Fundamentals of Laser Treatment of Scars

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Laser Treatment of Scars


Laser Scar Revision

Scar Type

- Hypertrophic / Erythematous
- Atrophic
- Surgical
- Hypopigmented
- Hyperpigmented
- Burn or Traumatic

Lasers Options For Cutaneous Scarring

- Vascular-specific millisecond-domain lasers/IPL
- 1,064/1,320 Nd:YAG, 1,450-nm diode
- Ablative fractional resurfacing (AFR)
- Laser-Assisted Drug Delivery (LADD): AFL + 5-FU +/- TMC
- Conventional CO2/Er:YAG resurfacing
- Non-ablative fractional resurfacing (NAFR)
- Bipolar fractional radiofrequency
- Picosecond lasers with diffraction array or hologram
- Microneedling

Ablative and non-ablative lasers

- Atrophic scars
- Graft site scars

Fractional (ablative and non-ablative)

- Atrophic scars
- Burn or traumatic scars
- Match depth laser to depth of scar with
  low density
- Laser-assisted drug delivery
- Early or late striae

Summary

- Pulsed Dye Laser (585-595-nm)
  - Hypertrophic & Erythematous Scars
  - Pre-Scars
  - Early striae
- Ablative and non-ablative lasers
  - Atrophic scars
  - Graft site scars
**Laser Treatment of Scars**

**595-nm LPDL**

<table>
<thead>
<tr>
<th>Device</th>
<th>Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>PDL</td>
<td>595-nm LPDL + NAFR + IL TAC/5-FU</td>
</tr>
</tbody>
</table>

Traumatic Scar  
After 3 Treatments

**Benefits of Intralesional 5-Fluorouracil for Hypertrophic Scars**

- Improve scar softness and pliability
- Reduce scar height
- Improve scar color
- Enhanced efficacy without side-effects associated with higher concentration TAC
- Easily combined with other modalities (laser)

**Non-Ablative Fractional Resurfacing (NAFR)**

- Intact stratum corneum
- Thousands of microscopic wounds completely surrounded by viable tissue for rapid healing
- Immediate and delayed therapeutic results
- Epidermal and dermal coagulation for resurfacing
- Collagen denaturation for deep remodeling
- Safe on neck, trunk, extremities

**595-nm LPDL + NAFR + IL TAC/5-FU Hypertrophic Scar**

1-month after breast augmentation.  
1-year after completing treatment.

**595-nm PDL + 1450-nm Diode Laser**

Hypertrophic Scar  
After
Lasers Options For Flat/Atrophic Scarring

- 595-nm Pulsed dye laser (PDL)
- Infrared (1.064/1.320 Nd:YAG, 1.450 nm diode)
- Non-ablative fractional resurfacing (NAFR)
  - ~25-50% improvement after 5 treatment sessions.
- Ablative fractional resurfacing (AFR)
  - ~50-75% improvement after 2-3 treatment sessions.
- Conventional CO2/Er:YAG resurfacing

Non-Ablative Fractional Laser Treatment of Atrophic Scars

- Produces deep dermal penetration up to 1400µm
- Treatment density - 5% to 40% coverage
- Lower density in darker skin types.

Non-Ablative Fractional Laser Treatment of Atrophic Acne Scars

- Multi-modality approach achieves the best outcome
  - Filler injections for atrophic, distensible scars
  - Subcision for release of tethered scars
  - Punch elevations, punch excision, cross technique for ice pick scars

Non-ablative Fractional Photothermolysis

Acne Scars and PIE

After 6 treatments 20-70 mJ, Tx level 8
Non-Ablative Fractional Photothermolysis

Acne Scars 1 month after 3 treatments


Non-Ablative Fractional Photothermolysis

Striae Rubra 1550-nm, 25-70 mJ, tx level 8-10


Non-Ablative Fractional Photothermolysis

Acne Scars 1 Month after 4 treatments 40 mJ, Tx level 5-7

Ablative Fractional Resurfacing

Atrophic, Acne Scars 2 years after 1 treatment


Ablative Fractional Resurfacing

Atrophic Scar 4 Months After 1 Treatment


Other Nonablatable Fractional Approaches for Atrophic Scars

- Picosecond lasers with diffraction array or hologram
- Microneedling
- Bipolar radiofrequency
**Hyperpigmented and Hypopigmented Scars**

