



Compilation of
Publications & Abstracts
on Melasma
using 755nm picosecond laser

World's 1st and Only
755nm picosecond device
FDA-cleared to treat melasma pigment
in ALL skin types



Study Title	Sample Size (N=)	Skin Types	Region	Key Takeaways	Protocols & Parameters	Page
1. Treatment of Melasma in Skin Type IV and V with a New Adjustable Fluence Diffractive Lens Array Picosecond 755nm Laser. Niwat Polnikorn MD., Pawit Phadungsaksawasdi MD., PhD., Harit Leksuksri MD., M.Sc.American Society for Laser Medicine and Surgery Abstracts (2024)	50	IV-V	Thailand	The adjustable fluence 755 -nm picosecond laser with diffractive lens array, alongside standard medications, effectively and safely treats mixed and telangiectatic melasma in skin types IV and V, improving pigmentation and rejuvenating skin.	/	5
2. Activated Melanocyte and Senescent Collagen Fibers as Predictors of the Prognosis of Melasma Post Picosecond Laser Treatment. China Medical University Hospital, Chang Cheng Chang, MD, PhD., Chang Cheng Chang, Yen-Jen Wang, Ling Huang, Emily Tsai, Jia-wei Shen, Meng-en Lu. American Society for Laser Medicine and Surgery Abstracts (2024)	20	/	Taiwan	Picosecond Alexandrite Laser with a DLA could effectively treat melasma. Activated melanocytes and senescent collagen fibers served as predictors of the prognosis of melasma post laser treatment.	/	6
3. Efficacy and Safety of 755-nm Picosecond Alexandrite Laser with Topical Tranexamic Acid Versus Laser Monotherapy for Melasma and Facial Rejuvenation: A Multicenter, Randomized, Double-Blinded, Split-Face Study in Chinese Patients. Yiming Li, Cheng Yao, Heye Zhang, Li Li, Yiyi Song. Lasers in Medical Science https://doi.org/10.1007/s10103-022-03566-4	36	III - IV	China	<ul style="list-style-type: none"> 36 patients were enrolled to compare the efficacy and safety of 755-nm picosecond alexandrite laser and topical tranexamic acid (TTA) combination therapy with laser monotherapy, for the treatment of melasma and facial rejuvenation. Compared with the baseline, hemi-MASI, dyschromia, and skin texture on both halves improved significantly through the follow-up. The picosecond alexandrite laser and TTA combination therapy demonstrated synergistic efficacy for hemi-MASI and dyschromia improvements over laser monotherapy at 1- and 3-month follow-ups. The laser monotherapy halves displayed significantly less redness and sensitivity during the 7-day post-treatment recovery period. The picosecond laser and TTA combination therapy did not demonstrate superior efficacy over laser monotherapy in other facial rejuvenation indicators (skin texture, laxity, and rhytids), recurrence reduction, and post-inflammatory hyperpigmentation (PIH) prevention at 6-month follow-up, either. 	<ul style="list-style-type: none"> Protocol: Compound lidocaine 5% was topically applied prior to treatment t in 16 patients. 8-mm spot size, 0.4 J/cm² fluence, 5 Hz, 750ps. 2000 pulses, 3 to 4 passes, with 10 to 15% of pulse overlapping. Three treatment sessions, 4-5 weeks intervals. Endpoint: mild or moderate erythema Immediately after laser treatment, 2.5 mL 10% TA was applied for the combination therapy half. For the laser monotherapy half, 2.5 mL normal saline solution was applied. 15 min cooling with ice packs. Patients were sent home with the identical ampoules containing 7.5 mL TA or NSS and were instructed to apply 2.5 mL on the corresponding halves 12 h, 24 h, and 48 h later, respectively. A broad-spectrum sunscreen with SPF 30 PA+++ throughout the 6-month follow-up period. 	7
4. Treatment of Refractory Melasma in Asians with the Picosecond Alexandrite Laser Niwat Polnikorn, Emil Tanghetti. Dermatol Surg. 2020 Sep 8. doi: 10.1097/DSS.0000000000002612.	60	IV-VI	Thailand	<ul style="list-style-type: none"> 60 Fitzpatrick Skin Type IV to VI Thai females with refractory melasma were successfully treated by both flat optic and Focus Lens on a sunny climate. The patients treated with Focus Lens had a lower percentage of complications and a better outcome. 6 months after the last treatment, 18.5% difference between two groups with a 75.7% improvement in the MSI in Group 2 with Focus Lens and a 57.2% improvement in the MSI in Group 1 with flat optic. 5% recurrence of melasma with no PIH in Group 2 in contrast to 16% recurrence of melasma with 21% transient PIH in Group 1. 	<ul style="list-style-type: none"> Protocol: ST IV-VI, 1.02-1.5 J/cm² with 3-4mm spot size on Flat Optic group, 0.4 J/cm² with 8mm spot size on Focus Len group, 1 pass, 1 Hz, 6 txs in 2 weeks intervals Endpoint: immediate grayish discoloration on Flat Optic, transient erythema on Focus Lens Post treatment care: application of topical emollient, sun avoidance, and broad-spectrum sunscreen. Topical 4% alpha arbutin and 15% ascorbyl phosphate palmitate sodium for prevention of PIH. 	8
5. A Prospective, Split-face, Randomized Study Comparing a 755 - nm Picosecond Laser With and Without Diffractive Lens Array in the Treatment of Melasma in Asians Woraphong Manuskiatti, Chadakan Yan, Ploypailin Tantraporn-pong, Kathryn Anne G. Cembrano,Thanya Techapichetvanich, Rungsima Wanitphakdeedecha. Lasers in Surgery and Medicine. (2020) DOI 10.1002/lsm.23312	18	IV-V	Thailand	<ul style="list-style-type: none"> After 5 txs, pigment clearance significantly improved on each side in the treatment of the mixed-type melasma on FST IV and V. There is a trend toward better pigment clearance from 1 to 6 mths post final tx. 755-nm picosecond laser treatment provide longer remission intervals compared with other laser and light options since the maintenance of the clinical outcome was as long as 6 months after the treatment was discontinued without the use of any topical bleaching preparations as post-treatment maintenance. 	<ul style="list-style-type: none"> Protocol: ST IV-V, air cooling during tx, 0.4 J/cm² with 8 mm spot size Focus Lens on one side, Flat Lens on another side, 750 ps, 2.5 Hz, 2 passes, 5 txs in 4 weeks intervals Post treatment care: application of a broad-spectrum sunscreen with SPF 50 	9

