

# Treating Melasma and other pigmented lesions by the GentleMax Pro using the 755nm and micro-second pulse



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## Introduction

Melasma is an acquired pigmentary disorder of the face. It is a symmetrical acquired hypermelanosis with slow progression, irregular coloration and irregular outline. It typically affects sun-exposed areas on the face and presents as symmetric brownish macules and patches coalescing in a reticular pattern. Melasma is most prevalent among young to middle aged women with darker (Asian African or Middle Eastern) skin phototypes<sup>1</sup> but can occur in lighter, western skin types as well. An estimated 6 million people in the US and 45-50 million people worldwide are affected by melasma with men comprising 10% of the affected population. Oral contraceptive pills, estrogen replacement therapy, ovarian tumors, ovarian dysfunction and thyroid dysfunction have been shown to induce melasma, suggesting a role for hormonal changes in melasma pathogenesis.<sup>2</sup>

Studies assessing histology of the diseases have identified that melanin increases in the epidermis, dermis, or both. Melanocytes show increased activity leading to increased formation of melanosomes, their melanization, and transfer to the superficial epidermis and dermis layers.<sup>3</sup> Keratinocytes and fibroblasts in the dermis have also been found to communicate with each other to regulate the function and phenotype of the skin. Besides the genetic make-up, the racial and ethnic differences in skin color depend upon other intrinsic and extrinsic factors (facultative pigmentation). Endocrine factors such as estrogen,  $\alpha$ -melanocyte-stimulating hormone, adrenocorticotrophic hormone, paracrine and autocrine factors, the ultraviolet radiation (UV-R) exposure, vitamin D, may all enhance melanogenesis. Some reports show increased angiogenesis and VEGF (vascular endothelial growth factor) level at the melasma area as well.<sup>4</sup> Most of melasma lesions are epidermal type that can be treated efficiently by using 755nm wavelength with microseconds pulse duration.

## Recommended Treatment Settings

GentleMax Pro is a dual wavelength, long pulse laser platform providing 755 nm Alexandrite and 1064 nm Nd:YAG laser energies at pulse durations ranging from 0.25 to 100 milliseconds. The device is used to treat various pigmentary disorders, provide skin rejuvenation treatments, treat vascular lesions and to provide effective, lasting hair removal treatments.

Pigmentary disorders are very effectively treated with the 755nm Alexandrite laser. With respect to pulse duration, millisecond pulses are used for the treatment of photo damage, freckles, seborrheic keratosis and lentiginos while the treatment of Melasma or post-inflammatory hyperpigmentation (PIH) requires shorter, microsecond level pulses as these lesions are very sensitive to thermal damage.

When treating melasma, one should not expect to see an immediate response, but rather a gradual improvement. In cases of immediate and fast response, the melasma will usually worsen within a few weeks post treatment. The ideal treatment course would involve frequent treatments providing slow, gradual results. Thus when treating melasma or PIH with the GentleLase Pro or GentleMax Pro's 755nm Alexandrite handpiece, the treatment should

include 2~3 passes using 8~10mm spot size with 1-3 Hz repetition, 0.25-0.35msec pulse duration and relatively low fluence of 6-7 J/cm<sup>2</sup>. Pulse stacking is usually not recommended. Multiple sessions are recommended once or twice per month.

When we treat pigmentary disorders in a practical situation, complex conditions are more common than simple cases. For example, melasma combined with Hori's nevus, seborrheic keratosis and lentigines are more common than melasma alone. Occasionally the melasma is also combined with PIH caused by procedures the patient has had in the past. It is for these reasons that correct diagnosis and analysis of the lesion is crucial to treatment success. Closely matching the treatment spot size to the size of the lesion is also important when treating lentigines, seborrheic keratosis, or freckles. This is because the millisecond pulses used to treat them generate more heat than the shorter microsecond pulses and the risk of PIH always needs to be managed in the Asian skin type. Para or post-treatment cooling is necessary in the most cases when we use high fluence and millisecond pulse widths, but for microsecond pulse treatments epidermal protection and skin surface cooling may be optional.

