New Strategies for Targeting Pigment

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Disclosures

Aerolase: Equipment, Advisory Board
Alastin: Consultant, Advisory Board
Cartessa: Equipment, Consultant, Advisory Board
Cynosure: Equipment, Consultant, Advisory Board
Vivo Capital: Consultant
This did not happen with a cream or one laser treatment…
Let’s be honest, this is photoshop

https://naturallydaily.com/essential-oils-for-sun-damaged-skin/
Pigmented Lesions

- **Discrete**
  - QS lasers, *Picosecond lasers*

- **Diffuse**
  - Non-Ablative Fractional Resurfacing - 1927 nm
  - IPL
  - “Fractionated” *picosecond lasers*

- **Combination therapies**
  - Multiple devices
  - Topicals, oral medications
Discrete Lesions
Q-switched Lasers

- Ultrashort pulse duration (ns)
  - Less than thermal relaxation time
- Wavelength is absorbed by target
  - 532nm, 694nm, 755nm, 1064nm
- High energy $\rightarrow$ high temperature/short time
  - Thermal expansion
  - Damages target only
QS lasers

- Treatment with QS 755 nm alexandrite laser
- End point: whitening

QS Alex 755nm, 3-3.5 j/cm², 50 nsec, 4mm
QS lasers

- Treatment with QS 755 nm alexandrite laser
- End point: whitening

Larger spot size, lower fluence $\rightarrow$ less PIH

Picosecond technology

- One trillionth of a second
- Maximizes photomechanical interactions
- Less thermal effects
- Less energy needed
- Currently Available
  - Picosure (Cynosure), Picoway (Syneron-Candela), Enlighten (Cutera), Discovery (Quanta), PiQo4 (Lumenis), PicoClear (Alma), PicoCare (Won Tech)
Picosecond 755nm

Before

After 1 treatment

755nm, 750ps, 3mm spot, 2.83 J/cm²
670nm Picosecond

PreTx

3 months Post1 Tx

670nm 660ps 4mm 1.0J/cm2

Photos courtesy of Omar Ibrahimi, MD, PhD
Nevus of Ota

Pretreatment

Post 3 treatments

755nm, 750ps, 4mm spot, 2.01 J/cm²
Which one is better for discrete pigment? Picosecond lasers or Q-switched lasers??
QS vs PICO

- 30 Asian patients with 2 solar lentigines on upper extremities
- Pair of lentigines randomized to 1 treatment with:
  - Q-switched KTP 532 nm (Revlite, Cynosure, MA) – 3mm, 1.4-1.7 J/cm²
  - KTP 532nm picosecond (Picoway, Syneron Candela, CA) – 3mm, 0.3-0.9 J/cm²
- Follow up at 6 and 12 weeks after
- No statistical difference in pigment clearance between the two lasers
- No statistical difference in AE between the two lasers

**Q-switched 532 nm**

> 75% clearance after 1 treatment

**Picosecond 532 nm**

> 75% clearance after 1 treatment

Diffuse Pigmented Lesions

- Non-Ablative Fractional Resurfacing - 1927 nm
- Intense Pulse Light - IPL
- Picosecond lasers – fractionated or rejuvenating
Picosecond 755nm Laser Focus Lens Array

- 120 closely packed array of diffractive lenses to focus, and redistribute each pulse
- Concentrates energy into hundreds of microspots
- Fluence within each microspot magnified up to 20X that of a standard pulse

Laser Induced Optical Breakdown

- Laser Induced Optical Breakdown
  - 10 minute after treatment

- Cascade that stimulates collagen production

Pico Focus Lens Array

Pre Immediate Post 3 hrs Post 24 hrs Post

Traditional Non-ablative

Pre Immediate Post 24 hrs Post 2 Days Post 3 Days Post 4 Days Post

Repetitive pulses- 3500-5000

Photo series 1 and 3 courtesy of David McDaniel, MD
Photo series 2 courtesy of Solta Medical Aesthetic
Combining Handpieces to Optimize Treatment

**Flat optic**: Flat, uniform beam that penetrates deeper beyond the DEJ

![Image of flat optic](image)

DISCRETE PIGMENT

**FLA**: Diffractive beam creating high intensity energy zones, absorbed more superficially within the epidermis

![Image of FLA](image)

DIFFUSE PIGMENT
Pigment treatment  
(combination Flat & Focus)

Before  Immediately After  After 48 hours  After 2 weeks

Treatment:  
Zoom handpiece, 3 mm/2.83 J/cm² (315)
Flat 6 mm whole face, 10 Hz (2450)
Focus 8 mm whole face, 10 Hz (3513)

