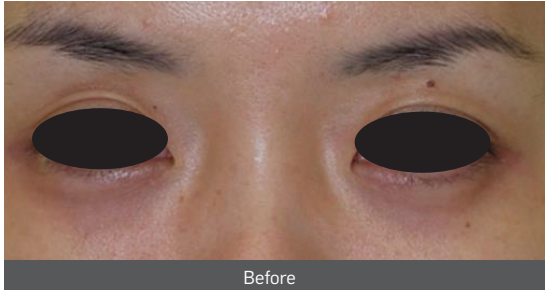
DISCUSSIONS AND CONCLUSIONS:

Infraorbital dark circles prevail in Asia and remain a big image concern for patients. The dark shadowing results from a mixture of vascular plexus proliferation and dermal melanosis with overlying thin skin. Clinical results using conventional lasers are usually inconsistent causing frustration for both physicians and patients. For the pure vascular type of DC, it usually manifests predominantly in very thin skin accompanied by medial underlying dark red color of muscle and broad area of a blue to purplish vascular hue. Treatment of vascular type DC with a conventional dye laser usually leads to poor results, because only small telangiectasia is removed and fast recurrence is observed. Bimodally approaching the vein and capillary simultaneously, both deep and superficially, with 1064 and 585 nm in sequence leads to not only better clearance of the whole vein–capillary plexus, but also less recurrence due to removal of the feeding vein. Rejuvenation may also be obtained with synergistic effect of neocollagenesis from the combination of the pulse dye and long pulse Nd:YAG laser sequentially or simultaneously.

Improvement of pigmentary type DC is extraordinarily dramatic. When the PicoTuning technique is applied, the improvement may result from both picodisruption and picoremodeling. The excellent results are achieved by gentle disruption of melanin with the zoom optic and non-thermal collagen remodeling with the Focus optic. Compared to a predominantly photothermal injury from conventional milli- to nanosecond technology, the synergistic effect was differentially obtained from the PicoSure laser in combination with optimal melanin absorption and disruption of 550-750 picosecond 755 nm wavelength and collagen remodeling from intra-epidermal laser induced optical breakdown (LIOB). This is a unique and different approach for treating thin, pigmentary DC skin with revolutionary PicoSure technology.

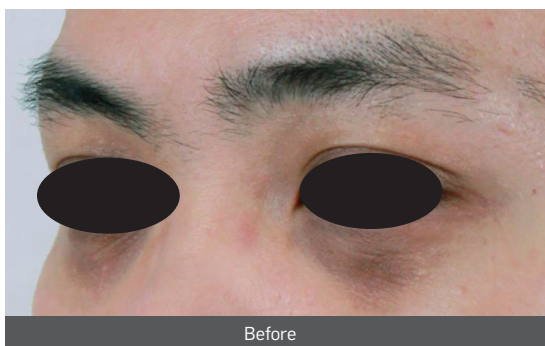
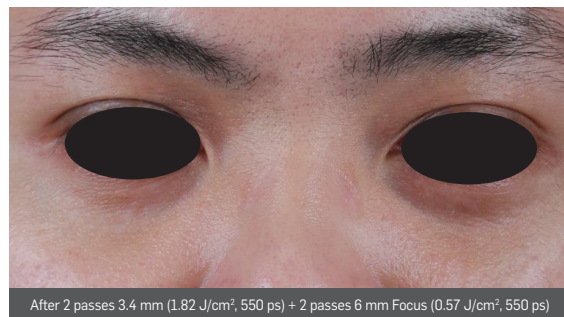
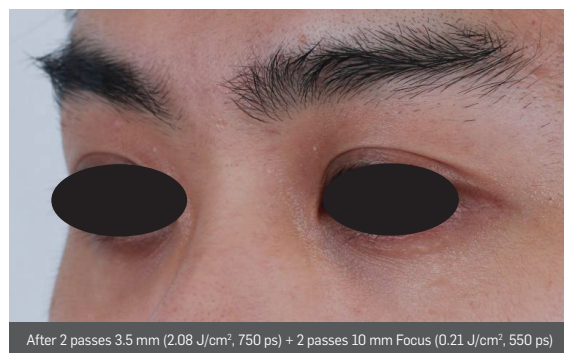
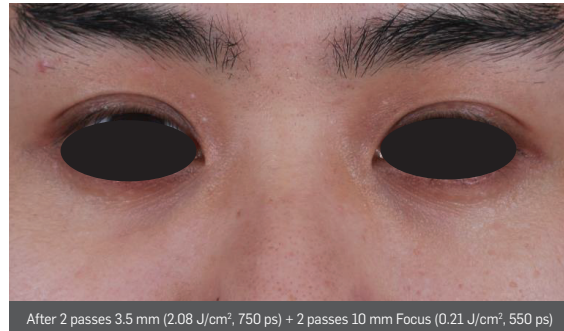
Moreover, when DC skin is treated with both optics (PicoTuning technique) for more sessions, the improvement of wrinkles and revitalization effect from collagen remodeling together with simultaneous pigment reduction appears to achieve an antiaging effect. Patients usually experience a whitening effect and also appear younger infraorbitally after the series of PicoTuning treatments. For patients with severe pigmentary conditions, dramatic results could be even obtained after 4-8 sessions. Conclusively, with revolutionary Cynergy MultiPlex alone or in combination with the PicoSure laser, DC can be safely and very effectively improved with this new paradigm shift.

VASCULAR TYPE



Photos Courtesy of Carl K.L. Cheng, MD.

PIGMENTARY TYPE



Photos Courtesy of Carl K.L. Cheng, MD.

PicoSure 755 is FDA cleared to treat pigmented lesions and tattoos in skin types I-VI. PicoSure 755 with Focus is FDA cleared to treat pigmented lesions in skin types I-VI, and acne scars and wrinkles in skin types I-IV.

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