



# Laser Liposuction: A 2 Year Experience

**Rex Moulton-Barrett, MD**  
**Plastic & Reconstructive Surgery**  
**Alameda and Brentwood, Ca**





# Paradoxes of Progress

QuickTime™ and a  
TIFF (Uncompressed) decompressor  
are needed to see this picture.

**Sir Peter Medawar**

**“technology and science advance in a sinusoidal pattern”**

QuickTime™ and a  
TIFF (Uncompressed) decompressor  
are needed to see this picture.

- Discoveries arise through necessity & create need for new technology
- When technology advances without a scientific basis be cautious



# Current Techniques of Lipolysis

- Topical anti-cellulite creams
- Oral anti-cellulite medication
- Trans-cutaneous laser lipolysis
- ultrasonic lipolysis
- Sub-cutaneous injection lipolysis
- Subcutaneous 'mechanical' lipolysis aka liposuction
- Subcutaneous Liposuction with: **Ultrasonic** lipolysis  
**Vibration** lipolysis  
**Hydro** lipolysis  
**Radiofrequency** lipolysis  
**Laser** lipolysis



# Topical Anti-Cellulite Creams

- > 30 products commercially available
- Only 1 study with blinding: 8 pts only
- Not effective in double blind placebo study
- Top product : Revitol
- 3 most common agents: retinol, caffeine, aminophylline
- 'Ms. Sixty Jeans': retinol capsules rupture with wear!

QuickTime™ and a  
decompressor  
are needed to see this picture.



# Oral anti-cellulite Medication

- **Cellasene:** Fucus vesiculolus or bladderwrack & clover extract, ginkgo, grapeseed, 240mig iodine, primerose oil and fish oil, lecithin
- **Published studies, New York 1998 and London 1999:** placebo and double blinded found no difference



# Cutaneous Injection Lipolysis

- Self administered 10 week kits (\$540) 'Lipodissolve'
- AKA: **Lipostabil**
- Each kit contains:
  - 5mls: 1250 mg **Phosphatidylcholine+deoxycholate**
  - 10mls: 14 mgs Tiratricol: Triiodothyroacetic acid
  - 10mls: 2% Procaine HCL
  - 10 x 5 ml syringes
  - EMLA cream
  - 10 x 30 g needles

QuickTime™ and a  
decompressor  
are needed to see this picture.



# Injectational Lipolysis for Lipomas

- 30 lipomas in 10 patients: Germany 2007
- 4 Phosphatidylcholine injections/lipoma/6-8 wk intervals
- 46% reduction in sonographic size
- 27% hematoma complication
- 40% complained of pain over injection site

