

Innovative 308/311nm
Solid-State Ti:Sapphire
UVB Laser

PALLAS

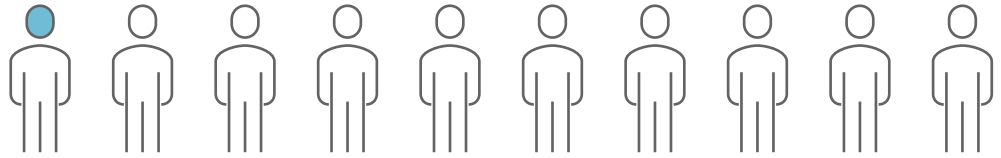
 **LASEROPTEK®**

Transforming Technology to Enrich Your Life

Understanding Vitiligo and Psoriasis

Vitiligo is a relatively common acquired depigmentation disorder affecting people of all ages and both genders, negatively impacting quality of life. Approximately 1% of the world population suffers from vitiligo.

1 out of 100 People



Approximately 70 million people across the world have vitiligo with 20-35% being adolescents.¹⁻²

95% of patients develop vitiligo before the age of 40

20% of patients have a family member with vitiligo

7% of adolescent patients inherited vitiligo from their parents

Psoriasis is a long-lasting autoimmune disease, causing hyper production of skin cells rapidly forming raised; red, itchy and dry scaly patches. It is a serious global problem affecting 125 million people worldwide across all age groups.

89% of people with psoriasis experience shame and embarrassment

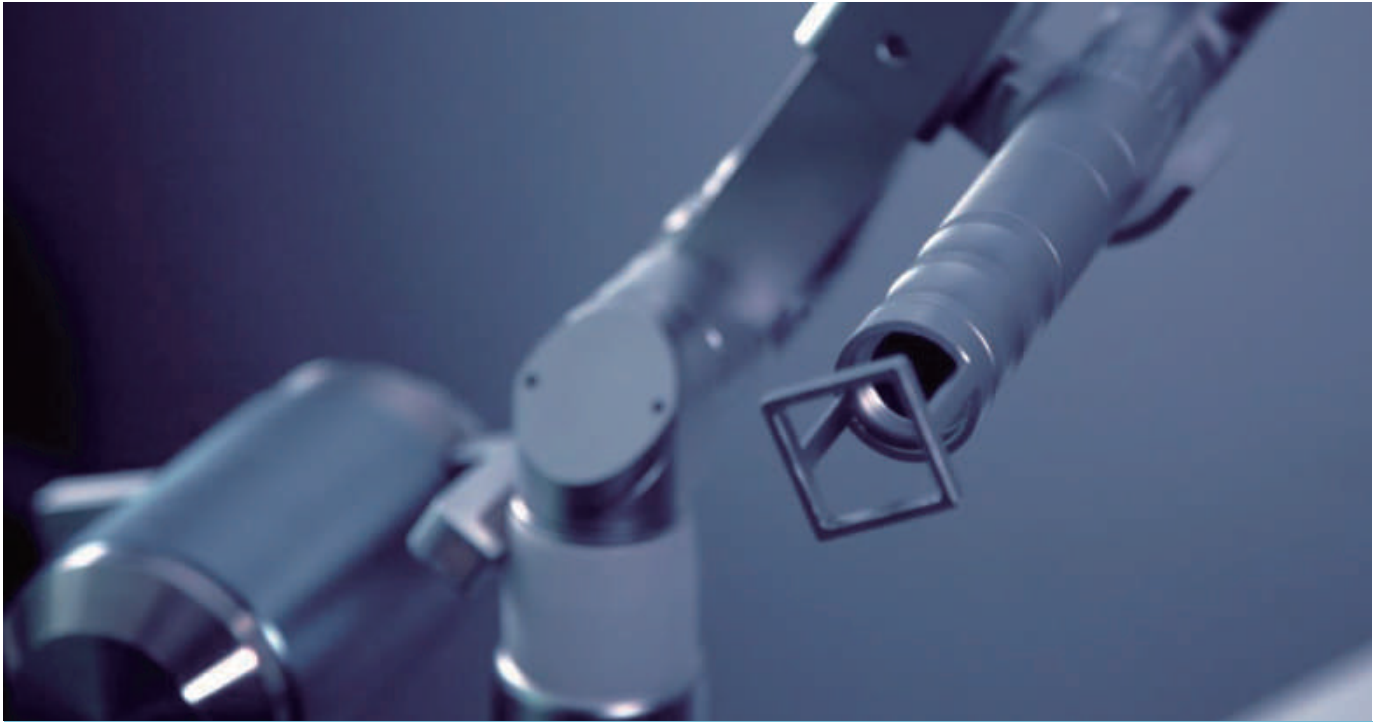
42% of people with psoriasis experience a lack of self-confidence

