Treatment of Multiple Skin Conditions with Advanced BroadBand Light BBL™: My Experience with Asian Patients

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INTRODUCTION

In Asian skin, the most common and severe manifestations of photodamage are pigmentary disorders (1). Ablative resurfacing with pulsed CO_2 and Er:YAG lasers, although effective, has not found wide acceptance by Asian patients because downtime is long and hyperpigmentation, hypopigmentation, hypertrophic scars, and other post treatment complications may persist for up to one year (2,3).

The groundbreaking flash lamp technology study by Dr. Patrick Bitter, Jr. (4) showed that a series of four to six full-face treatments with a non-ablative, non-coherent, filtered, visible light device provided improvement in all aspects of photodamage, including irregular pigmentation, skin smoothness, facial erythema, and telangiectasias. The device that Dr. Bitter used included a 550 or 570 nm filter. Dr. Bitter's report was followed by a series of papers from our group describing the use of similar devices to rejuvenate Asian skin, the addition of contact cooling to reduce post-treatment complications, and the acquisition of objective spectrophotometric data to document improvements in epidermal pigmentation and skin tone in Japanese patients (5-7). An additional study describes the use of adjunctive epidermal care by hydroquinone and tretinoin cream between treatments to enhance the efficacy (8). Treatment of melasma by flash lamp on Asian skin is also reported (9); however, its use needs careful attention since melasma can easily become worse by aggressive parameters of flash lamp irradiation (10).

In the author's experience, skin attributes such as pigment and scars are more refractory in Asian patients than patients with lighter skin. Topical treatments such as

hydroquinone, retinoic acid, and chemical peels are not effective enough to satisfy Asian patients whose culture demands clear, smooth skin. The use of lasers or flash lamps to treat Asian skin has been associated with post inflammatory hyperpigmentation (PIH) and hypopigmentation (Figure 1); worsening of melasma (Figure 2), even the subtle type; and less satisfactory clinical results compared to those obtained with lighter skin types.

To meet the needs of Asian patients, the author has developed two-step treatment protocols that use the BroadBand Light (BBL™) module of the Joule™ (Sciton, Inc.), a multi-module platform that permits a physician to treat a variety of skin disorders with a single device. The modules and skin conditions treated in the author's practice are shown in Table 1. Change-on-the-fly Smart Filters™ are available for multiple conditions (Table 2). Finesse Adaptors™ allow for different spot sizes and contact cooling (0°-30°) protects the epidermis, thus offering physicians a wide choice of treatment parameters for safety and effectiveness.

This paper focuses on BBL protocols the author has developed for the treatment of full-face rejuvenation, solar lentigines, erythema, skin texture, and melasma. In some cases, bleaching creams are included to achieve better outcomes.

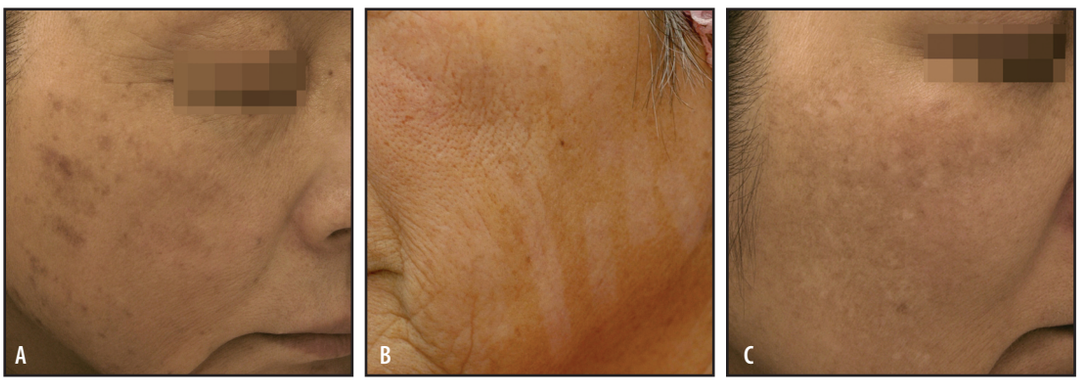

Figure 1. A) Post inflammatory hyperpigmentation, so-called "foot print" or "tiger striped" PIH and B) hypopigmentation caused by flash lamp treatment and C) hypopigmentation by laser treatment. (Treatments were not delivered by Sciton equipment.)

