

### Long-Term Hair Removal with a Novel 650-microsecond Pulsed Nd:YAG Laser

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#### Abstract

A study was conducted to evaluate a pulsed Nd:YAG 1064nm laser for long-term laser hair removal. Unlike conventional lasers and light-based devices in the field, the laser in this evaluation utilizes a unique 650 microsecond pulse duration with no skin cooling, gels or anesthetics. Ten female subjects and one male subject with Fitzpatrick Skin Types II through VI were treated and the long-term results indicated >75% clearance in the majority of cases; those treated 5 to 7 times reported 82% clearance on average and as high as 93%. These assessments were made, on average, 8.3 months after the subjects' final treatment session.

#### Background

A study was conducted to evaluate a pulsed Nd:YAG 1064nm laser for long-term laser hair removal. Unlike conventional lasers and light-based devices in the field – which often use longer pulse durations of 20-30 msec or greater for hair removal, with continuous skin cooling during treatment – the laser in this evaluation utilizes a unique 650µsec pulse duration with no skin cooling, gels or anesthetics. This laser, which is known as the LightPod Neo<sup>®</sup> with 650-microsecond technology, is manufactured by Aerolase in Tarrytown, NY.

All 1064nm lasers target melanin in the hair follicles during hair removal treatments. The lasers with the longer pulse durations cause significant heating of the surrounding skin tissue, and consequently they require continuous skin cooling to protect the epidermis and reduce pain during treatment. In contrast, the LightPod Neo's 650µsec pulse duration is below the skin's TRT (thermal relaxation time) of approx. 0.8 msec, which means that it heats the follicle faster than the rate at which the surrounding skin tissue can conduct the heat away; thus the destruction of the follicle is more efficient (Fig. 1). Meanwhile, these shorter laser pulses travel through the epidermis 30-50 times faster than a conventional 20-30 msec pulse, avoiding overheating of the epidermis – hence, no skin cooling is required and treatment is pain-free, with minimized chance of side effects on darker skin such as hypopigmentation.

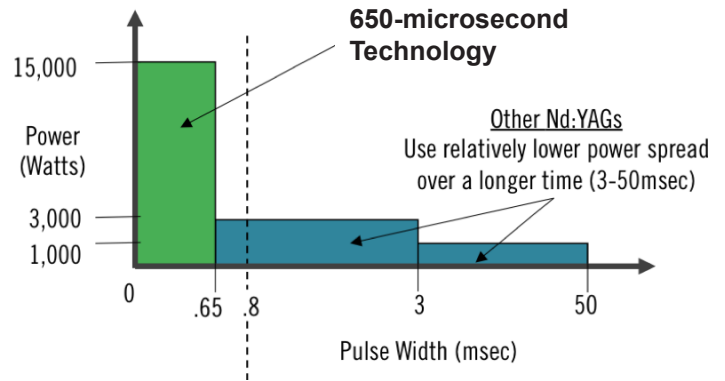


Figure 1. The 0.65msec pulse duration is safely and uniquely below the TRT (thermal relaxation time) of the skin.

The LightPod Neo produces the necessary fluences for hair follicle destruction at this pulse duration by generating up to 15,000 watts of optical energy per pulse. But the main question at the commencement of this study had to do with clinical efficacy: would this device – contrary to conventional expectations about the use of longer pulse durations for hair removal – have the capability of delivering long-term results?

#### Methods

Ten female subjects and one male subject, aged 30-42 and with Fitzpatrick Skin Types II through VI, were treated for laser hair removal in various anatomic sites including upper lip, chin, anterior and posterior neck, and axillae. Subjects were treated 3 to 7 times each, with sessions spaced approximately one month apart. Subject presented with visible stubs of the hairs in the treated areas, and individual follicles were treated with the laser pulses, as opposed to the method of covering the full treatment area including follicle-free skin between targeted hairs. 5mm and 6mm spot sizes were used and fluences were gradually increased from as low as 21 joules/cm<sup>2</sup> in initial sessions to as high as 51 joules/cm<sup>2</sup> in later sessions, to compensate for the reduction in melanin of the targeted hairs as treatments progressed (note: this increase in fluence was subject to skin tolerability, and somewhat lower fluences were used with very dark skin tones). No skin cooling, gels or anesthetics were used at any time. The laser utilized in the study was the LightPod Neo (Nd:YAG 1064nm) laser from Aerolase, with the 650µsec pulse duration setting. The long-term results were recorded at 4 to 11.5 months after the final treatment for each subject.



Figure 2. Clinical Case Examples: Long Term Hair Removal Using LightPod Neo 650 microsecond Pulsed 1064nm Laser

### Results

All subjects described pain as very low or tolerable. Visible charring of hairs and perifollicular edema were commonly seen during treatment, and transient post-operative erythema was observed in a few cases. None of the subjects reported any pigmentary changes or other complications. Treatment times were reasonable due to the method of targeting individual follicles rather than treating full areas of skin, and because no application or cleanup of any gels or anesthetics was required. The long-term results showed significant clearance of hair, as reported by the subjects and confirmed photographically. The results indicated >75% clearance in the majority of cases, and those treated 5 to 7 times reported 82% clearance on average and as high as 93%. These assessments were made, on average, 8.3 months after the subjects' final treatment session.

This study demonstrates that, from the standpoint of clinical efficacy, the Neo has the ability to perform hair removal in a similar fashion to Nd:YAG 1064nm lasers that employ substantially longer pulse durations. This is true not only in terms of the percentage of hair clearance that is achievable in a given number of treatment sessions but, of particular importance, in terms of long-term results. When combined with the other advantages of the 650µsec pulse duration mentioned above - no skin cooling with virtually no treatment pain and the ability to safely treat any skin type - this makes the Neo a unique addition to the field of Nd:YAG lasers from a clinical performance standpoint. The treatment is also very hygienic as no skin applicator is used and the handpiece doesn't contact the skin.

The physical characteristics of the LightPod Neo laser are also very unique. Due to its air-cooled emitter design, it is a compact & portable 22 pound attaché-size device, in marked contrast to large conventional water-cooled laser systems. The Neo design has eliminated the water circulating subsystem as well as fiber optic cables and lightguides that are common in other systems, which results in a highly affordable device that is essentially maintenance-free.

### Discussion

This study shows that a 650µsec pulsed Nd:YAG 1064nm laser delivers effective long-term clearance in hair removal. The study also demonstrates that this type of laser can be used to perform laser hair removal on all skin types without any skin cooling, gels or anesthetics, while being well tolerated with little or no pain and without pigmentary changes or complications. The LightPod Neo offers a new and unique set of capabilities to laser hair removal, enabling it to be a foundation laser for a hair removal practice focusing on higher-profit facial, axilla and bikini treatment areas or an extension of an existing practice into treatment of darker skin types, pain-free performance and/or any practice where the laser's compact size, portability or lack of required maintenance are deemed beneficial.

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