

# Skin Rejuvenation with 1,064-nm Q-Switched Nd:YAG Laser in Asian Patients

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**BACKGROUND** In recent years, using the 1,064-nm Q-switched neodymium-doped yttrium aluminium garnet (Nd:YAG) laser (QSNYL) with or without exogenous topical carbon solution application for facial skin rejuvenation has become popular in Southeast Asia, but there has not been any published clinical report discussing the rejuvenation effect of QSNYL for Asian patients.

**OBJECTIVE** To evaluate the efficacy of QSNYL in improvement of pore size, sebaceous secretion, skin texture, and skin tone of Asian patients. We also observed whether there is any enhancement of application of topical carbon solution before the therapy.

**METHODS** Twenty-four female patients completed four sessions of treatments at 4-week intervals. The assessment was evaluated by the patients, two independent physicians, and Canfield VISIA Complexion Analysis. In addition, we conducted a split-face study such that, in each case, topical carbon solution was applied to the right side of the face before the laser treatment.

**RESULTS** All evaluations showed significant improvement in rejuvenation effect. There was no difference in improvement in skin texture even after the application of topical carbon solution in our split-face study.

**CONCLUSION** The QSNYL is a safe and effective rejuvenation modality in Asian patients. Topical carbon solution application did not enhance laser efficacy.

*The authors have indicated no significant interest with commercial supporters.*

Based on the aesthetic standard of Southeast Asia, people with large pore sizes and greasy faces are considered undesirable and unsightly. In the past few years, the use of Q-switched neodymium-doped yttrium aluminium garnet (Nd:YAG) laser (QSNYL) with or without exogenous topical carbon application for improvement of large pore size and sebum overproduction has been gaining popularity in Southeast Asia. Furthermore, the adjuvant topical carbon solution application needed before laser rejuvenation has also been presented as a necessary but logistically undesirable and questionable procedure. Reviewing the literature, there have only been a few clinical reports, with varying results, regarding the efficacy of using QSNYL for facial rhytides in Caucasian skin types.<sup>1-5</sup> No clinical studies of the effect of QSNYL for improvement of pore size, sebum secretion, and wrinkles have been conducted

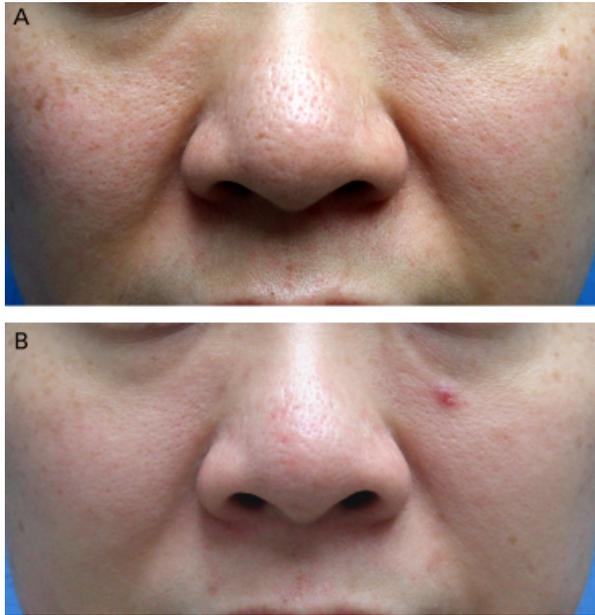
on Asian patients. The purpose of this study was to evaluate the efficacy and side effects of QSNYL for improvement of skin texture, skin tone, pore size, and sebum secretion in Asian patients and to evaluate the effect of exogenous topical carbon solution application in QSNYL skin rejuvenation treatments.

## Materials and Methods

### Patient Selection

Twenty-four female patients aged 26 to 40 with Fitzpatrick skin type III to V were enrolled in this study. To evaluate the efficacy of an exogenous topical carbon solution composed of 10% graphite and 90% mineral oil, we performed a split-face study such that, in each case, topical carbon solution was applied to the right side of the face before the laser treatment.