62% of people with psoriasis experience symptoms of depression

44% of people with psoriasis have major difficulties at work



Published data on the prevalence of psoriasis by country varies between 0.09% and 11.4% of the population. Population prevalence in developed countries varies between 1.5% and 5%. Evidentiary data suggests that psoriasis may be on the increase and multiple scientific studies demonstrate that psoriasis causes significant psychological and economic impact.³



PALLAS

The First Solid-State 308/311nm
Ti:Sapphire UVB Laser

UVB laser with highly safe and efficacious wavelengths for treating variety of complex skin conditions. Delivering targeted therapeutic beam efficaciously and comfortably treats vitiligo, psoriasis, atopic dermatitis, and leukodermas.



The World's First Solid-State
Ti:Sapphire UVB Laser



308 or 311nm, Optimal Wavelengths to Treat
Complex Autoimmune Skin Conditions



Proven Efficacy
and Safety



No Consumable Costs
High ROI

Why is the PALLAS Unique?

Revolutionary Innovation

LASEROPTEK invested the last decade researching, developing and designing PALLAS, the world's first and only Ti:Sapphire based solid-state UVB laser available today. Employing LASEROPTEK's unique and proprietary harmonic generation technology, PALLAS converts the Ti:Sapphire's 933nm output to 311nm, a highly safe and efficacious wavelength for treating a variety of complex skin conditions.

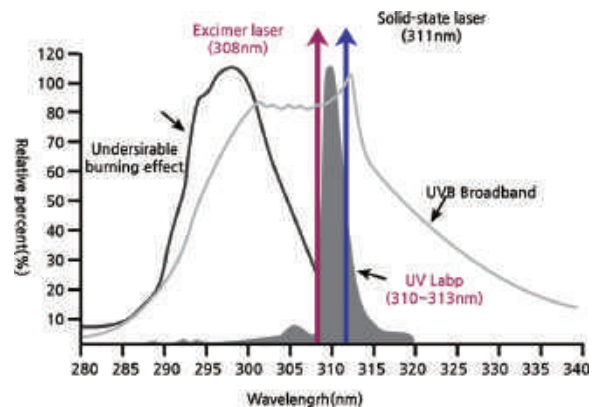
PALLAS exhibits world-leading conversion efficiency. This breakthrough technology and achievement is featured in the 2015 publication of "Optics Letters."⁴

Optimal Wavelengths

It is a well-known and studied fact that the 310-313nm wavelength range (narrowband UVB) is the most effective in treating complex skin conditions such as vitiligo and psoriasis while avoiding the burning effects common with shorter wavelengths such as 308nm.⁵

LASEROPTEK chose the 311nm wavelength given its ability to penetrate deeper into the skin amongst the wavelengths in the 310-313nm range.⁵ The 311nm Ti:Sapphire laser (TSL) light penetrates deeper than a 308nm excimer laser (EL) light thereby stimulating more melanocytes around hair follicles.

The 311nm wavelength is proven equally effective to and safer than the well-known and deployed 308nm wavelength. However, in order to provide physicians with more options for treating their patients, LASEROPTEK offers the choice of either 308nm or 311nm wavelength.

