



## CASE STUDY

# THE NEW TREATMENT OF PARTIAL UNILATERAL LENTIGINOSIS USING DR. HOONHUR'S GOLDEN PARAMETER THERAPY WITH A HIGH FLUENCE 1064NM Q-SWITCHED ND: YAG LASER WITHOUT SIDE EFFECTS

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### ARTICLE INFO

#### Article History:

Received 15<sup>th</sup> September, 2017  
Received in revised form  
03<sup>rd</sup> October, 2017  
Accepted 18<sup>th</sup> November, 2017  
Published online 31<sup>st</sup> December, 2017

#### Key words:

Partial Unilateral Lentiginosis,  
Dr. HoonHur's Golden  
Parameter Therapy, High Fluence  
Q-Switched 1064nm Nd: YAG Laser  
No side effects, No recurrences.

### ABSTRACT

Partial unilateral lentiginosis (PUL) is a rare pigmentary skin disease characterized by numerous small aggregated brown macules on an area of normal skin confined to only one side of the face or body and almost always starts in childhood, rarely at birth. Treatment of PUL is necessary for cosmetically disfiguring feature. However, treating the PUL with outside effects such as purpura, crust, postinflammatory hyperpigmentation, mottled hypopigmentation, scarring and recurrences is extremely difficult. Therefore, the authors introduce a new treatment of PUL using Dr. HoonHur's Golden Parameter Therapy (GPT) with a high fluence 1064nm Q-switched Nd:YAG laser (QSNL) without any side effects and recurrences. In this paper, Dr. HoonHur's GPT with a high fluence 1064nm QSNL proved to be a safe and effective treatment for PUL. We propose that Dr. HoonHur's GPT with a high fluence 1064nm QSNL is a new and good option for treating PUL.

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**Citation:** HoonHur, Yoon Jung Choi, Min SeokCheon and Yu Ri Kim, 2017. "The new treatment of partial unilateral lentiginosis using Dr. HoonHur's golden parameter therapy with a high fluence 1064nm Q-switched Nd:YAG laser without side effects", *International Journal of Current Research*, 9, (12), 63456-63460.

## INTRODUCTION

Partial unilateral lentiginosis (PUL) is a rare pigmentary skin disease characterized by multiple small aggregated brown macules on an area of normal skin with a segmental pattern and almost appears in childhood (Parslew, 1995; Goldberg, 1995 and Dawoud, 2016). Treatment of PUL is necessary because of cosmetic concerns. But treatment of PUL without side effects such as purpura, crust, postinflammatory hyperpigmentation (PIH), mottled hypopigmentation, scarring and recurrences is very difficult (Lee, 2012; Pretel, 2013 and Kim, 2016). In this paper, we report a new treatment of PUL using Dr. HoonHur's Golden Parameter Therapy (GPT) with a high fluence 1064nm Q-switched Nd:YAG laser (QSNL) without side effects and recurrences.

### Report of Cases

This study was performed on fifteen Korean patients (age range: 18-43 years old, mean age: 23.4 years old) who were clinically diagnosed with PUL (Fig. 1, 3, 5, 7, 9). No other mucocutaneous abnormalities were noted.

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The patients had no significant medical or familial history of similar pigmented lesions. After obtaining written informed consent, all of the 15 patients were received 50 treatment sessions of Dr. HoonHur's GPT with a high fluence 1064nm QSNL (Spectra Laser, Lutronic, South Korea) at a one-week interval with a spot size of 7mm, a fluence of 2.4J/cm<sup>2</sup> and a pulse rate of 10Hz with slowly one pass by a sliding-stacking technique over the PUL. After the laser treatment, the entire face was immediately cooled with ice packs, and the patients were instructed to use a broad-spectrum sunscreen to the entire face daily throughout the treatment period. The patients were photographed on the day of treatment and 4 weeks after the final treatment, and were evaluated with standardized digital photographs using a Canon Camera G11 (Japan). The patients were asked to notify immediately if any pain, discomfort or side effects occurred during each treatment. All of the 15 patients with PUL were achieved the complete clearance of the pigmented lesions after weekly successive 50 treatment sessions of Dr. HoonHur's GPT. And there were no significant side effects including purpura, crust, PIH and scarring except mild pain during the laser treatment (Fig. 2, 4, 6, 8, 10). During the 12-28 months' follow-up period after the last treatment, no signs of hypopigmentation, hyperpigmentation or recurrence on the treated areas have been observed (Fig. 11).



