LASER Lipolysis
What Every Practitioner Should Know

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- Medical Director
  - Clinic of Cosmetic Surgery - Milwaukee, WI
  - Laser Centers of Wisconsin
  - Contour Weight Loss
- Member – ABPS
- Disclaimer – Luminaris Palomar
So many Options

- **Cellulite Treatment**
  - Increase blood flow to fat cells causing cellulite chambers holding fat cells to dissolve
- **Non-Surgical**
  - “Cryolysis” External Cold Laser Liposuction -1960’s
  - Radiofrequency
  - Ultrasound
- **LASER**
- **Surgical**
  - Lipo-shifting
  - Liposuction
    - Suction Assisted Liposuction
    - Ultrasonic Assisted Liposuction
Cellulite Treatment

- Heat (Energy) used to increase metabolism of fat and massage to smooth out skin
  - 2-6 treatments spaced 1-2 weeks apart, minimal downtime
  - Results last 6-12 months
- *Triactive* – *Cynosure*
  - Suction massage to increase circulation
  - Laser energy to heat underlying skin to produce collagen and improve texture
  - Contact cooling to maintain patient comfort
- *Velashape* - *Syneron*
  - Bipolar RF + IR Light + Vacuum and Mechanical Massage
  - 85% circumferential reduction in thighs
- *SmoothShapes* - *Eleme*
  - 915 nm Diode + 650 LED Energy and Vacuum massage
Non-Surgical

- **External Cold Laser Liposuction -1960’s**
  - Low Level Laser Therapy (LLLT) – *Erchonia*
  - FDA approved for liposuction and musculoskeletal pain
  - Subcutaneous fat more sensitive to cold than skin
  -empties fat cells does not destroy them
- **CoolSculpting** - Zeltiq
  - Cryolipolysis
- **Zerona** - SBMI
  - Controlled cooling “selective cryolysis” – 635 nm
- **Coolipo Twin** – Bentley
  - Selective Cryolysis & Cryo-electrophoresis
- **i-Lipo** – chromogenex
  - 650-660nm diode cold laser
- **Accent XL – ALMA**
  - Monopolar and Bipolar Radiofrequency
- **Thermage**
  - Radiofrequency
- **Liposonix** - Medicis
  - High Intensity Focused Ultrasound => thermocoagulation of adipose tissue removed by macrophages
- **Ultrasound**
  - Pulsed Ultrasound
LASERS

- **Pulsed 1064 nm Nd:YAG**
  - *LipoLite* – Syneron

- **Continuous 980 nm Diode**
  - *Lipotherme* – MedSurge Advances
  - *Smoothlipo* – Eleme

- **Pulsed 1320 nm Nd:YAG**
  - *CoolTouch* – CoolLipo

- **Pulsed 1064nm/1319 nm Nd:YAG**
  - *Prolipo* – Sciton

- **Pulsed 1064 nm/1320 nm Nd:YAG**
  - *SMART Lipo* – Cynosure

- **Continuous 924/975 nm Diode**
  - SLIM Lipo: Palomar
What is Laser-Liposuction?

- Laser lipolysis $\rightarrow$ Fat liquefication $\rightarrow$ Easier aspiration
- Connective tissue heating $\rightarrow$ Skin retraction/tightening
- For safety and efficacy you need
  - Proper wavelength
  - Proper fiber/tip design
  - Optimal pulse format $\rightarrow$ CW vs. Pulsed

allows doctors to work at more controlled tip temperatures to both liberate fat and heat fibrous septae for skin tightening benefits
Which One Do I Choose

- Operator Dependant
- Confidence in Results and Safety
- What will fit your business model
  - Surgeon or Laser Technician
  - Cost
  - Hospital or Office Based Surgery
Selective heating leading to:

- Skin retraction
- Smoother skin
- Faster recovery
- Reduced bruising/blood loss
- Reduced post-operative pain
- Enhanced safety
- Less physician fatigue
- Use for liposuction revisions
- More easily treat small areas
Not new Science

2001 Study performed by Palomar and MGH

Showed differences in fat absorption and patented wavelengths
Optimal Absorption

- **Higher Tip Temperature (Less Safe)**
- **Lower Tip Temperature (More Safe)**

Wavelength (nm):
- 924
- 975
- 1064
- 1320
- 1440
# Absorption Coefficient: Dermis vs. Fat

<table>
<thead>
<tr>
<th>Wavelength, nm</th>
<th>Absorption in Dermis</th>
<th>Absorption in Human Fat</th>
<th>Ratio H2O / Fat</th>
<th>Ratio Fat / H2O</th>
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<tbody>
<tr>
<td>924</td>
<td>0.11</td>
<td>0.18</td>
<td>.61</td>
<td>1.7</td>
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<tr>
<td>975</td>
<td>0.46</td>
<td>0.04</td>
<td>11.50</td>
<td>.08</td>
</tr>
<tr>
<td>1064</td>
<td>0.11</td>
<td>0.05</td>
<td>2.20</td>
<td>.45</td>
</tr>
<tr>
<td>1320</td>
<td>2.01</td>
<td>0.08</td>
<td>25.12</td>
<td>.03</td>
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<tr>
<td>1440</td>
<td>29.71</td>
<td>.71</td>
<td>41.84</td>
<td>.02</td>
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</table>
Temperature profile for 1s pulse in mixed mode at 25W.

