

Versatility of the GentleMax Pro Plus™ laser system to treat various clinical indications with the 755 nm and 1064 nm wavelengths

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Study Methods and Design

The renowned platform for laser hair removal, GentleMax Pro®, now has a new addition to the device family. As with the previous model, the GentleMax Pro Plus™ laser system incorporates 755 nm and 1064 nm wavelengths to target specific tissue chromophores for treating various clinical indications, such as unwanted hair in all Fitzpatrick Skin Types (I–VI), pigmented and vascular lesions, wrinkles, and temporary increase of clear nail in patients with onychomycosis.* The new system has enhanced its versatility with features such as increased treatment speed due to a larger 26 mm spot size for optimal depth targeting in hair removal procedures, and faster repetition rates, as well as 2 ms pulse duration to treat thin, fine hairs.

Laser systems deliver a therapeutic effect by targeting a specific tissue chromophore (melanin, hemoglobin, water) in the skin, based on the theory of “selective photothermolysis,” first introduced by Anderson and Parrish in 1983.¹ Ideally, the wavelength selected for a specific application is maximally absorbed by the targeted chromophore and only minimally absorbed by other competing chromophores in the skin.

In the case of laser hair removal, the targeted chromophore is melanin, which is found both in the epidermis of skin and in portions of the hair follicle and hair shaft. Melanin has a broad absorption spectrum that decreases as wavelength increases.² The 755 nm and the 1064 nm wavelengths are in a range where the absorption of hemoglobin and water is reduced compared to melanin, which improves the selective targeting of melanin. The 755 nm alexandrite wavelength can treat a range of hair colors but is not ideal for darker skin due to melanin absorption in the epidermis.³ With longer wavelengths, there is a greater depth of penetration and less superficial chromophore absorption, making the 1064 nm Nd:YAG laser a safer option when treating darker Fitzpatrick Skin Types V and VI.²

Melanin in the skin is also the target chromophore for the treatment of benign pigmented lesions. Efficacy of the long-pulse alexandrite laser in treating superficial pigmented lesions in Fitzpatrick Skin Types I–III and in treating seborrheic keratoses in Asian Skin Types III–IV has been reported.^{4,5} A long-pulsed 755 nm laser improved pigmentary lesions in Korean patients with Fitzpatrick Skin Types III–IV, while those with facial flushing, skin laxity or some pigmentation were treated with a long-pulsed 1064 nm laser.⁶ The long-pulsed 755 nm and 1064 nm lasers have been used for reduction of the uneven pigmentation, telangiectasia, laxity and wrinkles in photoaged skin, while avoiding the long downtime and side-effects of ablative resurfacing.⁶

For treating vascular lesions, the target chromophore is hemoglobin. The alexandrite 755 nm laser wavelength is absorbed by both oxyhemoglobin and melanin, so should be reserved for lighter Fitzpatrick Skin Types, using conservative treatment parameters. The Nd:YAG 1064 nm wavelength is absorbed by deoxy- and oxyhemoglobin, which leads to selective photocoagulation within venules and veins.⁷ As the 1064 nm wavelength reaches deeper dermal structures and is less absorbed by melanin, it can be used for treating leg telangiectasias⁸ and simple cutaneous vascular malformations.⁷

In addition to the commonly performed laser hair removal and pigmentation and vascular treatments, the GentleMax Pro Plus™ platform can also be used to treat wrinkles and onychomycosis. Non-ablative lasers, using various wavelengths such as the 1064 nm, selectively target the dermis and may also play a role in dermal remodeling for the treatment of wrinkles.^{6,9} In one study, the long-pulsed Nd:YAG laser was found to be as effective as Er:YAG and CO₂ lasers, traditionally used to improve facial rhytides, but with shorter recovery and treatment times than ablative lasers.¹⁰ For the treatment of onychomycosis, the Nd:YAG laser can be used as an alternative to topical antifungal therapy of onychomycosis

a contagious infection of the nail bed, grid, or plate.¹¹ The 1064 nm wavelength can penetrate through the nail plate and into the nail bed to bulk heat the pathogens and repress their development.¹¹

Besides wavelength, other aspects of laser therapy, such as fluence, pulse duration and spot size, all factor into the success of treatment. For example, lasers with millisecond pulse widths and spot sizes greater than 15 mm are preferred to ensure optimal depth targeting in hair removal procedures. Longer wavelengths, longer pulse durations, and more efficient cooling are aspects to consider for laser hair removal in darker Fitzpatrick Skin Types IV–VI.²