Study Title	Sample Size(N=)	Skin Types	Region	Key Takeaways	Protocols & Parameters	Page
6. Photoaging Reversibility in Asian Patients with Melasma Treated Using Picosecond Lasers with Diffractive Lens Array: A 1-Year Prospective Observational Cohort Study Erh-Ti Lin, Hsiu-Mei Chiang, Bor-Shyh Lin, Yung-Hsueh Huang, Chang-Cheng Chang. ISSN: 1076-0512 Dermatol Surg 2020;00:1-6 ·DOI: 10.1097/DSS.0000000000002405	10	IV	Taiwan	<ul style="list-style-type: none"> In patients with melasma, picosecond laser treatment with DLA may alleviate pigmentation disorder and the related photoaging characteristics (e.g., wrinkled skin and increased vascularity), and the effects may be maintained 1 year post tx. 	<ul style="list-style-type: none"> Protocol: ST IV, pretreatment topical anesthetic, 0.4 J/cm² with 8 mm spot size Focus Lens, 750ps, 10 Hz, 2 passes, around 2500 pulses, 3-5 txs in 4 weeks intervals Endpoint: mild erythema without petechiae Post treatment care: skin was cooled for 15 minutes with icepacks post tx. all patients were using same broad-spectrum sunscreen with SPF 50+ and protection grade of ultraviolet (UV)Aband ++++ and the same baby moisturizers every 2 hours during daytime 	10
7. Prospective Randomized Controlled Trial Comparing Treatment Efficacy and Tolerance of Picosecond Alexandrite Laser with a Diffractive Lens Array and Triple Combination Cream in Female Asian Patients with Melasma Wang YJ, Lin ET, Chen YT, Chiu PC, Lin BS, Chiang HM, Huang YH, Wang KY, Lin HY, Chang TM, Chang CC. J Eur Acad Dermatol Venereol. 2020 Mar;34(3):624-632. doi: 10.1111/jdv.15934. Epub 2019 Oct 17. PMID: 31494973.	26	IV	Taiwan	<ul style="list-style-type: none"> Picosecond alexandrite laser treatment using DLA showed comparable efficacy with TCC topical therapy for the treatment of melasma with improvements in texture, spots, wrinkles and pores up to 3 months after the last treatment due to the continuous neocollagenesis. 	<ul style="list-style-type: none"> Protocol: ST IV, 0.4 J/cm² with 8 mm spot size Focus Lens, 750ps, 2 passes, around 2500 pulses, 3-5 txs in 4 weeks intervals Endpoint: mild erythema Post treatment care: using baby wash and moisturizing lotion daily and sunscreen SPF 50+, PA++++ every 2 hours during the daytime. 	11
8. Efficacy and Safety Evaluation of Picosecond Alexandrite Laser with a Diffractive Lens Array for Treatment of Melasma in Asian Patients by VISIA Imaging System Chen YT, Lin ET, Chang CC, Lin BS, Chiang HM, Huang YH, Lin HY, Wang KY, Chang TM. Photobiomodul Photomed Laser Surg. 2019 Sep;37(9):559-566. doi: 10.1089/photob.2019.4644. Epub 2019 Aug 14. PMID: 31411549.	20	IV	Taiwan	<ul style="list-style-type: none"> Three sessions of picosecond 755-nm alexandrite laser with a DLA were effective for melasma treatment in Asian patients with minimal side effects. 	<ul style="list-style-type: none"> Protocol: ST IV, 0.4 J/cm² with 8 mm spot size Focus Lens, 750ps, 10 Hz, 2 passes, 2000-2500 pulses, 3 txs in 4-6 weeks intervals Endpoint: mild erythema Post treatment care: application of a broad-spectrum sunscreens with SPF 50+ every 2-3 h during indoor and outdoor activities 	12
9. Using Reflectance Confocal Microscopy to Observe In-vivo Melanolysis After Treatment With The Picosecond Alexandrite Laser and Q-switched Nd:YAG Laser in Melasma Jo DJ, Kang IH, Baek JH, Gwak MJ, Lee SJ, Shin MK. Lasers Surg Med. 2019 Jul;51(5):423-429. doi: 10.1002/lsm.23025. Epub 2018 Oct 23. PMID: 30351494.	8	III	Korea	<ul style="list-style-type: none"> The distribution of melanin could be considered using RCM for following-up and monitoring the response to therapy. 	/	13
10. Treatment of Melasma and Post-Inflammatory Hyperpigmentation by a Picosecond 755-nm Alexandrite Laser in Asian Patients Lee YJ, Shin HJ, Noh TK, Choi KH, Chang SE. Ann Dermatol. 2017 Dec;29(6):779-781. doi: 10.5021/ad.2017.29.6.779. Epub 2017 Oct 30. PMID: 29200769; PMCID: PMC5705362.	2 (melasma) 1 (pigmented lesions)	IV IV	Korea	<ul style="list-style-type: none"> Picosecond 755-nm Alexandrite Laser provided effective treatments of intractable melasma and PIH with fewer adverse events in dark Asian skin 	<ul style="list-style-type: none"> Protocol: ST IV, on 2 melasma cases: 0.57 J/cm² with 6 mm spot size, 6 and 14 txs in 2 weeks intervals; on PIH case: 5.25 J/cm² with 2 mm spot size, 7 txs in 2 weeks intervals 	14
11. A Split-Face Study: Comparison of Picosecond Alexandrite Laser and Q-Switched Nd:YAG Laser in the Treatment of Melasma in Asians Mei-Ching Lee, Ying-Fang Lin, Sindy Hu, Yau-Li Huang, Shyue-Luen Chang, Chun-Yu Cheng, Chun-Shin Chang. Lasers Med Sci. Published online 7 May 2018.	12	III - IV	Taiwan	<ul style="list-style-type: none"> 755 nm alexandrite picosecond laser has been observed to achieve a faster and better clearance rate for melasma compared to 1064 nm QS-Nd:YAG laser in a Asian split-face study. 	<ul style="list-style-type: none"> Protocol: ST III-IV, pretreatment topical anesthetic, air cooling during tx, 0.88-1.18 J/cm² with 4.4-5.1 mm spot size, 650ps, 3 passes, average 1000 pulses on the right side of the face, 4 txs in 4 weeks intervals Endpoint: mild erythema and swelling without petechiae Post treatment care: ice packs for 15 min immediately post txs. Oral tranexamic acid 250 mg 3 times 1 day for 1 week after each treatment. sunscreen SPF 50 during the daytime and 3% topical tranexamic acid whitening essence at night. 	15
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Treatment of Melasma in Skin Type IV and V with a New Adjustable Fluence Diffractive Lens Array Picosecond 755 nm Laser