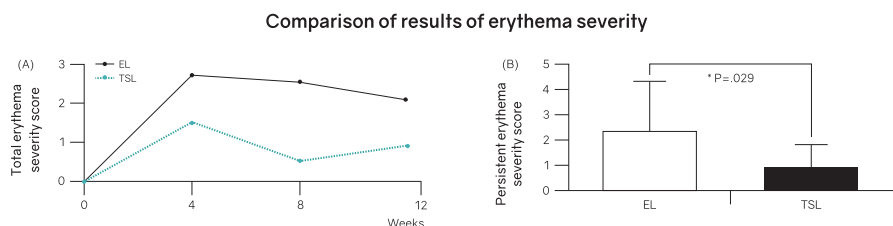


*Please note that this choice is not user-selectable on the system and must be determined when ordering.

Good Safety Profile

In a study comparing total and persistent erythema (lasting ≥ 24 hours), between a 308nm excimer laser (EL) treated group and 311nm Ti:Sapphire laser (TSL) treated group, the TSL group experienced significantly less erythema as compared to the EL group.

The average total erythema severity score was higher in the EL group (6.46 ± 6.12) than in the TSL group (2.07 ± 2), and the score tended to decrease as treatment continued, with a greater decrease in the TSL group. The mean persistent erythema severity score in TSL-treated lesions was $0.77 (\pm 0.93)$, which was significantly lower than $2.38 (\pm 1.94)$ seen with EL treatment ($P = .029$). This finding suggests that TSL therapy may induce less UV-burn reaction and be more tolerable.⁶



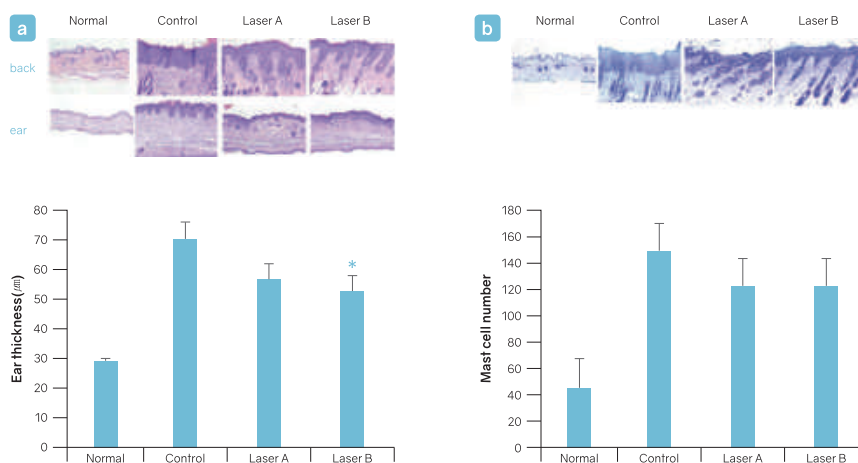
The total erythema severity score (A) shows that the trend is lower in the titanium:sapphire laser (TSL) group (small square, dotted line) than in the excimer laser (EL) group (small round, solid line) during the total 12-wk period. Additionally, the persistent erythema score lasting > 24 h (B) is significantly lower in the TSL group than in the EL group ($P = .029$).

Proven Efficacy and Safety

PALLAS has proven its efficacy by providing patients with relief in fewer treatments than topical and conventional phototherapy, and can effectively treat anatomical locations challenging to treat. PALLAS treatment is painless and long-lasting.

In the pilot study of patients with non-segmental vitiligo who had lesions on the face and neck, PALLAS showed 79% excellent to complete re-pigmentation and 21% good or moderate re-pigmentation. The initial response was fast, and re-pigmentation began after 4-9 treatment sessions. The therapeutic mechanism of TSL would involve immune modulation and melanocyte stimulation, as in narrowband UVB and EL treatment.⁷

PALLAS has also proven that it is an effective adjuvant treatment modality for atopic dermatitis (AD). In the study in AD mouse models, the gain-switched 311nm TSL suppresses the hyperproduction of IgE and T-helper cell type 2 (Th2) cytokines. The data demonstrated that PALLAS improves the severity and symptoms of AD in this murine model.



Effects of the gain-switched 311nm TSL on AD-like skin lesions.

a Ear thickness and b mast cell number also decreased from pre-radiation levels after irradiation. *P<0.05

* Control Group : Not irradiated, Laser A Group : 311nm TSL 500 mJ/cm², Laser B Group : 311nm TSL 1,000mJ/cm²

In addition to the clinical features of AD, it also reduced the skin thickening and mast cell infiltration in inflamed AD skin lesions. It was able to modulate the immune response, including hyper-IgE and upregulated Th2 cytokines.