**Fig. 1.** Multiple small agminated brown macules on the forehead (before treatment:4/1/2017)



**Fig. 2.** A complete clearance of partial unilateral lentiginosis (after Dr. HoonHur's Golden Parameter Therapy:9/9/2017)



**Fig. 3.** Multiple small agminated brown macules on the left infraorbital area, left zygoma and left cheek (before treatment:9/13/2016)



**Fig. 4.** A complete clearance of partial unilateral lentiginosis (after Dr. HoonHur's Golden Parameter Therapy:11/10/2017)



**Fig. 5.** Multiple small agminated brown macules on the right periorbital area, right zygoma and right cheek (before treatment:5/20/2015)



**Fig. 6.** A complete clearance of partial unilateral lentiginosis (after Dr. HoonHur's Golden Parameter Therapy:4/14/2016)



**Fig. 7. Multiple small aggregated brown macules on the left periorbital area, left zygoma and left cheek (before treatment)**



**Fig. 8. A complete clearance of partial unilateral lentiginosis (after Dr. HoonHur's Golden Parameter Therapy)**



**Fig. 9. Multiple small aggregated brown macules on the right periorbital area, right zygoma and right cheek (before treatment:8/22/2014)**



**Fig. 10. A complete clearance of partial unilateral lentiginosis (after Dr. HoonHur's Golden Parameter Therapy:8/2/2015)**



**Fig. 11. There is no recurrence at 28 months' follow-up (12/23/2017)**

## DISCUSSION

PUL is a rare acquired pigmented skin disease. Clinically, PUL occurs as multiple small aggregated brown macules on an area of normal skin confined to only one side of the face or body or extremity after childhood. It is especially distributed in a limited area of the body, which can affect one or more dermatomes and stop at the midline (Parslew, 1995; Goldberg, 1995 and Dawoud, 2016). Occasionally, PUL can be associated with other pigmented skin disorders such as café au lait spots and segmental neurofibromatosis (Lee, 1995 and Chen, 2005). Histopathologically, PUL shows typical findings of lentigo, which is a mildly increased number of melanocytes in the basal layer of the epidermis and variable elongation of the rete ridges (Marchesi, 1992). PUL should be differentiated from nevus spilus macularis, which is observed as multiple dark black spots on a large brown background patch. PUL occurs on normal skin and does not appear within an area of a large brown background patch (Dawoud, 2016). The etiology and pathogenesis of PUL is unknown, but some authors think that PUL is an undefined form of segmental neurofibromatosis because some signs specific to neurofibromatosis such as café au lait spots, neurofibroma, axillary freckling and Lisch nodule observed in patients with PUL (Lee, 1995 and Chen, 2004). Conventional laser treatments such as ruby laser, alexandrite laser and Q-switched 532nm Nd:YAG laser for PUL have been used widely for many years. However, conventional laser treatments were unsatisfactory because they may provoke purpura, crust, PIH, mottled hypopigmentation and scarring (Lee, 2012;

Pretel, 2013 and Kim, 2016). Especially, it is extremely difficult to treat PUL without PIH (Lee, 2012; Pretel, 2013 and Kim, 2016). Generally, 532 nm wavelength of QSNL, 694 nm wavelength of ruby laser, 755 nm wavelength of alexandrite laser and 515-755 nm wavelength of intense pulsed light are absorbed in much more melanin compared to 1064 nm wavelength of QSNL (4,5,6,13). The laser energy due to the higher absorbance by the melanin that leads to the destruction of the epidermal melanocytes and simultaneously injures the surrounding keratinocytes of the lesion (Lee, 2012; Pretel, 2013; Kim, 2016 and Hur, 2017). These damaged keratinocytes secrete interleukin-1 (IL-1), which stimulates keratinocytes to secrete some keratinocytic injury-induced cytokines such as endothelin-1,  $\alpha$ -melanocyte stimulating hormone (MSH), adrenocorticotropic hormone (ACTH) and prostaglandin (PGE<sub>2</sub>, PGF<sub>2</sub> $\alpha$ ). These cytokines activate melanocytes and increase melanin synthesis in the melanosomes therefore provoking PIH and worsening PUL (Hattori, 2004; Okazaki, 2003 Okazaki, 2005 and Hur, 2017). The damaged keratinocytes of the lesion also secrete the single-chain urokinase type plasminogen activator (sc-uPA) which converts plasminogen to plasmin. The plasmin then stimulates the keratinocytes to secrete basic fibroblast growth factor (bFGF). The melanocytes then get activated by this bFGF, increasing melanin synthesis in the melanosomes, which cause PIH (Hattori, 2004; Okazaki, 2003; Okazaki, 2005 and Hur, 2017). But given that bFGF in the lesional keratinocytes of PUL is not increased, bFGF may not cause PUL (Hur, 2017). When the conventional laser therapy can cause purpurae and crusts, the laser energy may injure fibroblasts, mast cells, lymphocytes, macrophages and vascular endothelium simultaneously. Especially, stem cell growth factor (SCF) and hepatocyte growth factor (HGF) from the damaged fibroblasts activate melanocytes and increase melanin synthesis in the melanosomes, and eventually leading to PIH and worsening PUL (Hattori, 2004; Okazaki, 2003 & 2005 and Hur, 2017). Finally, reactive oxygen species such as free radical oxygen and peroxide or nitric oxide from the damaged keratinocytes also activate melanocytes and increase melanin synthesis in the melanosomes, and eventually inducing PIH and worsening PUL (10-13). In order to minimize the side effects such as crust, purpura, PIH, mottled hypopigmentation and scarring caused by the conventional laser therapy, the authors devised a new treatment using Dr. HoonHur's GPT with a high fluence 1064nm QSNL (Spectra Laser, Lutronic, South Korea) at a one-week interval with a spot size of 7mm, a fluence of 2.4 J/cm<sup>2</sup> and a pulse rate of 10Hz with slowly one pass by a sliding-stacking technique over the PUL (13-17). We think that HoonHur's GPT using a high fluence 1064nm QSNL is a safer and more effective treatment for PUL than the methods of treatment tried so far (Hur, 2017). In the previous papers, the authors already reported the therapeutic effects of Dr. HoonHur's GPT using a high 1064 nm QSNL in various skin diseases such as café au lait spot, partial unilateral lentiginosis, Becker's nevus, Ota's nevus, Hori's nevus and congenital melanocytic nevus without side effects such as PIH, mottled hypopigmentation and scarring (Hur, 2017 & 2016). We believe that weekly successive Dr. HoonHur's GPT induces the progressive destruction of epidermal or dermal melanocytes with minimal epidermal damage and accelerates the apoptotic melanocytic cell death program (13-17). The wavelength of 1064nm adopted in Dr. HoonHur's GPT is less absorbed by the epidermal melanin. This mechanism of Dr. HoonHur's GPT using a high fluence 1064-nm QSNL is to minimize the epidermal damage and destroy the melanosomes in the epidermal melanocytes, which are changed into ghost cells due