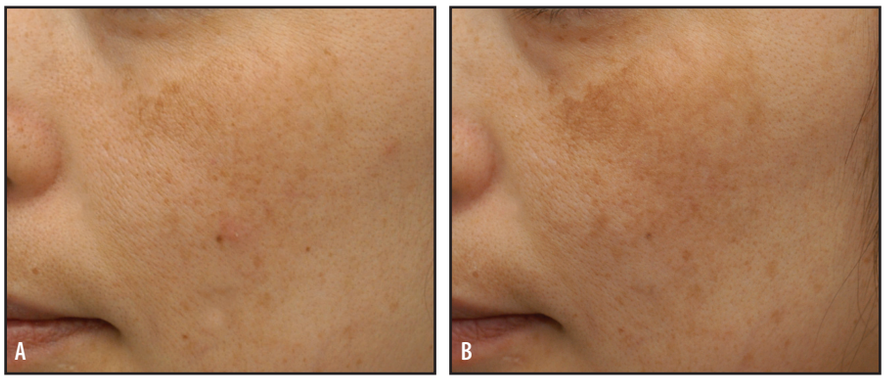

Figure 2. Exacerbation of melasma caused by flash lamp treatment. (Treatments were not delivered by Sciton equipment.) A) before and B) after treatment.

Table 1. The JOULE multi-module platform and skin conditions treated by Dr. Kei Negishi

Module	Description	Wavelengths (nm)	Skin Treatments	
			Dr. Negishi Uses For	Other Conditions
BBL™	BroadBand Light	420-1400	Rejuvenation with complexion blending, pigmented lesions including melasma, active acne	Vascular lesions, hair
SkinTyte //™	Visible & Infrared Light	590 - 1400	Skin laxity and wrinkles	
ClearScan YAG™	Long-pulsed Nd:YAG laser	1064	Microtelangiectasias, rejuvenation, erythema and vascular lesions	Hair, vascular lesions
ThermaScan™	Long-pulsed Nd:YAG laser	1319	Rejuvenation and mild acne scars	Wrinkles, acne, acne scars, skin tone and texture
Focused Handpiece	Er:YAG laser with focused handpiece (0.5 -1.0 mm)	2940	Cosmetic tattoos, small skin tumors including seborrheic keratosis	Shallow and deep wrinkles, perioral and periorbital deep rhytides, scars, actinic keratosis, skin tone and texture, pigmented lesions
ProFractional-XC™	Fractional Er: YAG laser	2940	Scars caused by acne, trauma, surgery, etc. Rejuvenation, congenital pigmented nevi	Blending scars with skin and other conditions that require fibroblast stimulation, formation of new collagen and elastin, and rapid healing

Other modules available but not listed include ClearScan ALX, ClearSense, ProLipo *PLUS*, Contour TRL, Pro-V

Table 2. Skin conditions treated with BBL Smart Filters

Condition	Wavelengths (nm) Sciton Recommends	Wavelengths (nm) Dr. Negishi Uses For Asian Skin
Acne	420	420, 560 and 590
Pigmented lesions	515	515, 560 640 or 695 for melasma
Vascular lesions	560	560, 590
Rejuvenation in dark skin types	590	560, 590, 640
Unwanted hair	590, 640, 695	695
Lax skin (SkinTyte)	590ST, 695ST, 800ST	590ST, 695ST, 800ST

Two-Step Treatments

Treatment for complexion blending consists of two steps: Step 1 treats the full-face and Step 2 treats the specific lesions in a targeted manner.