As a result, PALLAS improves skin barrier function in AD lesions and inhibits Th2 mediated inflammatory reaction showing the therapeutic effectiveness.⁸



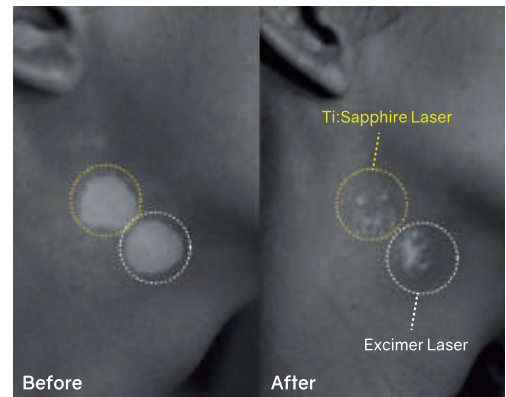
•79% Excellent •21% Good or Moderate

Similar Therapeutic Effect

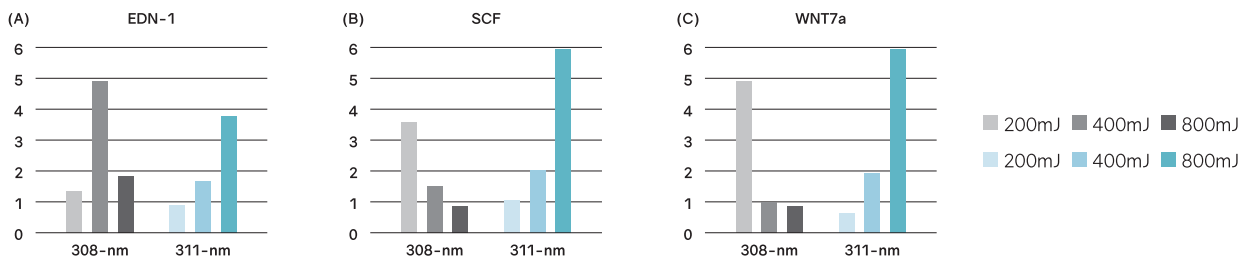
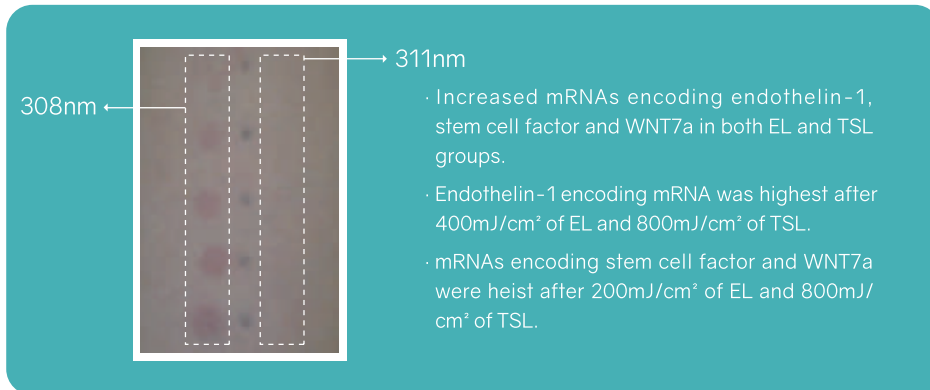
According to the randomized controlled non-inferiority study, which was conducted to compare 311nm TSL and 308nm EL treatment for vitiligo, both the extent of re-pigmentation and the treatment response of the TSL group were slightly better than those of the EL group.⁹

TSL irradiation was associated with a cytokine expression pattern similar to that of EL treatment, but the maximal expression levels were observed at higher radiation doses with the TSL than with the EL. This is explained by differences in the photobiological properties of the two lasers; the MED of the TSL was 1.74-fold higher than that of the EL. The TSL would be expected to penetrate deeper than the EL because the TSL operates at a longer wavelength.