Niwat Polnikorn MD., Pawit Phadungsaksawasdi MD., PhD., Harit Leksuksri MD., M.Sc.

American Society for Laser Medicine and Surgery Abstracts (2024)

Authors: Niwat Polnikorn, Harit Leksuksri, Pawit Phadungsaksawasdi, Dr. Niwat's Skin Clinic, Dr. Niwat's Skin Clinic, Prachuap Khiri Khan, Thailand, Division of Dermatology, Chulabhorn international college of medicine, Thammasat University, Thailand.

Background: Melasma, a complex skin condition, challenges traditional therapies like topical agents and peels. Advancements in 755-nm alexandrite picosecond laser technology, especially with adjustable fluence, promise tailored treatments. This study evaluates its efficacy and safety in Asian patients.

Study Design/Materials and Method: This retrospective study conducted from November 2022 to November 2023, analyzed patients treated for facial melasma with 755-nm alexandrite picosecond laser at a private dermatology center. It included two patient groups, differen-

tiated by their previous melasma treatment history, and utilized the Melasma Severity Index and Quartile grading scale for evaluation.

Results: Over 12 months, this study involved 50 patients (14% men, 86% women, ages 31-60) treated for facial melasma. On average, 3.26 treatment sessions were conducted, with Melasma Severity Index (MSI) scores improving from 14.10 to 8.34, showing statistically significant enhancement. Improvement varied: 10% excellent, 30% good, 22% moderate, 14% mild, and 24% no improvement. No substantial difference was noted in treatment efficacy between Mixed and Telangiectatic melasma or between previously untreated and I S183 refractory cases. Overall, 76% showed melasma improvement posttreatment, underscoring method's effectiveness.