In the first step, the full-face is treated with 560, 590 or 640 nm wavelength filter for skin texture, erythema, and dyschromia. The specific filter used depends on the Fitzpatrick Skin Type: 560 nm for type III, 590 nm for type IV and 640 nm for type IV with suntan or type V with no suntan – never use BBL for type V with suntan. In step 2, pigmented lesions are treated with the 515 or 560 nm filter and vascular lesions are treated with the 560 or 590 nm filter. Pulse width is mainly 20 ms for full-face and 10 or 15 ms on pigmented lesions and 20 ms on telangiectasia as shown in Table 3. Use the two-step process only on areas without melasma. If melasma is present, treat only with 640 or 695 nm on the area with melasma and do not treat with a second pass on the affected area.

Pigmented lesions may be of low or high contrast compared to the surrounding normal skin (Figure 3). The two-step process is designed to treat both low and high contrast pigmented lesions. In the first (full-face) step, the parameters are safe enough to treat the full area of normal skin. The high contrast darker lesions are also sufficiently treated with the first step pass parameters.

A second pass is required to remove the low contrast lesions and those that have proven to be stubborn to prior treatment. To minimize the risk of burning surrounding tissue or causing hyper- or hypopigmentation, the author recommends using a small spot size Finesse Adaptor on the second pass to treat these lesions. By singling out and isolating the lesion with a second pass, you can achieve the desired result while safely avoiding over treating the normal skin. The preferable clinical endpoint immediately after treatment is a slight darkening of the lesion. If it appears grayish, it means that it has been overtreated for Asian skin. Other applications of the BBL and the two-step processes of treatment are presented in Table 3.

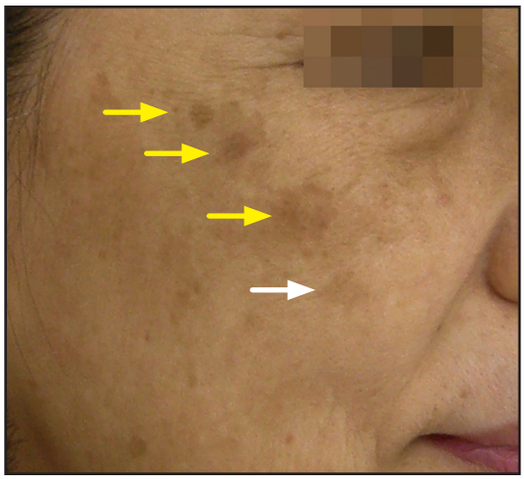

Figure 3. The right cheek of an Asian patient showing high-contrast lesions (yellow arrows) and low-contrast lesions (white arrow).

Table 3. Treatment parameters for facial skin conditions using the BBL two-step process

Parameters							
Tx	**Skin Condition(s)**	**Wavelength (nm)**	**Fluence (J/cm^2)**	**Pulse Width (ms)**	**Temperature (°C)**	**Spot Size Finesse Adaptors™**	**Notes**
A	Full-face rejuvenation including textural roughness, diffuse erythema and dyschromia	560 (III), 590 (IV), or 640 (IV with suntan and V no suntan)	10-12	20	15	No adaptor needed for large area (e.g., cheek); 15 x 15 mm for small area (e.g., ala of nose, upper lip)	—
B	Lentigines	515	14-16	10 or 15	15 to 20	7 mm spot	Combine with TC cream stimulates efficacy
C	Melasma	640 & 695 (depends on the severity)	10-12	25	15	No adaptor needed or 15 x 15 mm	Always combine with TC cream or some other bleaching agent like HQ to avoid exacerbation. Add oral TA if possible.

Tx = treatment

Fitzpatrick Skin Type I, II, III, IV, V, VI

TC = Triple combination cream (5% hydroquinone, 0.025 retinoic acid, 0.025% dexamethasone)

HQ = hydroquinone

TA = Oral tranexamic acid (1000 mg/day) may also be required

Solar Lentigines and Erythema

Improvement in erythema and solar lentigines after three and five treatments with the two-step protocol is shown in Figure 4. The author has found that fewer treatment sessions are required with the two-step protocol than with a single-step protocol.