**Bachara, et al, 2007. J Cut Surg 10(4), 155-9.**



# Sub-cutaneous Laser & Liposuction: 8 companies

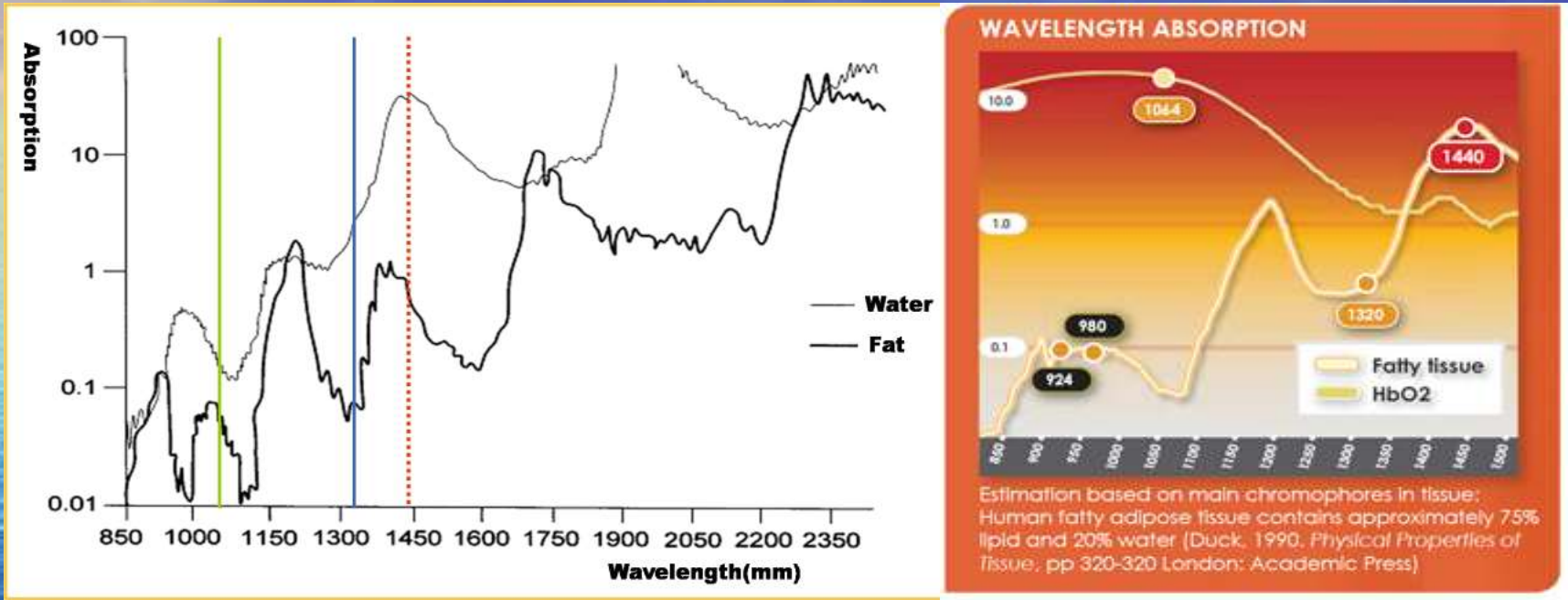
Name	Wavelength (nm)	Pulse Freq	Pulse Power	Max power output	Fiber size	Pulse width/duration	Simultaneous or staged lipo	Date FDA cleared
Osyris 'LipoControl'	980nm diode laser						staged	2009 pending
CoolTouch 'Cool-Lipo'	1320 Nd:YAG	20-50 Hz		15 Watts	.32-2mm	100 micsec	simultaneous	January 2008
Eleme 'SmoothLipo'	980nm	continuous						
Cynosure 'Smart-Lipo'	1064 & 1320 Nd:YAG	40 Hz	(aiming beam-3mW)	6, 12, 18 watt	.35mm .4 mm, .6mm	150,200, 250 mic sec	staged	November 2006
Palomar 'SlimLipo'	924 & 975 diode laser	continuous	N/A	15-25 Watt & 40 watt.	1.5 mm	continuous	staged	April 2008
Sciton 'ProLipo'	1064 & 1319 Nd:YAG	1-50Hz	5-10 watts	5-25 Watts	0.6 and 1 mm	10-100 microsec	staged	July 2007
Lutronic 'AccuSculpt'	1444nm Nd:Yag	40 Hz	175 mJ	7 W	0.6mm	100-150 micsec	staged	November 2008
Syneron 'LipoLite'	1064 Nd:YAG	50Hz	800mJ 2 pulsed energy levels	12 Watts	.550 mm	100-800 micsec	staged	May 2008

From 2006-2009





# Lutronic AccuSculpt 1444nm Laser Assisted Liposuction



- Purported to be the greatest fat absorption coefficient of laser assisted devices: " > 8 x absorption 1064 and 1320nm"
- Relies on photo-acoustic properties & less photo-thermic action for lipolysis
- Because of this requires less power and therefore less thermal damage
- **Theoretically, should have high photo-thermic injury**, purported opposite
- Competing chromophores: ie **dermal water** should limit power used



# 'Slimlipo': Palomar Aspire 924 & 975 nm YAG Laser Assisted Liposuction

- Approved for laser lipolysis April, 2008
- Dual Diode laser
- 924nm high preference for fat absorption
- 975nm high preference for dermis
- Purported continuous wave delivery with 20 times greater area of thermolytic lipolysis over other laser lipolysis

Histological zone of thermal effect

- 1mm diameter fiber and 0.4mm tip

QuickTime™ and a decompressor are needed to see this picture.

QuickTime™ and a decompressor are needed to see this picture.

QuickTime™ and a decompressor are needed to see this picture.

