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## Clinical Outcome of 1064-nm Picosecond Neodymium–Doped Yttrium Aluminium Garnet Laser for the Treatment of Hypertrophic Scars

*Choi Y-J, Kim JY, Nam J-H, Lee G-Y, Kim W-S. Clinical Outcome of 1064-nm Picosecond Neodymium–Doped Yttrium Aluminium Garnet Laser for the Treatment of Hypertrophic Scars. Journal of Cosmetic and Laser Therapy. 2019;(2):91-98. doi:10.1080/14764172.2018.1469768*

Patients were treated with the 1064nm low fluence picosecond laser.

Average laser parameters used in the study were 750ps pulse duration, a spot size of 4-8mm, a fluence of 0.4-2.0J/cm2, and a repetition rate of 2-10Hz with a total of 3-5 passes per treatment.

The average VSS score decreased significantly from 5.3 to 2.7.

Subject satisfaction and global assessment scores also indicated significant improvement.

## Cutaneous Delivery of Cosmeceutical Peptides Enhanced by Picosecond- and Nanosecond-Domain Nd:YAG Lasers with Quick Recovery of the Skin Barrier Function: Comparison with Microsecond-Domain Ablative Lasers

*Lee W-R, Hsiao C-Y, Chang Z-Y, et al. Cutaneous Delivery of Cosmeceutical Peptides Enhanced by Picosecond- and Nanosecond-Domain Nd:YAG Lasers with Quick Recovery of the Skin Barrier Function: Comparison with Microsecond-Domain Ablative Lasers. Pharmaceutics. 2022;14(2):450. doi:10.3390/pharmaceutics14020450*

The 1064nm wavelength was used with a pulse duration of either 450ps or 2ns with a fluence of 1.4J/cm2.

The use of the laser significantly increased the skin permeation of peptides in vitro.

In particular the device elevated the amount of PT-1 in the receptor 40 fold.

## Efficacy and Safety of a Novel Picosecond Laser Using Combination of 1 064 and 595nm on Patients With Melasma: A Prospective, Randomized, Multicenter, Split-face, 2% Hydroquinone Cream-Controlled Clinical Trial

*Choi Y, Nam J, Kim JY, et al. Efficacy and Safety of a Novel Picosecond Laser Using Combination of 1 064 and 595nm on Patients With Melasma: A Prospective, Randomized, Multicenter, Split-face, 2% Hydroquinone Cream-Controlled Clinical Trial. Lasers in Surgery and Medicine. 2017;49(10):899-907. doi:10.1002/lsm.22735*

Five weekly treatments were performed with the laser in addition to 7 weeks of 2% HQ compared to 2% HQ alone.

1064 parameters included a 7-10mm spot size, 0.2-1.5J/cm2 fluence and either a 5 or 10Hz repetition rate.

595nm parameters included a fluence of 0.1-0.55J/cm2, 5mm spot size, and a 2 or 5Hz repetition reat

77% of subjects in the combination group experienced a majority clearance in their melasma.

The combination group vastly outperformed the 2% HQ only group in satisfaction, relative lightness values, and melasma severity scores

## Efficacy and Safety of Picosecond-Domain neodymium-Doped Yttrium Aluminum Garnet Laser Treatment on Various causes of Traumatic Tattoos

*Goo BL, Cho SB. Efficacy and Safety of Picosecond-Domain neodymium-Doped Yttrium Aluminum Garnet Laser Treatment on Various causes of Traumatic Tattoos. Medical lasers. 2016;5(2):90-95. doi:10.25289/ML.2016.5.2.90*

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Patients were treated up to 3 times every 2 or 4 weeks with the 1064nm wavelength.
Laser parameters were set to fluence of 1.2-3.4J/cm2 at 3mm spot size, 1.6-2.8J/cm2 at 4mm spot size, or 0.6J/cm2 at 6mm spot size.
All subjects were satisfied with the results of their treatment.
Most subjects showed were graded as having either marked or moderate improvement.

## Improvement in Acquired Bilateral Nevus of Ota-Like Macules with Picosecond-Domain Wavelength-Converted 595-nm Neodymium:Yttrium Aluminium Garnet Laser Treatment

*Suk D, Cho KSB. Improvement in Acquired Bilateral nevus of ota-Like Macules with Picosecond-Domain Wavelength-converted 595-nm neodymium:Yttrium Aluminium Garnet Laser Treatment. Medical lasers. 2016;5(2):111-114. doi:10.25289/ML.2016.5.2.111*

Two sessions of combination 1064nm and 595nm laser treatment were performed two weeks apart.
The 1064nm wavelength parameters were set to a fluence of 2.5J/cm2 and a spot size of 4mm with a total of five passes on the pigmentary lesions.
The 595nm wavelength parameters were set to a fluence of 0.65J/cm2 with a spot size of 2mm in a single pass on the vascular lesions.
1 month following completion of the treatments the subject showed marked improvement from baseline conditions.
The only adverse events noted from the treatment were mild treatment pain.