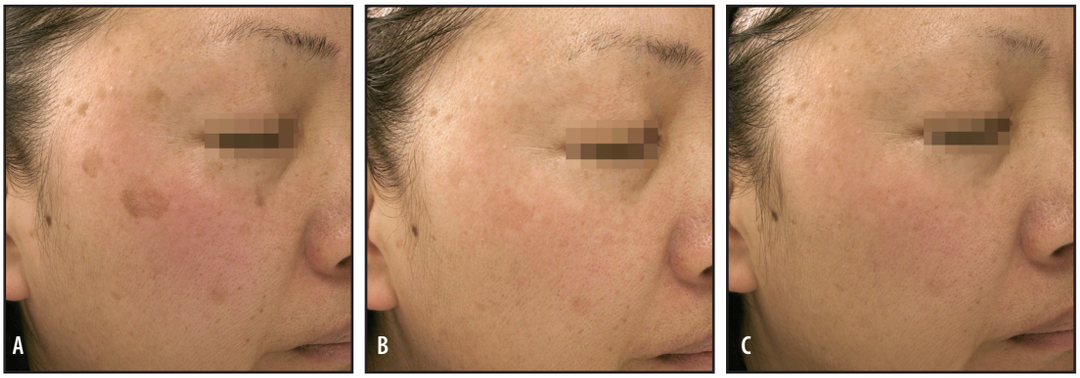

Figure 4. A 46 year old female with erythema and solar lentigines A) before B) after three and C) after 5 BBL treatments. Refer to Table 3 A & B for treatment parameters.

Solar Lentigines and Texture with Triple Combination Cream

Improvement in solar lentigines and skin texture after three BBL treatments with the two-step protocol is shown in Figure 5. Cream containing hydroquinone (5%), retinoic acid (0.025%), and dexamethasone (0.025%) was used on the pigmented lesions to enhance the improvement.

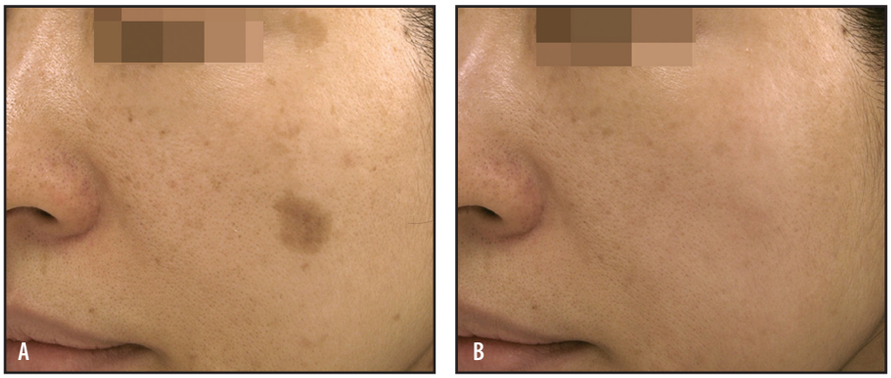

Figure 5. A 43 year old female with solar lentigines and poor skin texture A) before treatment and B) after three BBL treatments. A triple combination cream containing hydroquinone, retinoic acid, and dexamethasone was also used to enhance the results. Refer to Table 3 A & B for treatment parameters.

Melasma, Solar Lentigines and Texture

Although topical bleaching cream and oral medication are first-line therapies for melasma (11), BBL with a 640 or 695 nm wavelength using mild treatment parameters may provide better results. Figures 6 and 7 show improvements in melasma, solar lentigines, and skin texture after three BBL treatments and topical and/or oral medicine.

In Figure 7, a patient with melasma, solar lentigines, and poor skin texture is shown. In this case, the patient applied hydroquinone (5%) and took oral tranexamic acid (1000 mg) daily after the second BBL treatment.