Slimlipo

1064nm



# Cooltouch CoolLipo 1320nm Nd:YAG Laser Assisted Liposuction

- Delivery fiber diameter 320-**2000 microns**
- Designed for small area: neck and chin
- **New CoolBlue Duet Handpiece** : ablates and simultaneous aspiration with 2.5 mm cannulae ( June 2008 )



# SmartLipo 1064nm Nd:Yag

## SmartLipo MPX: 1064+1320nm

## SmartLipo Triplex: 1064+1320+1444

### Laser Assisted Liposuction

- Originally Italian 'Deka' company: termed 'lipolysis', designed for up to 500cc
- FDA approved 2006 Cynosure
- 1, 734 pts Brazil: 1 burn, 1 seroma, all < 500 mls, 300micron fiber, 1mm metal cannulae, tumescent technique ( Goldman, 2002)
- Commonest complaint undercorrection especially larger treatment areas
- 82 pts Brazil: submental area: **similar overall results with traditional liposuction except he noted less postoperative bleeding** ( Goldman, 2006)
- New 1mm fiber and hand-piece measures tip temperature and regulates energy provided to avoid overheating and skin injury
- Maximum power MPX up to 30 Watts 1064nm, 16 Watts 1320nm



## Syneron Lipolyte 1064nm with Nd:Yag Laser Assisted Liposuction

- Up to 12W, 100-800 mcsecs
- Uses 2 pulses:
  - <150 mcsec + < 250 mJ: photo-mechanical  
ie high frequency and low energy: mechanical
  - > 700mcsec + > 1J: photo-thermal  
ie low frequency and high energy: thermal
- 0.55 mm diameter fiber
- Disposable handpiece/cannulae
- Recommended for  $\leq 15 \times 20$  cm zones



# Sciton: 'ProLipo' 1064+1319nm Nd:Yag Laser Assisted Liposuction

- Subcutaneous laser lipolysis followed by liposuction
- 600 -1000 micron fiber, inside a 14 or 18g cannulae
- Choice of 2 wavelengths: **1064** & 1319 nm or blending both
- Maximum power 1064nm & 1319nm 40 W, RR up 50 Hz
- Pulse duration 10-100 microseconds
- May **combine with transcutaneous intense pulse light:**
- **'Skin -Tyte'** 800-1400nm **BBL: Broad Band Light**

# Trans-cutaneous Laser & Non-Laser Assisted Lipolysis: >13 companies



LASER

IPL

RF

U/S

CRYO

Company and product name	Type of product	Action	FDA clearance
Erchonia 'Niera'	635nm Dual Diode laser	Staged lipolysis before liposuction	2004
Erchonia 'Zerona'	650nm Diode Laser	Lipolysis alone	April 2008
Eleme 'SmoothShapes'	650 nm laser and 915nm IPL	Cellulite reduction	January 2008
Cutera 'Titan': V, XL,S	Infrared 1100-1800 nm	Skin tightening	2004
Palomar 'LuxDeepIR'	Infrared	Skin tightening	Feb 2007
Sciton 'BBL'	IPL: 800-1400nm	Skin tightening	2006
Solta Medical 'Thermage'	IPL	Skin tightening	2002
Syneron 'VelaShape II'	RF	Cellulite reduction	August 2007
Alma Lasers 'Accent XL'	RF: Uni / Bi - polar	Skin tightening	April 2007
BTL 'Exilis'	RF ans U/S	Skin tightening	FDA pending
General Project 'Slim Project, Med Sculpt, Med Contour'	External 2 wave U/S and massage	Cellulite Reduction & lipolysis	November 2006
Medicis 'Liposonix'	High intensity focused U/S	Lipolysis alone	Pending 2011 ?
MedixSysteme 'Ultracontour'	High intensity focused U/S and U/S vasodilation	Lipolysis Alone	Pending 2009
Zeltiq Aesthetics	Cryolipolysis	Lipolysis alone	Pending 2009

From 2002-2011



# Science Behind Specific Wavelength Choice for Laser Assisted Liposuction

- Little information to support a given wavelength: either photoacoustic or photothermolytic, comparing histological or clinical data :  
900-930, 1190-1220, 1700-1730, or 2280-2350 nm
- Fresh ex-vivo cadaveric abdominoplasty pannus lasered with 1064, 1320, 2100 nm using a 0.320mm fiber
  - Control: mechanical fiber trauma alone
  - Fiber withdrawn at 1mm per second, single pass
  - No clear fat liquefaction seen histologically
  - Difficult to capture photoacoustic effect histologically
  - Thermal damage dependent on power for each wavelength
  - Diameter of damage 1-5mm proportionate to power/pulse