**Hyperpigmented Scars:**
- 1550 or 1927-nm
- Rarely QS Alexandrite

**Hypopigmented Scars:**
- NAFR
- AFR

### 1927-nm Fractional Low-Power Diode

**Postinflammatory Hyperpigmentation**
- 4-weeks after 3 treatments

### Fractional Photothermolysis

**Postinflammatory Hyperpigmentation**
- 7 months after 3 treatments
- 1550-nm, 15 mJ, Tx level 6

### Non-ablative Fractional Photothermolysis

**Atrophic, Hypopigmented Scars**
- After 4 treatments
- 1550-nm, 20 mJ, Tx Level 7

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Atrophic, Hypopigmented Scar

After 2 sessions
1.550-nm, 4-50mJ, 7%-23% coverage

Non-ablative Fractional Photothermolysis


Ablative Fractional Photothermolysis


NAFR for Abdominoplasty Scar


1,550-nm Nonablative Laser for Facial Surgical Scars


Prevention of Thyroidectomy Scar Using a New 1,550-nm Fractional Erbium-Glass Laser


Facial Surgical Scars

2 weeks after 1 treatment

Communications and Brief Reports

Fractional Photothermolysis for the Treatment of Surgical Scars


Atrophic, Hypopigmented Scar

After 9/24/2015

Ablative Fractional Photothermolysis


Non-ablative Fractional Photothermolysis

Surgical Scars

- Mature hypertrophic scars
- Two arms: 10 subjects each
  - High Density: 40 mJ/mb, 26% coverage
  - Low Density: 40 mJ/mb, 14% coverage
- Split-lesion: treated vs. control
- Total 4 treatment sessions, every 2 weeks
- Follow-up: 1 and 3 months after laser

Non-Ablative Fractional Laser Treatment of Scars

- 20 mJ and 32% density, starting 2 weeks after suture removal, 4 to 6 treatments at 2 week intervals reported by Oliaei et al.

Fractional Photothermolysis

- Atrophic, Surgical Scar
- After 3 treatments 1550-nm, 40 mJ, tx level 9-10

1550-nm Fractional Photothermolysis

- Traumatic Surgical Scar
- After 2 treatments 1550-nm, 40 mJ, tx level 10

595-nm LPDL Early Burn Scar

- Early Burn Scar
- After

595-nm LPDL + IL TAC

- Burn Scar
- After


**Burn Scars**

1,550-nm NAFR

- 5 sessions at 4-week intervals
- 40-70 mJ/pulse, density 6-13
- 90% had overall improvement
- 60% had moderate to excellent improvement
- Improved skin texture: 90%
- Improved dyschromia: 80%
- Improved hypertrophy/atrophy: 80%


**595-nm PDL and Ablative Fractional Photothermolysis**


**Fractional Ablative Lasers and Topical Drugs**

- Fast uptake of many topical agents - large or small molecules
- Depth of uptake = depth of laser holes (0.5-1.5 mm)
- Massaging made no difference
- Possible drug depot in each channel
- Drug uptake is strongly enhanced for ~3 days
- Future applications will include drug-device combinations
Laser Scar Revision

Summary

- Several laser techniques are available for the safe and effective treatment of various types of scars.
- Individualize and combine devices to customize the treatment to the characteristics and depth of the scar.
- Although long-standing scars will respond to laser therapy, new scars are more amenable to treatment; therefore, prompt treatment is recommended.
- Debate remains on the best timing for treatment initiation.

Stay Tuned-The Future is Bright!

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