**Table 1: Parameters for Melasma & Pigmentation Treatment**

**\*\* Please note that caution must be taken, especially when treating darker skin types. Always perform test spots and take into account skin reaction during treatment, adjusting parameters accordingly.**

Clinical Indication	Wavelength	Pulse width	Fluence	Spot Size	DCD	# of Passes
Becker's Melanosis	755 nm	0.35 ms	7 J/cm <sup>2</sup>	10 mm	Off	
Becker's Melanosis	755 nm	3 ms	20-25 J/cm <sup>2</sup>	15 mm	30/30	
Blackheads	755 nm	3 ms	30-34 J/cm <sup>2</sup>	12 mm	30/30	
Freckles & Lentigines	755 nm	3 ms	24-32 J/cm <sup>2</sup>	12 mm	30/20	
Freckles & Lentigines	755 nm	3 ms	20-35 J/cm <sup>2</sup>	10 mm	Off	
Freckles & Telangiectasia	755 nm	3 ms	24-30 J/cm <sup>2</sup>	12 mm	30/20	
Laser Toning	755 nm	0.25 - 0.5 ms	6-7 J/cm <sup>2</sup>	10 mm	Off	
Lentigines (high PIH risk patients)	755 nm	0.35-0.50 msec	6-8 J/cm <sup>2</sup>	10 mm	On or Off	
Lentigines & Melasma	755 nm	3 ms	36 J/cm <sup>2</sup>	12 mm	Off	
Lentigines & Melasma	755 nm	0.35 ms	6 J/cm <sup>2</sup>	10 mm	Off	
Melasma	755 nm	0.30- 0.35 ms	6-7 J/cm <sup>2</sup>	10 mm	30/20	
Nevus Spilus	755 nm	3 ms	30 J/cm <sup>2</sup>	12 mm	30/30	
Nevus Spilus	755 nm	0.50 ms	20-24 J/cm <sup>2</sup>	6 mm	Off	
Photo Damage	755 nm	0.50 ms	18-22 J/cm <sup>2</sup>	6 mm	Off	
Photo Damage	755 nm	3 ms	22-34 J/cm <sup>2</sup>	12 mm	30/20	
Photo Damage	755 nm	0.35 ms	7-8 J/cm <sup>2</sup>	10 mm	Off	
PIH & Melasma Combined Tx	755 nm	0.25-0.35 ms	6-8 J/cm <sup>2</sup>	10 mm	20-30/20-30/Off	2-4
PIH & Melasma Combined Tx	755 nm	0.50 ms	16-26 J/cm <sup>2</sup>	6 mm	Off	1-3
PIH Tx High Fluence	755 nm	3 ms	16-26 J/cm <sup>2</sup>	10, 12 mm	20-30/20	
Post Acne PIH	755 nm	0.40 ms	7 J/cm <sup>2</sup>	10 mm	30/20	
Post Acne PIH	755 nm	3 ms	28-32 J/cm <sup>2</sup>	12 mm	30/20	
Post Operative PIH	755 nm	0.45 ms	8-9 J/cm <sup>2</sup>	10 mm	30/20	
Solar Lentigines	755 nm	3 ms	28-32 J/cm <sup>2</sup>	12 mm	30/30	
Speckled Nevus	755 nm	3 ms	32-36 J/cm <sup>2</sup>	12 mm	20/20	
Seborrheic Keratosis	755 nm	3 ms	60-80 J/cm <sup>2</sup>	6 mm	20/20	1-2

## Results (Before and after treatment comparison)



Before (L) and after (R) treatment of Melasma and Post-inflammatory Hyperpigmentation (755nm, 10 mm spot, 0.35 ms pulse-width, 6-7 J/cm<sup>2</sup> fluence, 30/20 DCD settings)