**Koury et al, 2008; Laser Surg Med 40(6):402-6**





# Liposuction alone vrs 1064nm subcutaneous laser assisted liposuction

- Few comparative clinical studies
- Laser assisted Liposuction described 1994: (Affelberg): **inconclusive benefit** using 1064nm over traditional liposuction
- Liposuction vrs Laser1064nm /liposuction randomised, controlled study in Chile, the latter causes:  
**less pain** ( $p > 0.0001$  t test),  
**less blood** within the aspirate,  
**average duration of surgery 25% longer** ( $p > 0.0005$ ):  
otherwise all other parameters are equal:  
swelling, bruising, skin tightening, contour improvement (Prado, et al, 2006)
- 82 pts Brazil: submental area: **similar overall results** with traditional liposuction **except** he noted **less postoperative bleeding** (Goldman, 2006)



# 1064nm Laser lipolysis with liposuction **versus** no liposuction

- No clinical studies sited
- No reports comparing liposuction with vrs no liposuction
- Lysed fat is locally inflammatory
- Does leaving lysed fat cause more swelling ?



## Trans-cutaneous Laser Assisted Liposuction Versus Liposuction Alone

- Few comparative studies
- Erchonia Niera 635nm Dual Diode, 14 mWatt
  - Reduces swelling & bruising (Neira, et al, 2002)
  - Speeds up rate of extraction by liposuction:  
40% faster, after 6 minute of application  
(Jackson, et al, 2004)
  - 50% greater volume of lipolysis when tumescent solution used



# BBL & Prolipo Clinical Choices

- BBL: before or after laser liposuction ?
- Laser lipolysis with and without liposuction ?
- End-point of laser lipolysis ?



# Variables In Technique of BBL & Laser Lipolysis and Liposuction

- **BBL settings** and application method: **passes**
- **Tumescent Injection**: concentration & volume
- **Laser Fiber**: size, settings, technique: depth/passes
- **Liposuction**: cannulae size, volume, end point
- **Post procedure care**: compression duration



# BBL Interchangeable Filters



## Applications

- **Filters (nm)**
  - 420 - **Blue light**
  - 515 - **Pigment**
  - 560 - **Vascular & Pigment**
  - 590 - **Vascular & Hair**
  - 640 - **Vascular & Hair**
  - 695 - **Hair**
  - 800 - 1400 - **ST applicator** \*



# BBL: Controlled Cooling



- Sapphire crystal contact cooling
- Provides timed before, during and after contact cooling
- System sets skin temperature accurately from 0°C to 30°C
- Includes 15 x 45, 15 x 15 or round 10 mm treatment area