Conclusion: Our results demonstrate that the adjustable fluence 755 -nm picosecond laser with diffractive lens array, alongside standard medications, effectively and safely treats mixed and telangiectatic melasma in skin types IV and V, improving pigmentation and rejuvenating skin.

Activated Melanocyte and Senescent Collagen Fibers as Predictors of the Prognosis of Melasma Post Picosecond Laser Treatment

Chang Cheng Chang, Yen-Jen Wang, Ling Huang, Emily Tsai, Jia-wei Shen, Meng-en Lu

China Medical University Hospital, American Society for Laser Medicine and Surgery Abstracts (2024)

Authors: Chang Cheng Chang, Yen-Jen Wang, Ling Huang, Emily Tsai, Jia-wei Shen, Meng-en Lu China medical university hospital.

Background: Data regarding the prediction of treatment response of melasma post laser treatment are limited. This preclinical study aimed to evaluate the in vivo efficacy of picosecond alexandrite laser (PAL) with a diffractive lens array (DLA) for melasma and delineate the prognostic factors that predict the outcome of picosecond laser treatment.

Study Design/Materials and Method: We evaluated the efficacy of PAL with a DLA based on Melasma Area and Severity Index (MASI) score and cellular resolution full-field optical coherence tomography (CRFF-OCT) images. The CRFF-OCT scoring system was developed and prospectively validated to predict the treatment responses.

Results: There was 20 melasma patients, who received 3-session 755nm picosecond laser with diffractive lens array (DLA), enrolled in this study from May 2020 to Feb. 2022. Five patients dropped out for the pandemic Covid-19. 360 vertical sections and 73,980 enface images were analyzed with the computer-aided detection (CADe) system. MASI score significantly decreased after laser treatment ($p < 0.001$). The

presence of activated melanocytes at baseline predicted a high regional MASI (corrcoef = 0.4496, $p = 0.0127$), whereas senescent collagen fibers at baseline predicted a minimal MASI improvement (corrcoef = -0.4989, $p = 0.005$). Moreover, basement membrane (BM) damage at the baseline predicted the presence of melanophages after laser treatment (corrcoef = 0.7678, $p = 0.0008$). BM damage was significantly repaired in lesions ($p < 0.001$).

Conclusion: PAL with a DLA could effectively treat melasma. Activated melanocytes and senescent collagen fibers served as predictors of the prognosis of melasma post laser treatment.

Efficacy and Safety of 755nm Picosecond Alexandrite Laser with Topical Tranexamic Acid Versus Laser Monotherapy for Melasma and Facial Rejuvenation: A Multicenter, Randomized Double Blinded, Split-Face Study in Chinese Patients

Yiming Li, Cheng Yao, Heye Zhang, Li Li, Yiyi Song

Lasers in Medical Science. <https://doi.org/10.1007/s10103-022-03566-4>

Abstract: To compare the efficacy and safety of 755-nm picosecond alexandrite laser and topical tranexamic acid (TTA) combination therapy with laser monotherapy, for the treatment of melasma and facial rejuvenation.

This multicenter, randomized, doubleblinded, split-face study enrolled 37 patients who presented with melasma and photoaging.

Facial halves were randomized to receive either laser and TTA combination therapy or laser monotherapy. Three treatments were delivered at 4–5 weeks intervals.

Patients were followed up for 1, 3, and 6 months post-fnl treatment and evaluated by blinded investigators for hemi-Melasma Area and Severity Index (hemi-MASI), facial dyschromia,

skin texture, laxity, and rhytids. Daily diaries rating healing progress for 7 days posttreatment and satisfaction grading were performed by all patients. Adverse events were recorded.

Thirty-six patients completed the follow-up. Compared with the baseline, hemi-MASI, dyschromia, and skin texture on both halves improved significantly through the follow-up ($p=0.000$). A significant difference in hemi-MASI and dyschromia between combination therapy halves and monotherapy halves was noticed at 1- and 3-month follow-ups ($p<0.05$).

The laser monotherapy halves displayed significantly less redness and sensitivity during the 7-day posttreatment recovery period ($p<0.05$). Patients' satisfaction ratings for the combination therapy halves were higher than the monotherapy halves at 1-month follow-up ($p<0.05$). No severe adverse events were observed.

The picosecond alexandrite laser and TTA combination therapy demonstrated synergistic efficacy for hemi-MASI and dyschromia improvements over laser monotherapy. The optimization of the picosecond laser and TTA combination regimen needs further investigation.

Treatment of Refractory Melasma in Asians With the Picosecond Alexandrite Laser

Niwat Polnikorn, Emil Tanghetti. Dermatol Surg.

