

# Novel Low Fluence Combination Laser Treatment of Solar Lentigines in Type III Asian Skin

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## ABSTRACT

**Objective:** To demonstrate a novel low fluence combination laser technique [Erbium-doped yttrium aluminum garnet (Erb:YAG) and neodymium-doped yttrium aluminum garnet (Nd:YAG)] to effectively treat solar lentigines in type III Asian skin in a single session. **Design:** A prospective study. **Setting:** A Singapore-based clinic. **Participants:** Five patients (all females) were enrolled into the study. The ages ranged 35-60 years; all patients had Fitzpatrick skin type III. **Measurements:** Photographs were taken at baseline and at 1-month follow-up. These were reviewed by two independent physicians who were blinded to the study. Changes in pigment severity were assessed by a 5-point scale (1: Aggravation of pigment, 2: No change, 3: 25-50% improvement, 4: 51-75% improvement, and 5: 76-100% improvement). **Results:** All patients received a single treatment session. At 1-month follow-up, a reduction in pigment was observed in all patients. Both physicians' reports were independently agreeable. All patients scored 5, having >90% improvement in pigment severity. No hypopigmentation, postinflammatory hyperpigmentation (PIH), or recurrence was seen. **Conclusion:** Low fluence combination laser is effective and safe for clearance of solar lentigines in type III Asian skin.

**KEYWORDS:** Asian, combination, solar, laser, lentigines, lentigo

## INTRODUCTION

Solar lentigines are common among Asians and are caused by an increased number of epidermal melanocytes producing excessive quantities of melanin.<sup>[1]</sup> Q-switched (QS) lasers are a popular treatment method,<sup>[2-9]</sup> but the results of this monotherapy are variable and typically require multiple sessions to achieve optimal results.

Studies have shown that ablative resurfacing with Erbium-doped yttrium aluminum garnet (Erb:YAG) laser effectively treats solar lentigines.<sup>[10-14]</sup> The Erb:YAG ablates away the pigment-containing epidermis as well as improves the overall brightness and texture of the skin. However, there are side effects such as postinflammatory hyperpigmentation (PIH).

Conceptually, combining lasers can potentially increase the effectiveness of treatment while reducing the risk of side effects. This is because each laser can be utilized at lower fluences, resulting in less severe complications such as PIH. By having two different yet complementary mechanisms, the treatment frequency and duration can be reduced as well.

Jun *et al.*<sup>[15]</sup> demonstrated a combination treatment using the 532 nm frequency-doubled QS Nd:Yag with an Erb:YAG laser. At 2 weeks, the combination therapy showed good results. However, at 1 month, PIH appeared in the combination therapy group. Jun *et al.* concluded that the fluence of their combination therapy might be too high.

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In our center, we have been using combination therapy for solar lentigines to great effect. We combined the use of a frequency-doubled 532 nm QS Nd:YAG with a low fluence Erb:YAG micropeel technique (with lower settings than Jun *et al.*). In this paper, we demonstrate five cases where a single treatment with this technique is able to achieve a significant improvement in the lentigines. The effect is sustained at 3 months of follow-up without any demonstration of PIH or any other complications.

## MATERIALS AND METHODS

This was a prospective study. Five females were recruited for the study after obtaining their written consents. Inclusion criteria included patients with solar lentigines otherwise in good health. Those with melasma, major sun exposures, or other major skin conditions were excluded from the study. Patients who used any topical bleaching creams and those who received laser treatment within the past 1 year were all excluded.

A single session of combination laser treatment was conducted for each patient. No topical anesthesia was used. The frequency-doubled 532 nm QS Nd:YAG (RevLite, Cynosure Co., Fremont, CA) was used at a fluence of 1.2 J/cm<sup>2</sup>, 2 Hz, 2 mm spot size on the specific lentigines. Subsequently, the fractional nonablative 2940 nm Erb:YAG laser (SP Spectro, Fotona, Ljubljana, Slovenia) was operated at a fluence of 0.7 J/cm<sup>2</sup>, spot size 12 mm, 15 Hz. A single full-face pass with 10% overlap was performed. Subsequent 2nd and 3rd passes were performed over the solar lentigines till a clinical end point of skin whitening was reached; no wiping was performed between the passes. Care was taken to keep the skin cool during the laser irradiation with cryogen spray cooling. After the laser treatment, patients applied topical antibiotic (fusidic acid) for 3 days and sun screens during day light (for 3 months after the laser treatment).