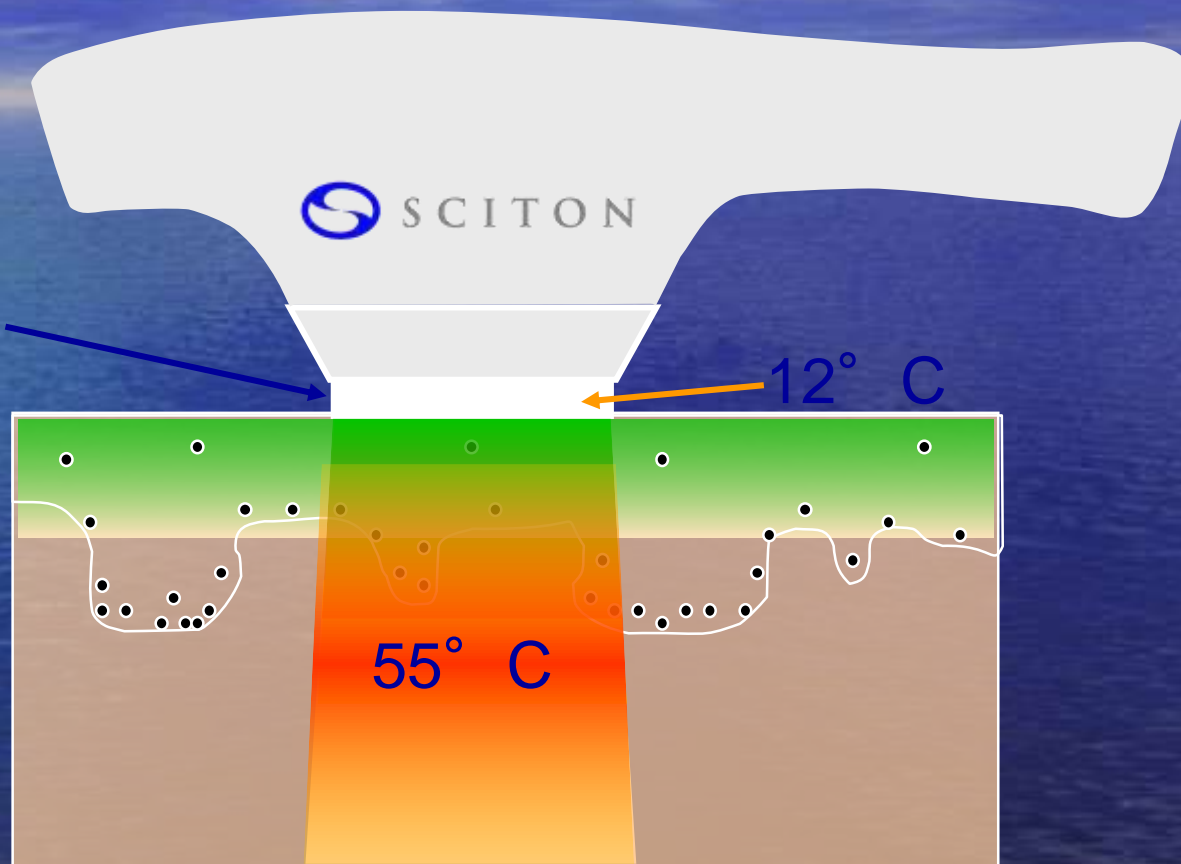


# Sciton SkinTyte

Chilled Sapphire Plate

Epidermis

Dermis



**The epidermis remains 12 C and  
dermis heats to 55 C**



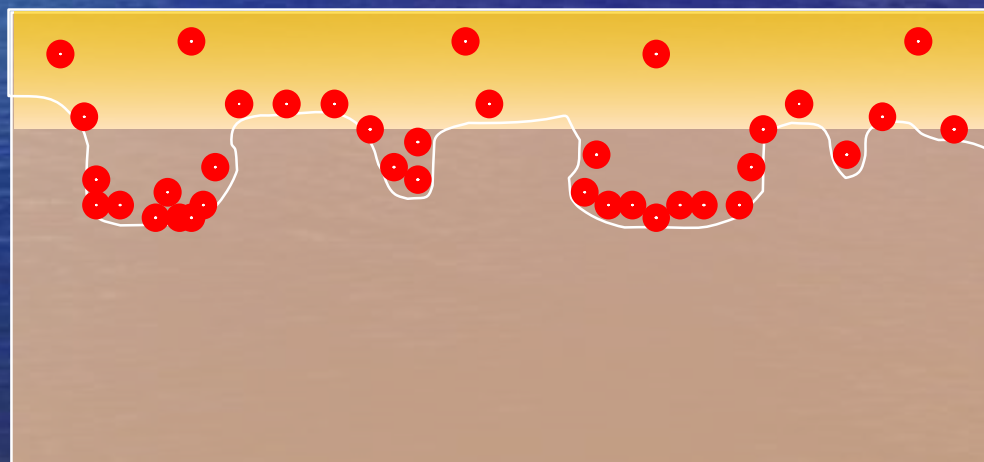


# Sciton SkinTyte

- Denatured collagen causing immediate contraction
- Activated fibroblasts leads to long-term remodeling

Epidermis

Dermis





# BBL Settings



Set Cooling Temperature: 12°C is recommended.  
 Set Fluence for TEST AREA, 40 J/cm<sup>2</sup>  
 Check Cooling Temperature before each area to be treated

Cooling Temperature	Starting Fluence	Pulse Width	Post Cooling	Passes
12°C	40 J/cm <sup>2</sup> < 20% on forehead	5 seconds	2 seconds	1 to 5

Treat with non-overlapping scans.  
 POSITION HANDPIECE COOLING PLATE in full contact with treated area. Use a thin film of colorless gel, KY, surgilube or water with the system for better heat removal, improved optical coupling, and lubrication for sliding the plate over skin. Gel will insure contact in areas with highly irregular surfaces.  
 ALLOW SEVERAL SECONDS OF COOLING before depressing laser foot switch.

