Laser & Light Based Treatments for Ethnic Skin

Laser & Light Treatment of Ethnic Skin

The following potential conflict of interest relationships are germane to my presentation.

Speakers Bureau:

Differences in Ethnic & Caucasian Skin

- Amount of epidermal melanin
- Melanosomes provide better photoprotection
- Greater melanin content increases risk for adverse events
  - Hypopigmentation
  - Hyperpigmentation
  - Depigmentation
- Thicker dermis
- Greater tendency for hypertrophic scarring
Determining Skin Types

- Visual inspection alone not enough
- Skin Typing Classifications
  - Fitzpatrick Classification of Skin Type
  - Goldman World Classification of Skin Type
  - Lancer Ethnicity Scale

Fitzpatrick Classification of Skin Type

- I: always burns, never tans
- II: burns easily, tans minimally with difficulty
- III: burns moderately, tans moderately and uniformly
- IV: burns minimally, tans moderately and easily
- V: rarely burns, tans profusely
- VI: never burns, tans profusely

Goldman World Classification of Skin Types

- Considers genetic, racial heritage, and response to UV light and inflammation
- Five ethnicity groups
  - European/Caucasian; white
  - Arabic/Mediterranean/Hispanic; light brown
  - Asian; yellow
  - Indian; brown
  - African; black
Goldman Classification

- Choice of three categories within ethnic groups
  - a) Pale, cannot tan, burns easily, no PIH
  - b) Tan, rarely burns, rare PIH
  - c) Deep tan, never burns, develops PIH

Lancer Ethnicity Scale

<table>
<thead>
<tr>
<th>LES Skin Type</th>
<th>Fitzpatrick Type</th>
<th>Background Geography</th>
</tr>
</thead>
<tbody>
<tr>
<td>LES Type 3</td>
<td>Type II</td>
<td>Ashkenazi Jewish</td>
</tr>
<tr>
<td>LES Type 1</td>
<td>Type I</td>
<td>Celtic</td>
</tr>
<tr>
<td>LES Type 2</td>
<td>Type III</td>
<td>Central, Eastern European</td>
</tr>
<tr>
<td>LES Type 1</td>
<td>Type I-II</td>
<td>Nordic</td>
</tr>
<tr>
<td>LES Type 1-2</td>
<td>Type I</td>
<td>Northern European</td>
</tr>
<tr>
<td>LES Type 3-4</td>
<td>Type III</td>
<td>Southern European, Mediterranean, North American</td>
</tr>
<tr>
<td>LES Type 3</td>
<td>Type II</td>
<td>Native American</td>
</tr>
<tr>
<td>LES Type 4</td>
<td>Type IV</td>
<td>Chinese, Korean, Japanese, Thai, Vietnamese</td>
</tr>
<tr>
<td>LES Type 4</td>
<td>Type IV</td>
<td>Filipino, Polynesian</td>
</tr>
<tr>
<td>LES Type 4</td>
<td>Type IV</td>
<td>Central, South American Indian</td>
</tr>
<tr>
<td>LES Type 5</td>
<td>Type V</td>
<td>Central, East, West African</td>
</tr>
<tr>
<td>LES Type 5</td>
<td>Type V</td>
<td>Eritrean, Ethiopian</td>
</tr>
<tr>
<td>LES Type 5</td>
<td>Type V</td>
<td>North African, Middle East Arabian</td>
</tr>
</tbody>
</table>

LES Ethnicity Scale

- Find LES type numbers for all 4 grandparents
- Add numbers together and divide by 4
- Lower LES skin type, less risk for scarring, keloids, erythema, discoloration, pigmentation
- Risk factors
  - Type 1 = very low risk
  - Type 2 = low risk
  - Type 3 = moderate risk
  - Type 4 = significant risk
  - Type 5 = considerable risk
Treating Ethnic Skin with Laser & Light

- Risks due to melanin’s wide absorption spectrum 250-1200nm
- Melanin can be targeted by visible, UV, and infrared light
- Epidermal melanin competes as significant chromophore and may lead to excessive heating of surrounding tissue
- Nonspecific thermal damage can occur resulting in blistering, transient or permanent dyspigmentation, textural changes, and scarring

Laser Hair Reduction

- Goal: use highest fluence tolerable to achieve hair reduction while minimizing epidermal damage
- Considerations
  - Wavelength
  - Pulse width
  - Epidermal cooling

Laser Absorption vs. Wavelength

- Important for hair removal and epidermal safety
- Important for vascular treatments
Laser Hair Reduction

- Skin types III-IV
  - Alexandrite
  - Diode
  - Nd:YAG 1064 nm (long-pulsed)
  - IPL (long wavelength, long pulse width)