Courtesy of Shangli Lin, MD
Picosecond with Focus Lens

1 Treatment

Treatment: Zoom handpiece, 3 mm/2.83 J/cm² (385)
Focus 6 mm whole face, 10 Hz (4250)
Fractionated 1064nm and 532nm Picosecond Laser

- 24 patients treated with either:
  - 1064nm – 1.3-2.9 mJ/microbeam, 450 ps, 5 monthly txt
  - 532nm – 0.2-1.5 mJ/microbeam, 375 ps, 3 monthly txt

- Blinded evaluation 12 weeks after last txt
  - 72%: Correctly identify baseline photos

- SE: post treatment erythema, mild edema, and petechiae

Holographic optic designed so that each beamlet is less than 5% of the total energy of the beamlets.

Bernstein EF et al. *J Drugs Derm.* 2017; 16(11): 1077-1082-
Baseline
Prior to txt w/ 1064 nm fractionated picosecond laser

Baseline
Prior to txt w/ 532 nm fractionated picosecond laser

12 weeks after 5 txt with 1064nm fractionated picosecond laser

12 weeks after 3 txt with 532nm fractionated picosecond laser
Multiwavelength Picosecond Laser for Pigmented Lesions and Textural Improvement

- Discrete benign pigmented lesions treated with the 670 nm picosecond
- Full face treated with 1064nm: low energy, high repetition rate treatment protocol (500-1000 pulses per cheek)
  - 1064 nm, 6-8 mm spot, 0.6-1.0 J/cm², 750 ps
- Minimal downtime
  - Mild erythema of short duration
- Used for improvements in skin texture and diffuse pigmentation

Presented at ASLMS 2017 by Kelly Stankiewicz, MD
Treatment Details

Before Treatment
Immediately After Treatment
1 month after 1 treatment

Courtesy of Kelly Stankiewicz, MD
Baseline

12 weeks after 2 txt

Courtesy of Kelly Stankiewicz, MD
Baseline

12 weeks after 2 txt

Courtesy of Kelly Stankiewicz, MD
Comparison of NAFR to Picosecond Lasers

- 20 patients randomized to either treatment with the NAFL 1927nm laser or the 755nm Alexandrite Picosecond Laser
  - 755 nm: 4 treatments, 3 weeks apart
    - Flat optic; Focus 6mm
  - 1927 nm NAFL: 2 treatments 6 weeks apart
    - 10mJ, treatment level 5 (40%), 4-6 passes

- 12 week follow up
- Statistically significant difference in improvement in pigmentation with the 755nm picosecond laser
- 755nm laser was better tolerated

1927nm Fractionated Thulium Laser

Baseline

12 wks after 2 txt

755 nm Picosecond Laser

Baseline

12 wks after 4 txt

(A) (B)

755 nm Picosecond Laser for Melasma

• Patients underwent 6-8 treatments with a 755 nm picosecond laser:
  • 41 female patients at two sites
  • Treated with both a surface optic lens and diffractive focus lens array
    • Flat optic → one pass over discrete pigment
    • Followed by FLA with several passes over full face
    • Varying spot size (6-10 mm) and energy levels
    • Treatments were performed at 4 week intervals
  • Follow up visits occurred at 1 month and 3 months following the last treatment
  • Images were judged by blinded ratings

Courtesy of Robert Weiss, MD and Laura Schilling, MD
Role of Tranexamic Acid?

- Antifibrinolytic agent
- Decreased production of FGF and PG → decreased tyrosinase activity in the melanocytes
- Increasingly popular for treating melasma
Combination Treatments to Maximize Outcomes
Topicals

- Bleaching agents – hydroquinone, triple cream

- *Preprocedure topical*
  - Increase collagen and elastin production with topical tripeptide/hexapeptide
  - Daily pretreatment 2 weeks prior to laser treatment and during treatment course

- Newer lightening creams – hydroquinone free
How to Treat This Lesion?
Careful When Treating

- Referred by dermatologist for laser treatment
- Noticed darkening within the past month
- Bx proven Melanoma In-Situ
- When you are not sure ➔ biopsy
Thank you

Questions ???

Email: nazanin.saedi@jefferson.edu
250 mg of TA or placebo capsules BID for 3 months + sunscreen then 3 months sunscreen only

after 3 months
- 49% reduction in mMASI score in the TA group
- 18% reduction in the control group

Patients with severe melasma improved more than those with moderate melasma.

Three months of sunscreen alone:
- 26% reduction in mMASI score in the TA group compared with the baseline
- 19% reduction in the placebo arm

No serious adverse events were noted in either group