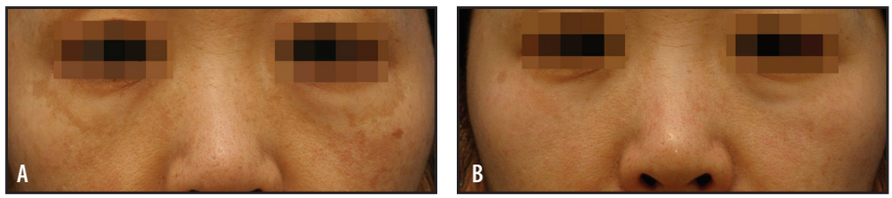

Figure 6. A 42 year old female with melasma, solar lentigines, and poor skin texture A) before and B) after three BBL treatments plus 5% hydroquinone. Refer to Table 3 C for treatment parameters.

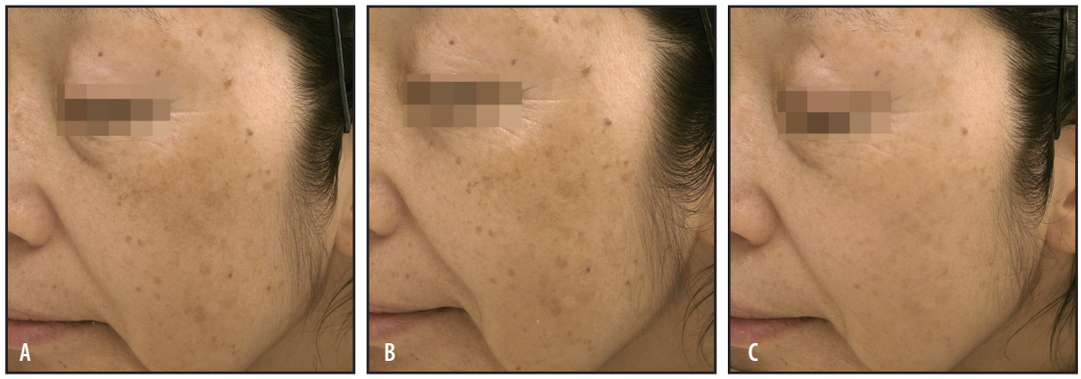

Figure 7. A 46 year old female with melasma, solar lentigines, and poor skin texture A) before, B) immediately after the initial treatment and C) after three BBL treatments. For treatment parameters, refer to Table 3 A & B for non-melasma areas and Table 3 C for melasma areas.

Important notes about treating pigmentation in Asian skin are: 1) Proper settings for each lesion are necessary for safe and effective BBL treatments. For removing solar lentigines, settings are preferable that are not as aggressive as those that would be used for lighter skin but that are relatively aggressive for Asian skin. Those settings can be achieved using the Smart Filters' shorter wavelengths and Finesse Adaptors' small spot size to target only the lesions. However, for melasma and irregular diffuse pigmentation, the same endpoint determination is not appropriate since inflammation in these kinds of pigmentation often cause post inflammatory hyperpigmentation. Thus, a very slight darkening change is enough for those and longer wavelength filters are preferable to gentle parameter settings. 2) All melasma cases show recurrence after termination of treatment. Proper explanation to patients to manage their expectations of treatment efficacy is necessary. Also, detailed education about appropriate skin care, including sun screen that protects against both UVA and UVB, is essential to maintain the results for a longer period of time.

BroadBand Light and Nd: YAG Laser for the Treatment of Melasma with Micro-telangiectasia

Non-contact irradiation with the photorevelation mode of the long-pulse, 1064 nm Nd:YAG laser can safely remove micro-telangiectasias collocated with melasma, as shown in Figure 8. It has been reported that these micro-telangiectasias may acerbate melasma by stimulating melanocytes to produce melanin (12). Treatment of micro-telangiectasias that are collocated with melasma using 532 or 590 nm lasers is not desirable because these wavelengths are also absorbed by epidermal melanin and thus can aggravate the severity of melasma. Using 1064 nm Nd:YAG combined with 640 or 695 nm BBL is a much better option, as it is less absorbed by the epidermal melanin than 532 or 590 nm.