2020 Sep 8. doi: 10.1097/DSS.0000000000002612.

Background/Objectives: The picosecond Alexandrite laser was studied in our practice with the diffractive lens array and the flat optic to treat melasma.

Methods And Materials: Sixty patients with melasma were treated in a prospective investigation with the picosecond Alexandrite laser. Nineteen patients were treated with the flat optic and 41 patients were treated with the diffractive lens array. Treatments were performed with 1 pass at 2-week intervals for 6 treatments. The Melasma Severity Index (MSI) was used to evaluate the patients before treatment and 3 and 6 months after the final treatment session.

Results: At 6 months after the last treatment, there was an 18.5% difference between the groups with a 75.7% improvement in the MSI in patients with the diffractive lens array and a 57.2% improvement in the MSIscore in patients

with the flat optic. At 6 months, there was recurrence of melasma in 5% of the cases with nohy-perpigmentation with the diffractive optic in contrast to recurrence in 16% of the cases in the flat optic group and a transient macular hyperpigmentation in 21% of the cases.

Conclusion: This investigation highlights the utility of a picosecond Alexandrite laser with a flat and diffractive lens to successfully treat a large percentage of Asian patients in a sunny climate.

A Prospective, Split-Face, Randomized Study Comparing a 755-nm Picosecond Laser With and Without Diffractive Lens Array in the Treatment of Melasma in Asians

Woraphong Manuskiatti, Chadakan Yan, Ploypailin Tantrapornpong, Kathryn Anne G. Cembrano, Thanya Techapichetvanich, Rungsima Wanitphakdeedecha.

Lasers in Surgery and Medicine. (2020) DOI 10.1002/lsm.23312

Background and Objectives: Treatment of melasma with lasers remains a challenge due to its limited clinical efficacy in addition to high rates of recurrence and side effects. Recently, picosecond lasers have shown favorable results in treatment of benign pigmented lesions. To compare the efficacy and safety of using a 755-nm picosecond laser for the treatment of melasma in a split-face manner, having one side treated with a fractionated beam (diffractive lens array [DLA] coupling) and with a full-beam (flat optics) on the other side.

Study Design/Materials and Methods: Eighteen subjects presenting with mixed-type melasma were enrolled. Each patient was randomly treated with a 755-nm picosecond laser coupled with DLA on one side of the face and without DLA (flat optics) on the other side. The laser was delivered through an 8-mm spot size with

an average fluence of 0.4 J/cm² at 2.5 Hz for a total of two passes without pulse overlapping. All subjects received five monthly treatments. Subjective (clinical evaluation) and objective (color readings) assessments on the degree of pigment clearance and adverse effects were obtained at 1-, 3-, and 6-month after the final treatment.

Results: At 6 months after the last treatment, physician-rating scores were 1.50 ± 0.76 and 1.50 ± 0.65 of the DLA and flat-optics sides, respectively. Pigment clearance significantly improved from 1 to 6 months after the treatment on each side ($P = 0.019$ on DLA and $P = 0.023$ on flat-optics sides). No statistically significant differences in physician-rating scores between the two treatment techniques were observed at all follow-up visits. Objective assessments of melasma clearance corresponded to the clinical evaluation. However, the full-beam (flat optics) provided lower incidence of post-inflammatory hyperpigmentation than the fractionated one.

Conclusion: A 755-nm picosecond laser is safe and effective for the treatment of melasma in dark-skinned individuals. The use of DLA does not provide additional benefit over the flat optics in clearing pigmentation.

Photoaging Reversibility in Asian Patients With Melasma Treated Using Picosecond Lasers With Diffractive Lens Array: A 1-Year Prospective Observational Cohort Study

Erh-Ti Lin, Hsiu-Mei Chiang, Bor-Shyh Lin, Yung-Hsueh Huang, Chang-Cheng Chang.

ISSN: 1076-0512 Dermatol Surg 2020;00:1-6 · DOI: 10.1097/DSS.0000000000002405

Background: Picosecond lasers appear to be effective and safe in treating pigmentation and photoaging disorders through laser-induced optical breakdown.

Objective: To analyze the feasibility of photorejuvenation using picosecond lasers with diffractive lens array(DLA) in patients with melasma.

Methods: Ten Asian (N = 10) women with melasma and Fitzpatrick skin Type IV were enrolled and treated using 755-nm picosecond alexandrite lasers with DLA. All individuals were assessed before treatment, and at 12, 20 weeks, and 1 year by post-hoc test on melasma area and severity index (MASI) and with VISIA Complexion Analysis System using percentile rank for measurement.

Results: The median participant age was 46.5 years. The average MASI continually and significantly ($p < .05$) decreased until the 1-year follow-up, with the photoaging characteristics, such as wrinkles and read areas improving simultaneously ($p < .05$). Spots, texture, pores, ultraviolet (UV) spots, brown spots, and porphyrins exhibited alleviation, but this improvement relapsed by the 1-year follow-up. No postinflammatory hyperpigmentation or hypopigmentation occurred.