**BBL Pulse Parameters**

Fluence: 45 J/cm<sup>2</sup>

Time: 3.0 Seconds

Treat Repeat: Off

Post Cooling: 3 sec

BBL Wavelength: ST - IR nm

Set Temp: 12°C

Shot Counter: 0

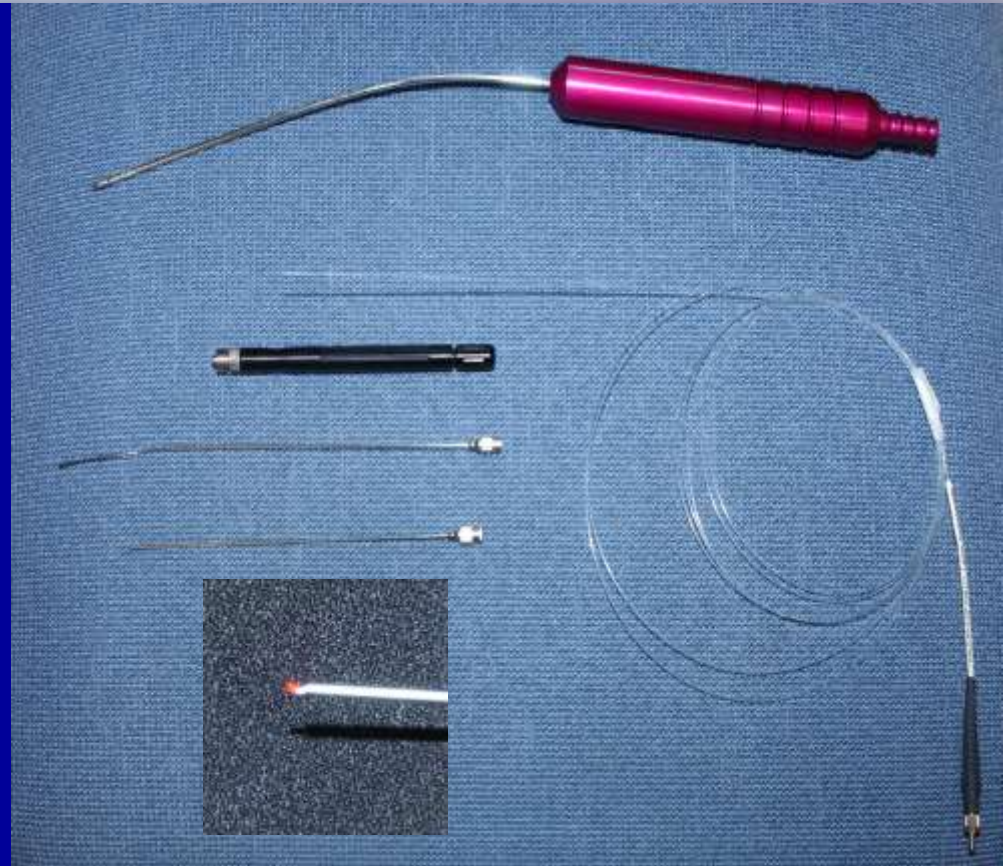
Standby

Reset



# ProLipo Equipment

- liposuction cannulae
- fiber and handle





## Settings





# Clinical Case Series: Case 1

- Patient information: age 39
- Hispanic with Fitzpatrick III-IV
- Unhappy with submental pannus





# Clinical series: Case 1 ( cont.)



one week later

BBL: submental

**40J/cm<sup>2</sup>**

3 second pulse

3 second post-cooling

12C cooling temp

**3 passes**

ProLipo:

• 20 ml 1% Lidocaine

• with 1:100,000 Epinephrine

• 0.6mm fiber

• 0.4 J/pulse

• **3000 Joules**

• Repetition rate (RR) 30

• **No liposuction performed**



## Clinical Case Series: Case 1 (cont.)



Before

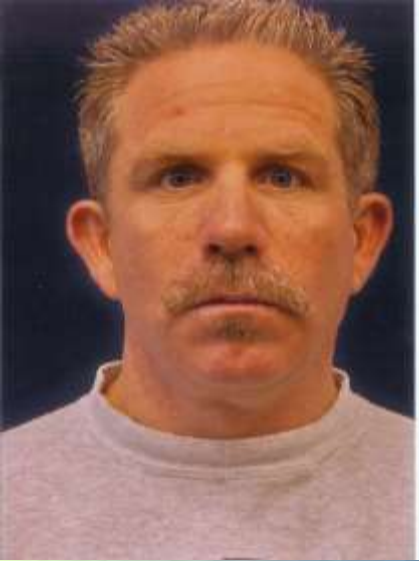
- Continued improvement 4-5 months
- More swelling without liposuction



6 months after



# Clinical Series: Case 2



QuickTime™ and a decompressor are needed to see this picture.

Before

3 Months after

- Patient Information: age 45
  - 1 yr after facelift
  - Unhappy with separation of submental platysma
  - & fat collections
- ProLipo: 20ml 1% lido with 1:100,000 epi
  - 3400 J total, RR 30, 2.5mm cannula,
  - 10ml liposuction
- Followed by BBL ST:
  - Unable to determine end -point
  - 40 J/Cm<sup>2</sup>
  - RR 30 Hz
  - 12C cooling, 3 seconds, 3 passes





# Clinical Series: Case 3



Before



5 Months after



- Pt. Information: 63 F
  - Fitzpatrick II
  - unhappy with submental faty platysma bands
  - previous facelift with platysma corseting 1 yr before
- BBL: ST:
  - 35 J/cm<sup>2</sup>, 30 Hz, 3 second cooling,
  - 3 passes
- ProLipo:
  - 15ml 1%lido with 1:100,000 epi
  - 0.4 J/ pulse, 35 Hz, 3600 Joules
  - Liposuction aspiration 10ml 2.5mm cannula
- Complication:
  - small skin burn at cervico-mental angle
  - just right of midline at platysma band



# Clinical series: Case 4



Before



3 Months after

- Pt Information: age 48
  - Fitzpatrick II-III
  - Unhappy with submental & jowl fat and platysma bands
- BBL ST: 40 J/cm<sup>2</sup>
  - 2 second post cooling
  - Cooling at 12 C
  - Pulse width 5 seconds
  - 3 passes
- ProLipo: 0.4J/pulse
  - Freq 30 Hz
  - 2000 Joules
- Liposuction: 14ml lidocaine & 1:100,000 epi
  - 2mm liposuction cannulae
  - Aspiration volume 10ml



# Clinical Series: Case 5



Before



7 Months after



- Pt. information:
  - 42F
  - Unhappy with submental pannus
- BBL: **35J/cm<sup>2</sup>**
  - 3 second passes
  - 3 second cooling: 12C
  - 3 passes
- PropLipo: 20ml 1% lido with epi 1:100,000
  - 6mm cannulae .35J/cm<sup>2</sup>
  - RR 30
  - **2000J**
  - **Liposuction 2mm cannula 15mls**



# Clinical Series: Case 6



Before



3 Months after



- Pt Information: 17 M
  - Unhappy with submental pannus
- BBL: ST: 40J/cm<sup>2</sup>
  - 3.5 second pulse width
  - 12 C cooling
  - 2 second cooling
  - 3 passes
- Prolipo
  - 0.35 J/pulse
  - RR 30
  - 2400 J
- Liposuction: infusion 20ml
  - 1% lidocaine &
  - 1:100,000 epi
  - Aspiration 20ml

# Clinical Series: Case 7



Before



- Patient Information: age 51
  - Fitzpatrick II
  - Requesting reduction of
  - Submental fat pannus
- BBL: 3 passes **40J/cm<sup>2</sup>**
  - 12C cooling temp
  - 5 second pulse width
  - 2 second post cooling
- ProLipo: 13 ml 1% lido with epi
  - 6mm fiber
  - rate 40
  - 12 watt
  - 3 Jewels
  - pulse energy 30
  - 234 seconds
  - **total 2000 J**
- Liposuction
  - 2mm cannulae lposuction
  - **10ml liposuction aspiration**