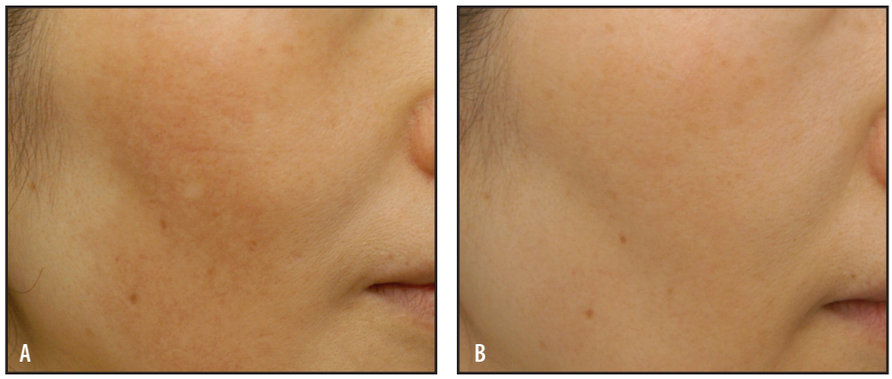

Figure 8. A 52 year old female with melasma and micro-telangiectasia A) before and B) after four treatments with the BBL device in combination with the microsecond Nd:YAG laser using a 3 mm spot at 0.3 ms, 14-16J/cm^2, 2000-3000 shots on each cheek by non-contact painting motion. Refer to Table 3 C for additional treatment parameters.

Solar Lentigines of the Hand

Using the treatment parameters in Table 3, the author successfully improved solar lentigines on the right hand of an Asian patient with a single BBL treatment (Figure 9). The maximum darkening response in the safe range occurred immediately after treatment as shown in the center photograph (9B). Approximately 10 days after treatment, micro-crusts formed on the lesions they eventually sloughed off. Four weeks after treatment, the solar lentigines were noticeably improved. If the treatment were more aggressive, the risk of post inflammatory hyperpigmentation would increase in Asian skin.

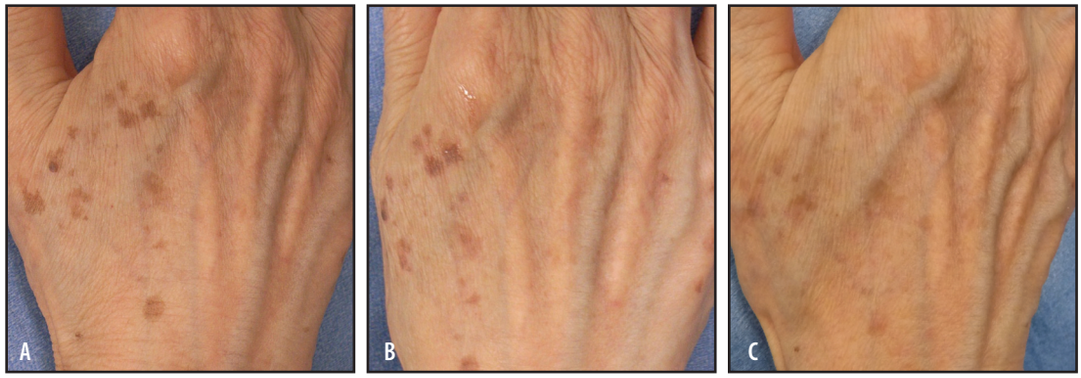

Figure 9. The right hand of a 66 year old patient with solar lentigines A) before, B) immediately after a single BBL treatment, and C) 4 weeks later. Refer to Table 3 B for treatment parameters.

CONCLUSION

BBL, with its broad range of wavelengths, allows targeted treatment for many skin conditions non-invasively. Patients have seen improvements in full-face rejuvenation, solar lentigines, erythema, skin texture, and melasma after BBL treatments. The results show that the two-step treatment protocol with BBL alone or in combination with topical agents is safe and effective for the treatment of a variety of common skin disorders with a low risk of complications in darker skin types. Combining treatments, such as BBL and 1064 nm to treat micro-telangectasias with melasma, results in extremely good outcomes that are not obtainable as easily as with the JOULE in another single device on Asian skin. Our experience and results may expand the use of BBL for patients of darker skin types living across the world.

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