Conclusion: In patients with melasma, picosecond laser treatment with DLA may alleviate pigmentation disorder and the related photoaging characteristics (e.g., wrinkled skin and increased vascularity), and the effects may be maintained for a long time. Nevertheless, post-treatment clinical visits every 3 to 6 months are recommended.

Prospective Randomised Controlled Trial Comparing Treatment Efficacy and Tolerance of Picosecond Alexandrite Laser with a Diffractive Lens Array and Triple Combination Cream in Female Asian Patients with Melasma

Wang YJ, Lin ET, Chen YT, Chiu PC, Lin BS, Chiang HM, Huang YH, Wang KY, Lin HY, Chang TM, Chang CC.

J Eur Acad Dermatol Venereol. 2020 Mar;34(3):624-632. doi: 10.1111/jdv.15934. Epub 2019 Oct 17. PMID: 31494973.

Background: Recent evidence suggests melasma to be a photoaging disorder. Triple combination creams (TCC; fluocinolone acetonide 0.01%, hydroquinone 4%, and tretinoin 0.05%) remain the gold standard treatment. Picosecond alexandrite laser treatment using a diffractive lens array (DLA) has been identified to be effective for improving photoaging conditions.

Objective: We aimed to compare the efficacy and tolerance of the picosecond alexandrite laser with those of DLA and TCC in female Asian patients with melasma.

Methods: Twenty-nine patients were randomly assigned to group A1 (3 laser sessions at 4-week intervals), A2 (5 laser sessions at 4-week intervals), or B (TCC daily for at least 8 weeks and then tapered until the final evaluation). The Melasma Area, Severity Index (MASI) score and VISIA were assessed at baseline, week 12, and week 20. By week 20, the follow-up periods for groups A1 and A2 were 3 months and 1 month, respectively.

Results: Nine, 11, and 6 participants in groups A1, A2, and B completed the study, respectively. MASI scores were significantly improved in all 3 groups at weeks 12 and 20. In groups A1, A2, and B, the improvement rates at week 20 were 53%, 38%, and 50%, respectively. VISIA® analysis additionally revealed a significant improvement in spots, porphyria, pores, and brown spots after 3 laser sessions ($p < 0.05$). Group A2 showed greater improvements than group A1 in terms of spots, wrinkles, and pores; however, only red areas were significantly different ($p < 0.001$). All side effects in the 3 groups were transient and gradually subsided after 1 to 3 months.

Conclusion: Picosecond alexandrite laser treatment using DLA showed comparable efficacy with TCC for the treatment of melasma. Improvements in texture, spots, wrinkles, and pores were observed in the laser groups. Patients with melasma lesions that exhibit telangiectasia may benefit from additional laser treatment sessions.

Efficacy and Safety Evaluation of Picosecond Alexandrite Laser with a Diffractive Lens Array for Treatment of Melasma in Asian Patients by VISIA Imaging System

Chen YT, Lin ET, Chang CC, Lin BS, Chiang HM, Huang YH, Lin HY, Wang KY, Chang TM.

Photobiomodul Photomed Laser Surg. 2019 Sep;37(9):559–566. doi: 10.1089/photob.2019.4644. Epub 2019 Aug 14. PMID: 31411549.

Objective: To evaluate the efficacy and safety of picosecond (ps) 755-nm alexandrite laser with a diffractive lens array (DLA) generating laser-induced optical breakdown, which may be beneficial for melasma treatment.

Background: Melasma is notorious for difficult to treat with any modality setting. Recently, picosecond alexandrite laser with DLA seems promising for dealing with it without intolerable complications.

Methods: Twenty ($N = 20$) Asian female melasma patients with Fitzpatrick skin type IV were recruited for 3 treatment sessions of picosecond 755-nm alexandrite laser with DLA at a 4- to 6-week interval. The pulse duration was 750 ps. An 8-mm spot size and the fluence of 0.4 J/cm² was used over the target area with 2 passes per treatment area and around 2000–2500 passes in total. The repetition rate was 10 Hz. Melasma Area and Severity Index (MASI) score and VISIA® imaging system analysis were utilized for evaluation before treatment and 4 weeks after the completion of the third treatment session. The clinical improvement and adverse events were assessed by the physicians and patients, respectively.

Results: The median age of the patients was 45 years (from 27 to 55 years). In the physicians' evaluation, 40% ($n = 8$) of patients showed good improvement and 40% ($n = 8$) of patients showed moderate improvement. The mean MASI score before and after laser therapy showed significant improvement from 9.0 – 4.8 to 6.5 – 3.7 ($p < 0.001$). VISIA analysis of the forehead presented significant improvement in spots ($p = 0.007$) and porphyrins ($p = 0.032$). Some patients experienced erythema (25%), pruritus (20%), and scaling (20%) but subsided within few days of using emollients and sunscreen. Only 5% ($n = 1$) of patients developed mild postinflammatory hyperpigmentation, which also subsided in 3 weeks.