Photographs were taken at baseline and at 1 month follow-up. Clinically, the patients were seen monthly, up to 3 months – following the laser treatment. Patient photographs (at baseline and at 1 month) were reviewed by two independent physicians who were blinded to the study. Changes in pigment severity were assessed by a 5-point scale (1: Aggravation of pigment, 2: No change, 3: 25-50% improvement, 4: 51-75% improvement, and 5: 76-100% improvement).<sup>[15]</sup>

## RESULTS

Five females were enrolled into the study. Their ages ranged 35-60 years; all patients had Fitzpatrick skin type III. The patients tolerated the procedure well, without anesthesia. After the treatment, for 5-7 days, they experienced erythema of the face associated with scaling. However, all recovered within a week.

At 1 month follow-up, photographs were taken. A reduction in pigment was observed in all patients. Both physicians' reports were independently agreeable. All patients scored 5, having >90% improvement [Figures 1 and 2]. After 3 months of follow-up, no hypopigmentation, PIH, or recurrence was seen. All patients expressed satisfaction with their outcomes. There was also feedback from the patients about the general improvement in skin tone and texture.

## DISCUSSION

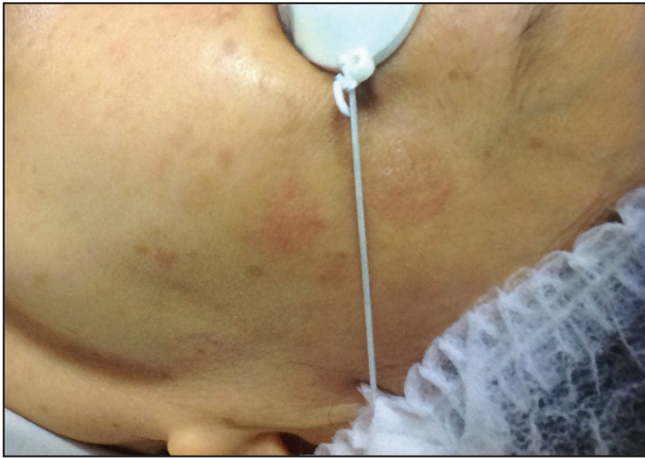
Solar lentigines are treated with a variety of ablative and nonablative lasers. The QS Nd:YAG laser is well absorbed by melanin and it selectively destroys melanosome-containing cells while preserving the surrounding tissue.<sup>[16-18]</sup> Er:YAG laser, on the other hand, is an ablative laser.<sup>[11-14,19,20]</sup> Each pass of the Er:YAG laser removes a thin layer of skin with a controlled ablation depth. As monotherapy solutions, however, the QS Nd:YAG produces variable response and requires multiple sessions for a satisfactory clearance, with possible complications such as blistering and hypopigmentation. The Erb:YAG may conversely cause complications such as PIH, especially in Asian type III skin.

In our study, we demonstrated a combination technique that harnessed the effectiveness of both lasers, while keeping the fluence low. Thus, it delivers a satisfactory response in a single treatment session, with no complications thereafter.

Jun *et al.* studied the combination of the Erb:YAG and QS Nd:YAG on solar lentigines.<sup>[15]</sup> While combination therapy demonstrated superior results over Nd:YAG monotherapy at 2 weeks; there was an increase in PIH at 1 month. We proposed that the main problem was the usage of a fluence of 2.5 J/cm<sup>2</sup> for the Erb:YAG. In our center, we used the Erb:YAG at subablative thresholds



Figure 1: Solar lentigines before laser



**Figure 2: One month after the laser treatment**

of 0.7 J/cm<sup>2</sup>. In our own internal unpublished audits, we have utilized different settings for the Erb:YAG. We found that at 0.7 J/cm<sup>2</sup>, patients still experienced the benefits of the laser (improvement of dyschromia, rhytides, etc.). Downtime and complications were minimal and the procedure was well tolerated without anesthesia.

There are, however, limitations in this study. Due to strict selection criteria, we could only recruit five cases. We intend to follow up with further studies with a larger sample size and a longer term of follow-up to demonstrate the efficacy of our combination technique. We also need to evaluate the settings in skin type IV and greater, as risk of PIH is higher in these group of patients.

### Declaration of Patient Consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Nil.

### Conflicts of interest

There are no conflicts of interest.

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