## In Vivo and Ex Vivo Skin Reactions after Multiple Pulses of 1,064-nm, Microlens Array-type, Picosecond Laser Treatment

*Lyu H, Park J, Lee HC, Lee SJ, Kim YK, Cho SB. In Vivo and Ex Vivo Skin Reactions after Multiple Pulses of 1,064-nm, Microlens Array-type, Picosecond Laser Treatment. Medical lasers. 2020;9(2):142-149. doi:10.25289/ML.2020.9.2.142*

Ex-Vivo human skin and Ex-Vivo micropig skin were both treated with at a fluence of 0.1 or 0.3J/cm2.
The device was able to generate multiple lesions of thermally-initiated laser-induced optical breakdowns.
Stacking between 20-100 pulses in the micropig skin at a fluence of 0.3J/cm2 showed distinct oval zones of coagulation

## Interactive tissue reactions of 1064-nm focused picosecond-domain laser and dermal cohesive polydensified matrix hyaluronic acid treatment in in vivo rat skin

*Kim HK, Kim H, Hong JY, et al. Interactive tissue reactions of 1064-nm focused picosecond-domain laser and dermal cohesive polydensified matrix hyaluronic acid treatment in in vivo rat skin. Skin Research and Technology. 2020;26(5):683-689. doi:10.1111/srt.12853*

Treatments were completed with either a microlens array (MLA) or diffractive optical element (DOE) type handpiece at a 1064nm wavelength.
MLA pulses were delivered with and without subdermal CPMHA with a spot size of 6mm, a fluence of 1.5J/cm2, a repitition rate of 5Hz.
DOE pulses were delivered at a 7mm spot size, a fluence of 0.6J/cm2, and a repetition rate of 5Hz with single and dual pulse modes.

The laser was able to create frationated zones of pseudo-cystic cavitation along the epidermis.
Laser treated areas with CPMHA had increased epidermal thickness, dermal fibroblasts, and collagen fibers.

**Long-Term Follow-Up of 1,064-nm Picosecond-Domain Neodymium:Yttrium-Aluminum-Garnet Laser Treatment for Acquired Bilateral Nevus of Ota-Like Macules**

*Kim SY, Park J, Kim H, Cho SB. Long-Term Follow-Up of 1,064-nm Picosecond-Domain Neodymium:Yttrium-Aluminum-Garnet Laser Treatment for Acquired Bilateral Nevus of Ota-Like Macules. Medical lasers. 2017;6(2):93-98. doi:10.25289/ML.2017.6.2.93*

Subject receieved single treatment with the picosecond laser after nanosecond laser treatment.
The treatment was completed with a 7mm spot size, 0.6J/cm2 fluence a totoal of 2,000 shots in single pulse mode.
Additional pulses delivered on ABNOM lesions with a 4mm spot size and a fluence of 2.4J/cm2 in single pulse mode with three passes in total.
18 months following picosecond laser treatment the patient had nearly complete improvement and there was no worsening or recurrence noted.
The only adverse events noted from the treatment were mild treatment pain.

**Pattern analysis of 532- and 1,064-nm picosecond-domain laser-induced immediate tissue reactions in ex vivo pigmented micropig skin**

*Lee HC, Childs J, Chung HJ, Park J, Hong J, Cho SB. Pattern analysis of 532- and 1,064-nm picosecond-domain laser-induced immediate tissue reactions in ex vivo pigmented micropig skin. Scientific Reports. 2019;9(1). doi:10.1038/s41598-019-41021-7*

Pulses were delivered with flat and MLA-type beam at 532nm and 1064nm wavelengths. Single
The 532nm wavelength was used with a 6mm spot size with average fluences ranging from 0.04 - 1.0J/cm2.
The 1064nm wavelength was used with either a 7 or 10mm spot size with fluences ranging from 0.13 - 1.9J/cm2.
Treatments with the MLA-type beam at both wavelengths resulted in fractionated zones of micro-vacuolization in both the epidermis and dermis.
Flat beam picosecond laser with the 1064nm wavelength at a 0.18J/cm2 fluence significantly reduced melanin pigments.