9 Months after



# Clinical Series: Case 8



Before



3 Months after



- Pt. information: 36 F
  - Unhappy with submental laxity and fat
- BBL ST: 45 J/cm<sup>2</sup>
  - 3 second post cooling
  - Cooling at 12 C
  - Pulse width 5 seconds
  - 3 passes
- ProLipo:
  - 30 ml infiltration
  - 1064nm
  - 6mm fiber
  - 0.7J/pulse
  - Freq 30 Hz
  - 3,300 Joules
  - 25ml liposuction aspiration

# Clinical Series: Case 9



Before



- Pt Information 35 F
  - c/o familial submental laxity and pannus
- BBL: 40J/cm<sup>2</sup>
  - 3 second exposure
  - 2 seconds cooling
  - Temp 15C
  - 3 passes
- Prolipo: 0.4J/pulse
  - RR 30, 2412 J total
- Liposuction
  - 18 ml tumescent solution
  - 2.5mm cannula
  - 20ml aspiration



3 weeks after



# Case 10



Before



2 Months after



11 Months after







# Results: Submental ST and ProLipo

## Demographics and Clinical

- 10 pts aged from 17-63
- Between 2008-2009
- longest follow-up 12 months
- 7/10 women
- All unhappy with submental fat collection & laxity
- 2/10 previous face lifts & developed laxity within 1 yr



## Results: Submental ST and Prolipo ( cont. )

- 9/10 pts underwent BBL: ST prior to ProLipo
- End-point: patient 'heat and or discomfort' from ST
- Unable to tolerate more than 3 passes
- Most common settings: 35-40J/cm<sup>2</sup>, 3.5 second pulse width, 12-15 C cooling temp, 2-3 second post cooling
- 1/10 injected with local anesthetic before ST: patient unable to help us with endpoint determination, felt unsafe to use anesthetic prior to ST thereafter



## Results: Submental ST and Prolipo ( cont. )

- 0.6mm fiber passed through a single submental incision
  - No pre-tunneling & no cross-hatching
  - Settings:
    - 2000J total energy used in submental area
    - between 0.35-0.4 J/pulse
    - RR 30
    - End - point: Ease of fiber passage
- Surface temperature measured by hand  
Total energy count 2000 J



## Results: Submental ST and Prolipo ( cont. )

- 1/10 underwent laser without liposuction
- This patient developed significant local tissue reaction presumed secondary to not removing the lysed fat
- I felt it is better to remove the lysed fat cells
- 1/10 technical complication of skin injury
- Complication was entirely preventable, surgeon was attempting to divide a platysma band which was adherent to the skin s/p facelift
- All 10 patients very satisfied with results



## Results: Submental ST and Prolipo ( cont.)

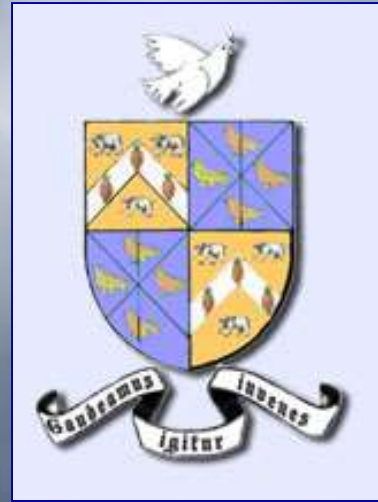
- No patients reported significant pain and did not require pain medication, all patients were given prophylactic antibiotics in view of the procedure being performed in an office setting
- 7/10 patients requested oral sedation with a combination of diazepam and vicodin immediately prior to the procedure



## Conclusions: Submental ST & Prolipo

- Combination BBL:ST and ProLipo with laser followed by immediate liposuction is **safe and operator dependent** technique for improving submental contour
- BBL:ST should be performed **prior to** local-injection **anesthesia**
- **Laser without liposuction leads to unacceptable swelling** due to the inflammatory effect of lysed fat cell products in the intercellular space. However, it can achieve significant contour improvement
- A further study comparing BBL alone with, liposuction alone, versus combined BBL, laser and liposuction alone is warranted.

*Gaudeamus igitur juvenes*



“Be joyful while we are young”