Ideal Characteristics of Laser:
- Larger lipid liberation zone
- Continuous wavelength vs pulsed wavelength
- More selective wavelength for fat
Temperature profile in adipose tissue at the end of a 20W, 300 ms pulse from a 600 micron fiber compared across different wavelength lasers.
Temperature profiles in adipose tissue at the end of a 300 ms pulse from a 600 micron fiber compared across different wavelength lasers. The power of each laser is adjusted for equal damage volume in adipose tissue. Damage to the dermis is defined by the volume within the 50°C contour.
Role of Wavelength Selectivity

1 Stroke, 2 mm/s, 1.5 mm tip

924 nm 20 W

$\frac{\text{Abs Coeff}}{\text{Abs Coeff}} (\text{Skin}) \approx 0.5$

924 selective for subcutaneous fat

975 nm 20 W

$\frac{\text{Abs Coeff}}{\text{Abs Coeff}} (\text{Skin}) \approx 3$

975 selective for dermis
Optical Tip vs. Hot Tip

60W, 924:975 nm, 2 mm tip
9 strokes, 2 cm/s
Deposited 54J/mm along tunnel

20W, 1.5 mm Hot Tip
10 strokes, 1 cm/s
Deposited 40J/mm along tunnel

More uniform heating

Hotter tunnel temperatures
Excess heating & char

Hot tip causes much larger temperature gradients and unnecessary tissue damage but lower volumetric coagulation of tissue and fat liberation.
Aspirate
IN VIVO ENDO SCOPY OF INTACT SEPTAL FIBERS FOLLOWING DIFFERENT LIPO SUCTION TECHNIQUES REVEALS VARYING DEGREES OF TRAUMATIZATION

Afschin Fatemi, M.D.

• Compares the preservation of septal fibers following LAL, SAL, PAL, WAL, UAL
• 52 Patients treated
• Greatest number of intact septal fibers preserved by LAL and PAL
• UAL and WAL were most damaging to septal fibers
• LAL and PAL also showed less blood in aspirate than all other methods of liposuction
Preservation of Fibrous Septae
600 µm fiber tips

Water Fat

924nm @ 25W (CW)

Fat

Fat

1320nm @ 10W
1064nm @ 15W (pulsed)
Note: 1064nm and 924nm have same absorption strength in water (CW vs Pulsed → Water Boiling)
924nm vs 980nm
6 weeks post treatment

<table>
<thead>
<tr>
<th></th>
<th>SAL</th>
<th>SlimLipo™</th>
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<tbody>
<tr>
<td>Inflammation</td>
<td>1 channel (sparse, mild)</td>
<td>All 5 channels (significant)</td>
</tr>
<tr>
<td>Foamy Macrophages</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Fibrotic Replacement of Fat cells</td>
<td>Mild</td>
<td>Significant</td>
</tr>
</tbody>
</table>

10 Laser Strokes/channel
20 Toomey Strokes/channel
11cc Aspirate/Side
Dense fibrosis

Inflammation

Dermis/hypodermis

*Post SlimLipo treatment mosaic section*
Technique

- **Office Based Outpatient Procedure**
- **IV Sedation or Local Anesthesia**
- **Tumescent Fluid – Wet/Superwet**
  - (Pain Control)
  - Allow time for tumescent to absorb
- 50+ % less aspirate
- Operative Time equal to SAL
Personal Technique

• First Pass
  • Blend 924/975 nm
  • Endpoint
    • Feel
    • Pinch
  • Power
    • Get it hot, not too hot!

• Aspirate
  • Maximum 3 mm cannulae

• Second Pass
  • Blend 924/975 nm
  • Endpoint
    • Hot
Results

• 40% Less Downtime
  • Return to work POD 1-3
  • Compression garment 3 weeks

• 3 Months for Final Results

• Complications
  • Burn
  • Paresthesia Ulnar N.
SUBMENTAL

Before

POD #1

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SUBMENTAL

Post Op 1 Month

Post Op 3 Months

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SUBMENTAL

Before

2 Weeks Post-op
SUBMENTAL

Pre-Treatment

2 Weeks Post-Treatment
ABDOMEN

Pre-Treatment

1 Month Post-Treatment

Brooke Seckel, MD
GYNECOMASTIA / ABDOMEN

Pre-Treatment

5 Weeks Post-Treatment
UPPER EXTREMITY

Pre-Treatment

2 Weeks Post-Treatment

Jeff Angobaldo, MD
UPPER EXTREMITY

Pre-Treatment

2 Weeks Post-Treatment

Jeff Angobaldo, MD
Results

Pre-Treatment

Post-Treatment

Photos courtesy of Steven Bloch, MD
Ancillary Procedures

LIPOMAS
Avoidance of Bad Results
Reduced Downtime

Traditional Liposuction 5 Days Post-op
REDUCED DOWNTIME

Pre-Treatment  5 Days Post-Treatment  2 Weeks Post-Treatment
Learning Curve

How Hot Is Too Hot?
AB-SCULPTING
The Business Side

- Results
  - Safe
  - Effective
- Marketing tool
  - Patients will ask for it
  - Newest technology
  - Bring in new patients
    - New candidates for new procedures or for old procedures
Nurses Role

- Pre-Operative
- H/P, EKG
- DC BCP/HRT
- No Smoking
- No ASA, NSAID’S
- The usual extensive list of medications to avoid
Intra-Operative

- Laser safety glasses
- Standing prep if indicated
- TEDS & SCD’S
- Tumescent Solution (Super wet)
- Keep incision site cool with saline
- Apply Aloe Vera gel if a “bleb” or burn
Post-Operative

- Compression garment
- Less down time
- Less bruising
- 3-6 months for final results