**Pattern analysis of 532- and 1064-nm microlens array-type, picosecond-domain laser-induced tissue reactions in ex vivo human skin**

*Chung H, Lee H, Park J, et al. Pattern analysis of 532- and 1064-nm microlens array-type, picosecond-domain laser-induced tissue reactions in ex vivo human skin. Lasers in Medical Science. 2019;34(6):1207-1215. doi:10.1007/s10103-018-02711-2*

The laser was used with both 532 and 1064nm wavelengths with either the single flat-top beam or MLA-type beam.
For the 532nm wavelength a 6mm spot size with a 1.0J/cm2 fluence were utilized in a

single pass.
For the 1064nm wavelength a spot size of 4-10mm with fluences ranging from 0.3-2.8J/cm2 with up to 5 passes used for the 10mm spot size.
Both the 1064 and 532nm wavelength were capable of producing cystic cavitation lesions in the epidermis and papillary dermis.
Single pulsed mode versus dual-pulse appeared to elicit a more dramatic reaction from the dermal cells.

**Pattern analysis of laser-tattoo interactions for picosecond- and nanosecond-domain 1,064-nm neodymium-doped yttrium-aluminum-garnet lasers in tissue-mimicking phantom**

*Ahn KJ, Zheng Z, Kwon TR, Kim BJ, Lee HS, Cho SB. Pattern analysis of laser-tattoo interactions for picosecond- and nanosecond-domain 1,064-nm neodymium-doped yttrium-aluminum-garnet lasers in tissue-mimicking phantom. Scientific Reports. 2017;7(1). doi:10.1038/s41598-017-01724-1*

Both picosecond and nanosecond lasers were used to compare their effects on tattoo ink.
Lasers were used at fluences of 1.8, 2.8, 3.8, and 4.8J/cm2 with the 4mm spot size.
Fluences of 0.5, 0.7, 1.0, 1.2, and 1.5J/cm2 were used with the 7mm spot size.
Tattoo ink particles fractured more evenly with the picosecond laser as compared to the nanosecond laser.
Picosecond laser was able to induce greater disintegration of tattoo particles as compared to nanosecond.

**Picosecond-Domain Fractional Laser Treatment Over Hyaluronic Acid Fillers: In Vivo and Clinical Studies**

*Kim JE, Hong JY, Lee HJ, Lee SY, Kim HJ. Picosecond-Domain Fractional Laser Treatment Over Hyaluronic Acid Fillers: In Vivo and Clinical Studies. Lasers in Surgery and Medicine. 2020;52(10):928-934. doi:10.1002/lsm.23254*

For the in-vivo rat model a single pass with a 6mm spot size and 1.4J/cm2 fluence were utilized at a 450ps pulse duration.
The clinical study treated 36 patients with the MLA-type beam and received two treatments one month apart.
Picosecond laser did not cause histological changes in the HAF or surrounding skin.
Over 75% of subjects exhibited moderate improvement in their acne scars as graded by blinded dermatologist.

**Post-acne Erythema Successfully Treated with 595-nm Picosecond-domain Neodymium:Yttrium-aluminum-garnet Laser**

*Kim J-H, Choe SJ, Kim T-G. Post-acne Erythema Successfully Treated with 595-nm Picosecond-domain Neodymium:Yttrium-aluminum-garnet Laser. Medical lasers. 2020;9(1):84-87. doi:10.25289/ML.2020.9.1.84*

Subject was treated 4 times with the 595nm wavelength picosecond laser.
Subject was treated with a 5mm spot size at a fluence of 0.1J/cm2 on their cheeks which was then followed by pulse stacking at the same parameters on the red spotted areas.
3 months following completion of the treatment regimen the subject presented with near complete clearance of their post-acne erythema without worsening or recurrence in the treated area.

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**Postinflammatory Hyperpigmentation Successfully Treated with 1,064-nm Picosecond-Domain Neodymium:Yttrium-Aluminum-Garnet Laser**

*Lee H-J, Lee SH, Yoon SY, Lee JW, Kim YK, Choi EH. Postinflammatory Hyperpigmentation Successfully Treated with 1,064-nm Picosecond-Domain Neodymium:Yttrium-Aluminum-Garnet Laser. Medical lasers. 2018;7(1):52-54. doi:10.25289/ML.2018.7.1.52*

Subject was treated with 5 weekly sessions of 1064nm wavelength picosecond laser.
Laser parameters were set to 8mm spot size, a 0.6J/cm2 fluence and single pulse mode for a total of 200 pulses.
1 week following completion of the treatment regimen the patient presented with nearly complete clearance of their PIH.
There was no noted recurrence or worsening within the treatment area.