Minimal Erythema Dose (MED) of 311nm TSL is 1.7 times higher than that of 308nm EL.



TSL has a similar therapeutic effect to EL in localized vitiligo with good safety profiles.

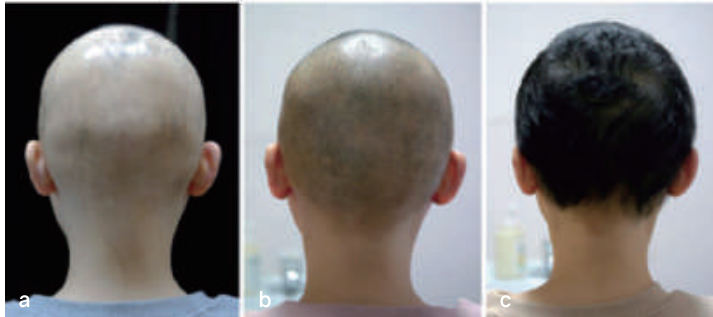


The radiation-induced expression levels of genes encoding endothelin-1 on the six 7-week-old C57BL/6 mice to explore molecular changes after irradiation.

Promising Therapeutic Options

Current treatment modalities for alopecia areata (AA) consist of intralesional corticosteroid injection, topical immunotherapy, and topical and systemic corticosteroids, but have substantial disadvantages such as the injection-associated pain, allergic sensitization, and various adverse effects.¹⁰

In a pilot study in AA patients, a remarkable response to 311nm TSL was achieved in 73.9% of the treated AA patients. Although the mechanism by which TSL induces hair regrowth in AA has yet to be investigated it seems to be related to the photobiological effects of modulating the immune response such as NBUVB, which emits a 311nm as a peak wavelengths.¹¹



Alopecia totalis treated with a gain-switched 311nm TSL

- a. A 27-year-old female with a 21-year history of AA before treatment.
- b. The regrowth of all hair was evident after 12 treatment sessions (3 months).
- c. Full growth was achieved after 30 sessions (7 months).

In a recent study of the use of EL in the treatment of vitiligo, stimulation of the Wnt/ β -Catenin signaling pathway was demonstrated and may also participate in the induction of hair regrowth in AA patients. It is assumed that TSL also induces hair regrowth of AA with similar mechanisms as ELs. Because 311nm TSL has a longer wavelength than 308nm EL, it may penetrate deeper to the level of the hair bulb in the skin.

It was found that the 311nm provides non-invasive, pain-free treatment for AA patients without any risk of adverse drug reactions and can be safely treated at various ages.*

* PALLAS is not FDA cleared for alopecia areata.

High ROI

PALLAS' solid-state design eliminates the need to replace consumable items such as excimer gas, electrodes, laser mirrors and switches. The elimination of expensive consumables significantly lowers the cost of operation and ownership as well as service downtime throughout the laser's operational lifetime.

PALLAS frees clinicians from the financial and time burden associated with replacing consumables thereby increasing ease of ownership and return-on-investment. PALLAS helps physicians focus on what is most important, treating patients.

Safety, efficacy, patient comfort and the clinician's ownership experience form the foundation of LASEROPTEK's design and development philosophy. PALLAS is a prime and successful example of this ideology in action.

References

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Before & After



before



after



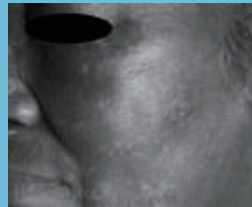
before



after



before



after



before



after

Photos courtesy of Jung Min Bae, M.D, PhD



before



after

Photos courtesy of Dr. Shibata, MD

PALLAS Specifications

Laser Type	Ti:Sapphire
Wavelength	308nm / 311nm
Pulse Duration	15 ~ 20ns
Pulse Energy	5mJ
Repetition Rate	100Hz
Spot Sizes	12 x 12mm ²
Display	10.4" TFT LCD Touch panel
Electrical Control	ARM processor
Cooling system	Closed cycle water to air heat exchanger Chiller equipped
Electrical Power	220-230VAC, 50/60Hz
Dimensions	298(W) x 819(D) x 936(H)
Weight	80kg

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