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**Figure 1.** Dilated pores and rough skin surface texture in a 34-year-old woman before (A) and after (B) four successive treatments at 4-week intervals with Q-switched neodymium-doped yttrium aluminium garnet (Nd:YAG) laser.

### **Study Protocol**

All subjects completed four sessions of treatments, with a 4-week interval between treatments. In each treatment, a eutectic mixture of lidocaine and prilocaine was applied under occlusion for 30 minutes before each treatment. The topical carbon solution was applied only to the right side of the face for 10 minutes to ensure that it penetrated well before the laser treatment. The laser used in this study was the MedLite C6™ Q-Switched Frequency Doubled Nd:YAG Laser (HOYA ConBio, Fremont, CA), using a 1,064-nm wavelength, 6-mm spot size, and energy fluence of 3.5 J/cm<sup>2</sup>. Treatment consisted of three to five passes of the laser until a clinical end point of pinpoint bleeding was observed.

### **Treatment Evaluation**

Prospectively, all subjects and two independent physicians completed an evaluation form before each treatment and at each follow-up visit. They recorded their assessments of skin texture, skin tone, pore size, and sebum secretion. Subjective assessments by patients and objective assessments by physicians

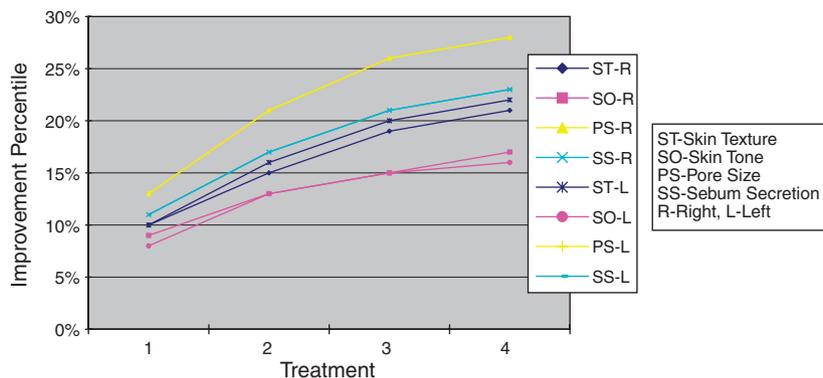
were divided into those for the left and right sides of the face and graded using a 10-point satisfaction rating scale (1 = highest and 10 = lowest). The same photographer took photographs before each treatment and at each follow-up visit with a digital camera and Canfield VISIA (Fairfield, NJ) Complexion Analysis system using the same light setting. VISIA has three lighting modes: standard daylight fluorescent lighting, cross polarized flash, and ultraviolet lighting to visualize multispectral imaging. We also objectively assessed improvement in skin texture, pore size, visible spots, and uneven pigmentation visible using ultraviolet (UV) reflectance photography using the VISIA system. Sebum production could not be objectively assessed using the VISIA system.

### **Results**

The improvement within each subject was analyzed using the Wilcoxon signed-rank test because of the ordinal rating scale and limited sample size. In sub-



**Figure 2.** Dilated pores and uneven skin tone in a 31-year-old before (A) and after (B) four successive treatments at 4-week interval with Q-switched Nd:YAG laser.



**Figure 3.** Subjective evaluation of ST, SO, PS, SS by patients: Improvement percentile compared with baseline of 4 weeks after each treatment.

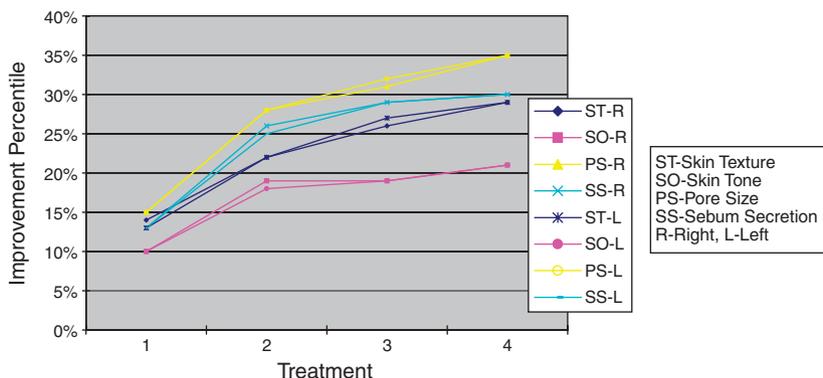
jective and objective evaluation by the subjects and two independent physicians, all assessments of skin texture, skin tone, pore size, and sebum secretion showed significant improvement ( $p < .001$ ) (Figures 1 and 2). Conversely, there was no significant improvement noted with the application of topical carbon solution in our split-face study. In objective evaluation of the data recorded by VISIA, significant improvement was noted in skin texture, pore size, visible spots, and uneven pigmentation visible with UV reflectance photography ( $p < .05$ ). The results of overall improvement are summarized in Figures 3–5.