to the loss of function (Hur, 2017 & 2016). Then performed weekly, Dr. HoonHur's GPT using a high fluence 1064 nm QSNL destroys melanocytes completely and accelerates apoptotic melanocyte cell death. And the dispersed melanosomes and melanins, which are the end products of damaged melanocytes, are either removed by the transepidermal elimination or are removed by dermal melanophages via the lymphatic system (Hur, 2017 & 2016). The lesional melanocytes are progressively displaced into normal melanocytes which migrate from the outer root sheath of hair by apoptotic melanocytic cell death program and homeostasis (Hur, 2017 & 2016). Finally, the complete clearance of PUL without any side effects or recurrences can be achieved. In this paper, all of the 15 patients with PUL were treated with 50 treatment sessions of Dr. HoonHur's GPT with a high fluence 1064 nm QSNL at a one-week interval with a spot size of 7 mm, a fluence of 2.4 J/cm<sup>2</sup> and a pulse rate of 10 Hz with slowly one pass by a sliding-stacking technique over the PUL. The one pass of a fluence of 2.4 J/cm<sup>2</sup> by a sliding-stacking technique is very important to minimize the epidermal damage (Hur, 2017). If two passes of a fluence of 2.4 J/cm<sup>2</sup> by a sliding-stacking technique were performed, the epidermal damages might have occurred. The damaged keratinocytes might have secreted cytokines such as endothelin-1,  $\alpha$ -MSH, ACTH, bFGF and prostaglandin (PGE<sub>2</sub>, PGF<sub>2</sub> $\alpha$ ), and reactive oxygen species such as free radical oxygen and peroxide or nitric oxide which could cause PIH and worsen PUL (Hur, 2017). To put it simply, the end point of Dr. HoonHur's GPT with a high fluence 1064 nm QSNL is to induce only erythema without petechiae or purpurae. Due to the less absorption by epidermal melanin in Dr. HoonHur's GPT, it is possible to deliver sufficient energy to destroy epidermal melanocytes and in the same time salvaging normal background tissue, minimizing epidermal damage without inducing purpurae and crusts and preventing PIH and scarring (Hur, 2017 & 2016). However, in order to achieve the complete clearance of PUL without recurrence, this therapy requires the continuous 50 treatment sessions for one year. In this paper, 15 patients with PUL (Fig. 1,3,5,7,9) were treated with Dr. Hoon Hur's GPT using a high fluence 1064 nm QSNL. All of the 15 patients with PUL were achieved the complete clearance of the pigmented lesions without PIH and scarring (Fig. 2,4,6,8,10). There are no recurrences after a follow-up of 12-28 months (Fig. 11). All patients were satisfied with the results of Dr. HoonHur's GPT without any side effects such as PIH and scarring.

## Conclusion

In this paper, Dr. Hoonhur's GPT using a high fluence 1064 nm QSNL achieved the complete clearance of PUL without significant side effects and recurrences. We suggest Dr. HoonHur's GPT using a high fluence 1064 nm QSNL is a new, safe and good option for treating PUL.

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