Before (L) and after (R) treatment of Photodamage (After 1 treatment) (755nm, 12 mm spot, 3 ms pulse-width, 28-34 J/cm<sup>2</sup> fluence, 30/30 DCD settings, then 10 mm diameter, 0.35 ms pulse width, 7J/cm<sup>2</sup> fluence, Off)



Before (L) and after (R) treatment of Seborrheic Keratosis (After 1 treatment) (755nm, 6 mm spot, 3 ms pulse-width, 65-70 J/cm<sup>2</sup> fluence, 20/20 DCD settings)

## Discussion

Disruption of the basal membrane, related to photo-damage is common among melasma patients. Thus applying high fluences may trigger PIH by melanocyte destruction on upper dermis and cause long lasting erythema due to neovascularization followed by superficial vascular injury<sup>5</sup> and extreme temperature increase in the dermis layer needs to be avoided. To prevent adverse events, it is very important that targeting melanin pigment is done at microsecond level with minimal thermal damage. Post-treatment hyperpigmentation or hypopigmentation is a main concern following pigmented lesion treatment, especially in Asian patients. GentleMax presents a lower risk of both hyper and hypo-pigmentation with low fluence settings. Melanin and hemoglobin absorption curve are relatively close in certain wavelength ranges. So, while treating pigmented lesion vascular damage should be avoided. Because DCD or air cooling can't prevent iatrogenic purpura, it is important to keep the safe treatment parameter guidelines in mind.

## Conclusion

The 755 nm laser energy delivered by GentleLase Pro and GentleMax Pro are convenient and effective for the treatment of melasma and other pigmentary disorders. Versatility is an advantage of these systems, which provide 755nm energy in microsecond pulse widths for laser toning or melasma treatments and millisecond pulse widths for freckles, lentigines, or seborrheic keratosis and at the millisecond level treatment mode, we can get more effective results than IPL. In conclusion, GentleMax laser is very useful armamentarium for the treatment of pigmented disorders with minimal downtime and discomforts.

### **About Dr. Geun-Soo Lee**

*Dr. Geun-Soo Lee is a board certified dermatologist of Korea. He was conferred M.D. and Ph.D. degree from Hanyang University, Seoul, Korea. He did clinical fellowship at Thomas Jefferson University. Currently, he is director of Drs. Woo & Hann's Skin & Laser Center. He is taking in charge of financial secretary of the Association of Korean Dermatologist. He has been contributed to scientific committee of the Association of Korean Dermatologist as one of main organizer from since 2010. He is vice-president of the Korean Academy of Corrective Dermatology. He is also secretary of Korean Society for Laser Medicine and the Korean Society for Aesthetic and Dermatologic surgery. He is organizing committee member of 3rd Eastern Asia Dermatology Congress (EADC) 2014. He wrote clinical studies and editorials about fractional laser, radiofrequency devices, light source, acne treatment and non-ablative lasers. He also participated as a co-author for some books, such as "Asian Skin and Skin Diseases" and "Aesthetic and Dermatologic surgery (Korean)". His main clinical focuses are acne treatment, pigment treatment, HIFU, and fractional laser and radiofrequency skin resurfacing.*

## Resources

- 1 The Association Between Melasma and Postinflammatory Hyperpigmentation in Acne Patients. Hassan Adalatkah and Homayoun Sadeghi Bazargani
- 2 Finasteride associated melasma in a Caucasian male. Famenini S, Gharavi NM, Beynet DP. J Drugs Dermatol. 2014 Apr;13(4):484-6.
- 3 Pigmentary disorders: An insight, Sunil Dogra, Rishu Sarangal
- 4 The vascular characteristics of melasma. En Hyung Kim, You Chan Kim, Eun-So Lee, Hee Young Kang\*
- 5 Lasers for treatment of melasma and post-inflammatory hyperpigmentation. Arora P1, Sarkar R, Garg VK, Arya L.