## Discussion

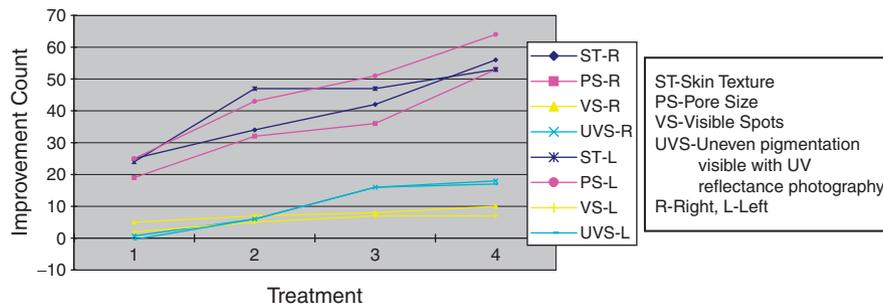
A variety of nonablative techniques, such as 585-nm pulsed dye, 1,064-nm Q-switched Nd:YAG, 1,320-nm Nd:YAG, and 1,540-nm erbium:glass lasers, as

well as intense pulsed light sources and radiofrequency devices, have been widely used for skin rejuvenation in recent years.<sup>6–10</sup> For most of these systems, the mechanism relies on dermal thermal injury to induce dermal collagen remodeling and regeneration without damage to the epidermis. Because it requires minimal recovery time and has few adverse effects, nonablative laser skin resurfacing is becoming popular, although there are extreme differences in clinical efficacy.

QSNYL, one of the first modalities to use the nonablative approach to dermal remodeling, has been used in an attempt to improve facial rhytides with skin phototypes I and II. There have been no published data discussing the rejuvenation effect of QSNYL in Asian patients, even as it has become widely accepted in the aesthetic markets of Southeast Asia.



**Figure 4.** Objective evaluation of ST, SO, PS, SS by physicians: Improvement percentile compared with baseline of 4 weeks after each treatment.



**Figure 5.** Evaluation of ST, PS, VS, UVS by VISIA: Improvement feature count compared with baseline of 4 weeks after each treatment.

Because there was no difference in skin condition between the right side and left side of the face before laser treatments, our split-face study was not randomized. In our study, all assessments showed obvious improvement after the first treatment, with continued improvement after each successive treatment. The majority of adverse effects were limited, such as mild, brief, post-treatment erythema and petechiae. No postinflammatory hyperpigmentation was noted. Although in one previous study, carbon was regarded as an enhancement component for QSNYL by an unknown mechanism, our study showed no significant difference with or without the use of the carbon solution.<sup>2</sup> Reaching the clinical end point of pinpoint bleeding at each treatment might be the key factor in achieving optimal results.

The proposed mechanism of skin texture and skin tone improvement is believed to be secondary to new collagen production by thermal damage.<sup>4</sup> Smaller pore size and less sebum secretion may also be due to collagen remodeling around the follicle and sebaceous gland shrinkage induced by thermal heating in the dermis. The reason for fewer visible spots and uneven pigmentation visible with UV reflectance photography with the VISIA system is unclear; further histological studies are necessary for elucidation.

Overall, QSNYL provided a safe and effective treatment for skin rejuvenation in Asian patients. Application of a topical carbon solution did not enhance or improve the laser efficacy.

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