In this clinical bulletin, several examples are shown as to the versatility of the GentleMax Pro Plus™ laser system to treat various clinical indications. As part of an ongoing IRB-approved clinical study**, the 755 nm and 1064 nm lasers in the GentleMax Pro Plus™ laser system are currently being evaluated for the efficacy of larger spot sizes and shorter pulse durations in hair removal treatment and other intended uses. The device used for treatments, the GentleMax Pro Plus™ laser system, incorporates both a 755 nm alexandrite laser and a 1064 nm Nd:YAG laser, to selectively target chromophores in

epidermal and dermal structures. A range of spot sizes up to 26 mm and pulse durations from 0.25 – 100 ms (including the new 2 ms pulse duration) are available with the system. The output energy is delivered to the skin through an optical fiber delivery system. Effective epidermal (surface) cooling is important to reduce epidermal injury. The GentleMax Pro Plus™ laser system incorporates two different cooling methods. A Dynamic Cooling Device™ (DCD) is used to cool and protect the epidermis, and to reduce pain, by spraying the skin with cryogen before the laser pulse is delivered. An Air Compatible Cooling (ACC) delivery system delivers continuous, reduced temperature air that can cool the skin prior to, during, and following the laser pulse. The GentleMax Pro Plus™ laser system is designed for treatment of unwanted hair and pseudofolliculitis barbae (PFB) in all Fitzpatrick Skin Types (I–VI), pigmented and vascular lesions, wrinkles, and temporary increase of clear nail in patients with onychomycosis.* Figures 1-4 below demonstrate examples of various clinical indications and the treatment techniques and parameters, such as use of the Nd:YAG laser in Fitzpatrick Skin Type IV and the 2 ms pulse duration for hair removal, which resulted in a successful clinical outcome.

GentleMax Pro Plus™ Laser Hair Removal



Figure 1. A 53-year-old Asian female with Fitzpatrick Skin Type IV and unwanted hair on the axillae underwent one treatment with the 1064 nm Nd:YAG Large Spot (20 mm) ACC (cooling setting 6) Handpiece. A total of 58 pulses were applied: pulse duration 2 ms, fluence 16 J/cm², and repetition rate 2 Hz.

GentleMax Pro Plus™ Pigmented Lesion Treatment



Figure 2. A 64-year-old female with Fitzpatrick Skin Type II and benign pigmented lesions on the forearms underwent two treatments with the 755 nm Alexandrite Laser Medium Spot Size DCD Handpiece.

Tx.#	Wavelength nm	Fluence J/cm ²	Spot Size mm	Pulse Duration ms	Repetition Rate Hz	Cooling	# Passes
1	755	9	10	0.5	3	OFF	5
2	755	15	8	0.5	3	OFF	6

GentleMax Pro Plus™ Treatment of Diffuse Redness in Photoaged Skin



Figure 3. A 32-year-old female with Fitzpatrick Skin Type II and photoaged skin on the face and neck underwent four treatments with the Nd:YAG (1064 nm) Laser Medium Spot Size (6mm-18mm) DCD Handpiece.

Tx.#	Pulsing Technique	Fluence J/cm ²	Spot Size mm	Pulse Duration ms	Repetition Rate Hz	Cooling	# Passes
1	Stamping (1 pass) & painting (2 passes)	14	15	20	2	20/10/0	3
1	Painting	14	15	20	2	OFF	2
2	Stamping	16	15	20	2	20/10/0	3
2	Painting	9	10	0.50	7	OFF	6
3	Stamping	16	15	20	2.5	20/10/0	3
3	Painting	9	10	0.50	5	OFF	15

GentleMax Pro® Treatment of Onychomycosis



Figure 4. A 60-year-old female with Fitzpatrick Skin Type II and onychomycosis of the right middle fingernail underwent one treatment with the 1064 nm Nd:YAG Laser Medium Spot Size DCD Handpiece and 6 mm spot size. A painting technique, with fluence of 8 J/cm², 0.5 ms pulse duration and 7 Hz repetition rate, was used to administer 7 passes (total of 215 pulses) by hovering above the nail bed to bulk heat the tissue. Cooling settings were OFF.



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*GentleMax Pro Plus, CE mark.

**IRB-approved study protocol GMP19002: Clinical Evaluation to Assess the Safety and Efficacy of GentleMax Pro /GentleMax Pro Plus

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