Conclusion: Three sessions of picosecond 755-nm alexandrite laser with a DLA were effective for melasmatreatment in Asian patients with minimal side effects.

Using Reflectance Confocal Microscopy to Observe In-vivo Melanolysis After Treatment With The Picosecond Alexandrite Laser and Q-Switched Nd: YAG Laser in Melasma

Jo DJ, Kang IH, Baek JH, Gwak MJ, Lee SJ, Shin MK.

Lasers Surg Med. 2019 Jul;51(5):423-429. doi: 10.1002/lsm.23025. Epub 2018 Oct 23. PMID: 30351494.

Objectives: Melasma is an acquired type of hyperpigmentation that is characterized by the appearance of scattered light- to dark-brown macules and patches on the face. Recently, several lasers have been proposed as treatment options for melasma. In particular, the picosecond alexandrite laser is an ideal laser for selective photothermal melanolysis. The aim of our study was to compare the effectiveness in melanolysis of a single treatment of the picosecond alexandrite laser with that of the Q-switched Nd:YAG laser using reflectance confocal microscopy imaging of the melasma lesions.

Materials and Methods: We performed a split-face study using the picosecond alexandrite laser and Q-switched Nd: YAG laser in eight patients with melasma. Both melasma lesions and surrounding normal skin were examined under reflectance confocal microscopy 1 and 24 hours after treatment. The melanin intensity of each skin layer was investigated.

Results: At baseline, melasma has irregular melanin distribution and a higher melanin density than surrounding normal skin under reflectance confocal microscopy. After a single treatment with either the picosecond alexandrite laser or the Q-switched Nd:YAG laser, both melanin-induced reflectance and melanin index decreased.

Conclusion: Our findings suggest that it is feasible to assess the distribution of melanin by reflectance confocal microscopy and observe the melanolysis in melasma lesion after laser-treatment. Lasers Surg. Med. 9999:1-7, 2018. ©2018 Wiley Periodicals, Inc.

Treatment of Melasma and Post-Inflammatory Hyperpigmentation by a Picosecond 755-nm Alexandrite Laser in Asian Patients

Lee YJ, Shin HJ, Noh TK, Choi KH, Chang SE.

Ann Dermatol. 2017 Dec;29(6):779-781. doi: 10.5021/ad.2017.29.6.779. Epub 2017 Oct 30. PMID: 29200769; PMCID: PMC5705362.

The picosecond lasers have shown to effectively treat tattoo pigments that are intractable to previous multiple Q-switched (QS) laser treatments. Therefore we hypothesized that a picosecond laser would show better efficacy with minimal adverse events in the treatment of melasma and post-inflammatory hyperpigmentation (PIH) that are difficult to treat with conventional QS lasers. Two patients with melasma and one patient with PIH were treated with a Picosecond 755-nm Alexandrite Laser (Cynosure, USA).

All patients were Korean with skin type IV and no longer responding to QS laser treatments. Laser treatment was well tolerated in all the patients. Adverse events such as PIH were not reported during 8 weeks of follow up period. After the multiple treatment sessions, one patient reported fair improvement and two patients reported good improvement.

Consistent with the clinical results, *ex vivo* skin model irradiated with a Picosecond 755-nm Alexandrite Laser also showed decreased epidermal keratinocyte necrosis compared with the 532-nm QS Neodymium-Doped Yttrium Aluminium Garnet Laser (Lutronic, Korea) yet decreased melanin content. In conclusion, the Picosecond 755-nm Alexandrite Laser may be useful for effective treatment of intractable melasma and PIH with fewer adverse events in dark Asian skin.

A Split-Face Study: Comparison of Picosecond Alexandrite Laser and Q-Switched Nd:YAG Laser in the Treatment of Melasma in Asians

Mei-Ching Lee, Ying-Fang Lin, Sindy Hu, Yau-Li Huang, Shyue-Luen Chang, Chun-Yu Cheng, Chun-Shin Chang.

Lasers Med Sci. Published online 7 May 2018.

Abstract: To evaluate efficacy and safety of picosecond 755 nm alexandrite laser as compared to 1064 nm QS-Nd:YAG laser for melasma treatment in Asians. Twelve patients received 4 sessions of treatments at 1-month interval in a split-face manner. The right side of each patient's face received 755 nm picosecond laser, and the other side received 1064 nm QS-Nd:YAG laser.

Zoom handpiece of 755 nm picosecond laser at fluence of 0.88–1.18 J/cm² was applied. The treatment protocol used for 1064 nm QS-Nd:YAG laser was 8 mm spot size at fluence of 2.0 J/cm² initially followed by 6 mm spot size at fluence of 3.5 J/cm², and finishing with 4 mm spot size at 3.2 J/cm².

For both 755 nm picosecond laser and 1064 nm QS-Nd:YAG laser, the endpoint was mild erythema and swelling without petechiae. Objective evaluation with visual analogue score was conducted by two independent physicians.

