Pigmented Lesions: How to Optimize Your Results for Melasma

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Disclosures

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Melasma – Pathophysiology

- Pathophysiology unknown
  - Estrogen and UV
  - Melanocytes are more active
    - Overproduction of melanin
  - Pigment incontinence (dermal melanophages)
  - Vascular component
  - Possible role of estrogen receptor overexpression
- Given the high recurrence rate, a multimodality approach is necessary to target all components of this complex disorder.
Laser Treatment of Melasma: Ensuring Safety

- Create realistic expectations: Show a variety of before and after pictures.
- Under promise, over deliver: Multiple treatment sessions are required.
  - Melasma patients need long term treatment with combination therapy
- Pretreatment photos in a reproducible position and lighting.
- Ultraviolet photography to detect subtle melasma before beginning treatments.
- Spectrocolorimetry may be utilized to detect underlying telangiectasias.
Very subtle epidermal melasma may be difficult to diagnose under normal light.

UV light enhances the appearance of epidermal pigmentation.

UV photograph identified 63 cases (28.3%) not clinically diagnosed as melasma.

Significantly higher incidence seen in sunscreen non-users (6.8 times).

This condition may be exacerbated by aggressive treatment.
Vascular Targeted Therapy
For Melasma

- Spectrocolorimetry used to identify telangiectatic erythema underlying lesions of melasma

Laser Treatment of Melasma: Ensuring Safety

• Broad spectrum, high SPF sunscreen with visible light protection before and after treatment session.

• Combination treatment with topical bleaching creams as part of pre- and post-treatment regimen to suppress melanogenesis.
  - Synergy between lasers and medications
    - Hydroquinone 4%, Retinoids, Glycolic acid, Vitamin C, Phloretin, Ferulic acid, Lignin Peroxidase

• Counsel melasma patients about switching to low estrogen containing birth control pills or discontinuing prior to initiating laser treatment if possible.
PIH After NAFR

• Melasma can be heat-sensitive
• Less is more, treat conservatively and discuss potential for worsening in the consultation
PIH After IPL
Advances in Laser Treatment of Melasma

- Multiple, gentle treatments are effective (less is more) with lengthened treatment intervals.
- Low-fluence (1-2 J/cm²), 1,064-nm Q-switched Nd:YAG laser
- Low-density (5%), low-energy (5mJ) 1927-nm fractional diode laser (Clear & Brilliant Permea)
- Picosecond laser technology
- Pulsed dye laser
  - Combination therapy targeting pigment and vasculature may be ideal to prevent frequent relapses.
1064-nm Low-Fluence Nd:YAG Melasma

- 27 women, FST II-V
- Microdermabrasion
- 1.6-2.0 J/cm², 5-6 mm
- q month, up to 4 sessions
- Sun protection
- 4% hydroquinone BID
- 0.05% retinoic acid QHS
- 11/27 women > 95% clearance

1927-nm Fractional Low-Power Diode Laser For Melasma and PIH

- 30 patients, FST I-VI had up to six sessions q2 weeks
- Low-density, low-energy: 5-7.5% coverage, 5 mJ, average 4-12 passes
- Significant reduction of hyperpigmentation without exacerbation

Nonablative Lasers & Drug Delivery

- No true epidermal destruction but instead disruption
  - epidermal spongiosis, vacuolization on histology
  - observed transient transepidermal water loss
- Photomechanical waves may affect intercellular paths
  - disruption of lipids
  - transient lacunar networks
- Barrier function of the skin temporarily inhibited allowing for enhancement of drug delivery

Shin MK et al. Skin Res Technol 2013
Lee WR et al. J Pharm Sci 2002
1927-nm Fractional Low-Power Diode Laser for Treatment of Melasma

Pre-Treatment 5/31/2012

Post Topical Skin Brightener for 3-months 10/24/2012

Post Three Laser Treatments and Skin brightener 10/11/2013

1927-nm, tx level low
# Picosecond Lasers for Benign Pigmented Lesions

<table>
<thead>
<tr>
<th>Wavelength (nm)</th>
<th>Laser</th>
<th>Pulse Duration</th>
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<tr>
<td>532/670/1064</td>
<td>Enlighten (Cutera)</td>
<td>Nanosecond &amp; picosecond</td>
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<tr>
<td>532/755/1064</td>
<td>PicoSure (Cynosure)</td>
<td>750-850 picoseconds/550 picoseconds</td>
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<tr>
<td>532/785/1064</td>
<td>Picoway (Syneron/Candela)</td>
<td>300-750 picoseconds</td>
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Fractionated Picosecond Lasers

<table>
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<tr>
<td>755</td>
<td>PicoSure (Cynosure)</td>
<td>750 picoseconds with diffractive lens array fractional technology</td>
</tr>
<tr>
<td>532/1064</td>
<td>Picoway (Syneron/Candela)</td>
<td>375-450 picoseconds with holographic optical fractional technology</td>
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• Laser Induced Optical Breakdown (LIOB)
Vascular Characteristics of Melasma

- Immunohistochemistry for factor VIII a-related antigen revealed enlarged and elongated blood vessels in the upper dermis (B), as compared with perilesional normal skin (A).
- Computer assisted morphometric analysis of factor VIIIa-related antigen stained sections revealed a significant increase in vessel size (C), vessel density (D) and the relative area covered by blood vessels (E), as compared with perilesional normal skin.
Vascular Characteristics of Melasma

VEGF Immunostain

• The expression of vascular endothelial growth factor (VEGF) was significantly increased at lesional epidermis (B) compared with perilesional normal skin (A) and may play an important role in melasma.

