Non-ablative Facial Remodeling: Erythema Reduction and Histologic Evidence of New Collagen Formation Using a New 300 microsecond, 1064-nm Nd:YAG Laser

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Abstract

Ten non-smoking women with erythema and/or fine lines (Fitzpatrick skin types I-III) were treated with a 1064 nm Nd:YAG laser emitting pulses in the microsecond range. Three treatments were administered to the face at 2 week intervals with a fluence of 13 J/cm^2, pulse duration of 300 microseconds, and a 5 mm spot size. A smooth, rapid painting motion was used to administer treatment, holding the tip of the instrument 2-4 cm above the skin surface. No cooling was utilized. The face was treated in four sections with a total of 12,000 to 14,700 light pulses applied per treatment. The pulses were applied at a rate of 7 Hertz with a continuous motion of the handpiece such that the pulses had little, if any, overlap. Patients were photographed at baseline, prior to each treatment, and at 1 and 3 months after final treatment. Photographs were evaluated by two non-blinded physicians and changes in erythema, and skin quality were assessed. Two-millimeter punch biopsies were obtained at baseline and at 1 and 3 months after final treatment. Electron microscopic evaluation of dermal papillary collagen fiber diameter was performed by a blinded observer.

Results: Four of the patients had significant erythema at baseline. All four of these patients had an improvement in erythema at 1 and 3 months after treatment. Skin quality was improved as well in these patients. Ultrastructural analysis of the entire 10 subject treated group showed that collagen fiber diameter was significantly decreased 3 months after treatment ($p = 0.03$). This is consistent with formation of new collagen. Younger patients had a greater decrease in collagen fiber diameter than older patients. There were no adverse events.

Conclusion: Microsecond Nd:YAG lasers appear to be safe for non-ablative laser remodeling. Our study indicates that microsecond Nd:YAG lasers can produce new collagen formation in the papillary dermis. In addition, patients with erythema may be improved. Younger patients may form more new collagen than older photodamaged patients.

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