Subject self-assessment for each patient was conducted as well. Statistical results showed that higher pigmentation clearance rate was achieved at the 755 nm picosecond laser side after the second treatment.

At the 3 months follow-up, greater clearance was observed at the 755 nm picosecond laser side compared to the 1064 nm QS-Nd:YAG side. 755 nm alexandrite picosecond laser has been observed to achieve a faster and better clearance rate for melasma compared to 1064 nm QS-Nd:YAG laser. We conclude that the 755 nm picosecond laser could be a safe and effective modality for melasma treatment in Asians.

Summary

Treatment and Parameters Based on Peer-reviewed Published Studies

Protocol/

Total Subjects	187
No. of Treatment	3-6 treatments
Treatment Interval	Mostly 4-6weeks
Skin Type	III - VI

Parameter/

Lens	Focus	Flat			
Spot Size	Mostly 8mm	3-4mm*	4.4-5.1 mm	8mm^	4.5-5.6mm**
Pulse width	750ps	/	650ps	750ps	/
Fluence	0.4 J/cm ²	1.02-1.5J/cm ²	0.88-1.18 J/cm ²	0.4 J/cm ²	0.8 J/cm ²
Frequency	2.5-10Hz	/	/	2.5Hz	5 Hz
No. of Passes	1-4 passes	/	3 passes	2 passes	2-3 passes
No. of Pulses	2000-2500	/	1000	/	/
Technique	10 to 15% of pulse overlapping	/	/	/	/
Endpoint	Mild or moderate transient erythema	/	Mild erythema and swelling without petechiae	/	No visible skin change or mild temporary erythema
Pre Treatment	Topical anesthetic (Optional)				
During Treatment	Air cooling during treatment				
Post-Treatment Care	<ul style="list-style-type: none"> -15 min post tx cooling with ice packs - Topical moisturizers/ emollient - Broad-spectrum sunscreen with SPF 50 PA+++ - Sun avoidance - Topical 4% alpha arbutin and 15% ascorbyl phosphate palmitate sodium for prevention of PIH* - Oral tranexamic acid 250 mg 3 times 1 day for 1 week after each treatment+ - 3% topical tranexamic acid whitening essence at night+ 				

Notes/

What are the recommended settings for the treatment of melasma?

A wide range of fluences have been reported as effective however there is not one single setting recommended for use when treating melasma. A thorough patient assessment and administering test spots is recommended prior to performing a treatment.

What are the post treatment care recommendations patients should follow after treatment?

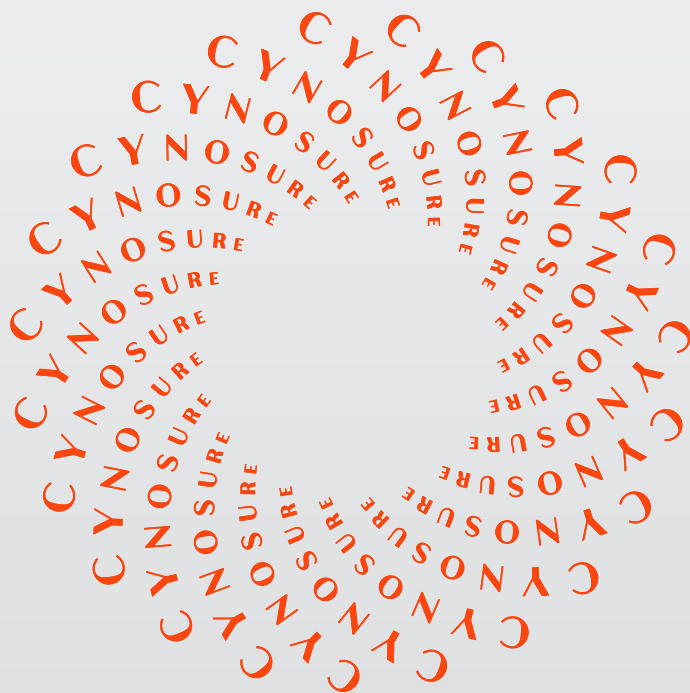
While the literature did not note any specific post treatment recommendation; it is important to note that in multiple articles the authors noted the importance of avoiding sun exposure and applying a sunscreen as part of daily skincare regimen following treatments.

** Niwat Polnikorn, Emil Tanghetti. Dermatol Surg. 2020 Sep 8. doi: 10.1097/DSS.0000000000002612.

*Mei-Ching Lee, Ying-Fang Lin, Sindy Hu, Yau-Li Huang, Shyue-Luen Chang, Chun-Yu Cheng, Chun-Shin Chang. Lasers Med Sci. Published online 7 May 2018.

^ Woraphong Manuskietti, Chadakan Yan, Ployallin Tantrapornpong, Kathryn Anne G. Cembrano, Thanya Techapichetvanich, Rungsima Wanitphakdeedecha. Lasers in Surgery and Medicine. (2020) DOI 10.1002/lsm.23312

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