• Increased estrogen receptor expression around dermal blood vessels in lesions of melasma. Hyper-estrogen states have increased vascular phenomenon.
Melasma Treatment with Pulsed-Dye Laser and Triple Combination Cream

- Left forehead triple combination cream, right forehead both the cream and PDL.
  - Three PDL treatment sessions at 3-week intervals on the right forehead.
  - Compression handpiece 10mm, 1.5 ms, 7 J/cm^2
  - 2nd pass regular handpiece 7mm, 20ms, 10J/cm^2, DCD 30/40

Long-Lasting Effect of Vascular Targeted Therapy of Melasma

- Central forehead with clearing of melasma at 3-year follow up (A) matched perfectly with area treated with combination approach of Kligman’s trio and PDL (B).
Effect of Tranexamic Acid on Melasma

- Improvement of melasma after 8 weeks of tranexamic acid 250mg orally three times daily. Clinical photographs were taken at week 0 and week 8 using a Robo skin analyzer®. Improvement of pigmentation (a, b) and reduced erythema (b) is noticeable.
Tranexamic Acid for Melasma

- Over 12 studies (>1600 patients) published from Asia.
- Dose is usually 250mg bid over 1-4 months with mean response in two months.
  - Side effects are rare.
  - Contraindications: hypercoagulable states, history of deep venous thrombosis, stroke, other thrombotic events, use of anticoagulants, 2 or more spontaneous abortions, pregnancy, nursing, family history of DVT.
Vascular Targeted Therapy in Patients Exhibiting Telangiectatic Erythema within Lesions of Melasma
Long-Pulsed Dye Laser of 595 nm in Combination With Pigment-Specific Modalities for a Patient Exhibiting Increased Vascularity Within Lesions of Melasma

Figure 1. Melasma at baseline.

Figure 2. Spectrocolorimetry-detected telangiectatic erythema corresponding to lesions of melasma at baseline.

Figure 3. Improvement of melasma at 2-month follow-up after 3 treatments of PDL combined with pigment-specific modalities.

Figure 4. Improvement of spectrocolorimetry-detected telangiectatic erythema at 2-month follow-up after 3 treatments of PDL combined with pigment-specific modalities.
Retrospective Analysis of the Treatment of Melasma Lesions Exhibiting Increased Vascularity With the 595-nm Pulsed Dye Laser Combined With the 1927-nm Fractional Low-Powered Diode Laser

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Vascular Targeted Therapy For Melasma

- Retrospective review, 10 females and 1 man, average age 38.7 years, FST II-IV
- Tx at 4-6 week intervals, average 4 treatment sessions, average follow-up of 96 days.
- Vascular component treated with 595-nm long-pulsed dye laser.
  - 10 mm spot, 7.5-8.5 J/cm², 10-20 ms, DCD 30/30
- Hyperpigmentation treated with the 1927-nm fractional low-powered diode laser (Clear & Brilliant Permea).
  - 5% treatment coverage, 8 passes
  - Energy of 5mJ
  - Zimmer forced air cooling
- Sun protection and skin brightener
Retrospective Analysis of the Treatment of Melasma Lesions Exhibiting Increased Vascularity With the 595-nm Pulsed Dye Laser Combined With the 1927-nm Fractional Low-Powered Diode Laser


### TABLE 1. Patient Characteristics, Treatment Data, Graded Assessments, and Follow-Up Times

<table>
<thead>
<tr>
<th>Patient</th>
<th>Age</th>
<th>FST</th>
<th>No. of PDL treatments</th>
<th>No. of Fx diode laser treatments</th>
<th>Erythema score(^a)</th>
<th>Melasma score(^a)</th>
<th>Follow-up post-final treatment (days)</th>
<th>Satisfaction score(^b)</th>
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\(^a\) Improvement score: 1 = 0–25%, 2 = 25–50%, 3 = 50–75%, and 4 = 75–100%.

\(^b\) Satisfaction score: 0 = not satisfied, 1 = satisfied, 2 = very satisfied.

\(^c\) Patient 1 could not be reached to answer the satisfaction question.
70 day follow-up
After 3 treatments
Baseline

70 day follow-up
After 3 treatments

Baseline

26 day follow-up
After 2 treatments

Baseline

26 day follow-up
After 2 treatments
Baseline

94 day follow-up
After 5 treatments

Baseline

84 day follow-up
After 4 treatments

Vascular Targeted Therapy
For Melasma

• Independent physician assessment demonstrated:
  • Improvement of melasma largely paralleled improvement of erythema.

• Subject Satisfaction:
  • Overall subject satisfaction score averaged 1.6, with all patients reporting 1 ("satisfied") or 2 ("very satisfied") with treatment results.

• No post-inflammatory hyperpigmentation or adverse events were noted.
Vascular Targeted Therapy For Melasma

• Vascular targeted therapy may provide additional improvement in patients exhibiting telangiectatic erythema within lesions of refractory melasma.
  • High patient satisfaction with excellent safety profile.
• Further randomized controlled split-face designed studies are needed to determine long-term durability.

Laser Treatment of Melasma: Ensuring Safety

- Use low fluences, long wavelengths (pigment specific).
  - Avoid inflammation and epidermal barrier disruption from aggressive treatments (topical, peels, laser).
- Vascular targeted therapy (laser, ? drug)
- Lengthen intervals between successive treatments
- Ensure appropriate cooling times and technique during and after treatment.
- Consider short course of low potency topical steroids as part of post-op regimen.
- Provide detailed post-op instructions
Stay Focused--The Future is Bright!

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