Laser Hair Reduction

- Skin types V-VI
  - Long pulsed Nd:YAG
  - Long pulsed diode


Diode Laser, Type IV skin
ND:Yag, Type IV skin

Nd:YAG, Type IV skin

Nd:YAG, Type V skin
Vascular Lesion Treatment

• Melanin competes strongly for light absorption in Asian skin
• Melanin acts as total barrier to light absorption for IPL in dark skin

Laser Absorption vs. Wavelength

<table>
<thead>
<tr>
<th>Wavelength (nm)</th>
<th>Absorption</th>
</tr>
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<tbody>
<tr>
<td>532</td>
<td>Melanin</td>
</tr>
<tr>
<td>694</td>
<td>Hemoglobin</td>
</tr>
<tr>
<td>755</td>
<td>Important for vascular treatments</td>
</tr>
<tr>
<td>810</td>
<td>Important for hair removal and epidermal safety</td>
</tr>
<tr>
<td>1064</td>
<td>Nd:YAG</td>
</tr>
</tbody>
</table>

Vascular Lesion Treatment

• 585 nm or 595 nm pulsed dye laser with epidermal cooling appropriate for most vascular lesions in skin types III-IV
• Long pulsed Nd:YAG or IPL for resistant lesions (Note; IPL should be used by experience operator only)

Greve B, Raulin C. Prospective Study of port wine stain treatment with dye laser: comparison of two wavelengths (585 nm vs. 595 nm) and two pulse durations (0.5 ms vs. 20 ms). Lasers Surg Med 2004;34:168-73.
Pigmented Lesions

- Melanin absorption stronger at shorter wavelengths
- Longer wavelengths penetrate skin better
- Increasing melanin correlate with increasing adverse events
- Dark skin competes for the chromophore

Epidermal Lesions

- Lentigines, ephelides, café au lait macules, seborrheic keratoses
- Suggested wavelengths
  - 532 nm Q-switched Nd:YAG (Types III-IV)
  - 694 nm Q-switched Ruby (Types III-IV)
  - 510 nm Pulsed Dye (Type V)

Pigmented Lesion Treatment

Pigmented Lesion - Treated once with 532 nm.
Medlite 532nm Treatment

Images Courtesy of Clarence Wiley, MD, Shawnee, OK

Café Au Lait

3 treatments, 6 months Post Op, 532nm, 3mm, 2.5J/cm²!

Epidermal Pigmented Lesions

1 treatment, 4 months Post Op, 532nm, 3mm, 1Hz, 1.3J/cm².
Epidermal Pigmented Lesions

1 treatment, 6 months Post Op, 532nm, 4mm, 5Hz, 1.8J/cm²

Dermal Pigmented Lesions

- Nevus of Oti, ABNOM, Hori’s nevus
- Treatment for Asian skin
  - Q-switched alexandrite
  - Q-switched Nd:YAG (1064 nm)
  - Avoid Q-switched ruby

Dermal Pigmented Lesion

5 treatments, 3 months Post Op, 1064nm, 3mm-4mm, 10Hz, 6.1-8.3J/cm²

Dermal Pigmented Lesion

4 treatments, 6 months Post Op, 1064nm, 4mm, 10Hz, 6.6-7.6J/cm²

Dermal Pigmented Lesion

3 treatments, 4 months Post Op, 1064nm, 4mm, 10Hz, 5.2-8.5J/cm²
Dermal Pigmented Lesions

Nevus of Ota, five 1064 nm treatments

Melasma or Ochrynosis?

1064nm, multiple treatments

Dermal Melasma

1064nm, 2 treatments, 4 mm spot 5 j/cm²
Melasma in Asian Skin

- Melasma has been successfully treated in Asian patients using fractional photothermolysis
- 1550 nm wavelength non-ablative treatment


Dermal Pigmentation-Melasma

Melasma treated with 1064nm, 6mm spot size, 5.5 J/cm2, 20 Hz. Treated once a day for initial first week and then once every 3 days after the initial first week. End point was moderate erythema.

Courtesy of Dr. Connie Ho, Hong Kong
FRAXEL LASER

Before Treatment
After 4 Treatments

Tattoo Removal

- 532 nm Q-switched Nd:YAG for red and yellow pigment
- 1064 nm Q-switched Nd:YAG for blue and black pigment
- Q-switched alexandrite or ruby for green pigment (increased risk of permanent hypopigmentation)


Ablative Resurfacing

- Appropriate for treatment of photoaged skin and acne scarring
- Er:YAG resurfacing can be performed on skin types III-V
- Pre and Post treatment protocol important to reduce PIH
  - Retin-A
  - Lightening agent
  - No sun exposure

Complications in Laser Treatment of Ethnic Skin

- Post inflammatory hyperpigmentation
- Hypopigmentation
- Scarring

Complication Prevention

- No sun exposure 2-4 weeks pre and post procedure
- Sunblock SPF 30 or more
- Bleaching agent 2-4 weeks pre procedure
- Retin-A 2 weeks pre procedure
- Topical corticosteroid post procedure
- Restart topicals 2-4 weeks post procedure