



Laser-Assisted Lipolysis Using ProLipo PLUS™



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INTRODUCTION

The body shaping and liposculpture market has grown significantly as manufacturers develop and refine technology addressing patient preference for less invasive approaches and improved recovery associated with liposuction procedures¹. Physicians seek technology that overcomes the limitations of traditional lipolysis and offers distinct advantages to their patients². Patients are drawn to Laser-Assisted Lipolysis (LAL), a “walk-in, walk-out” procedure using a safe and comfortable tumescent anesthetic resulting in a quick return to daily pursuits. Additional key benefits are the efficacious utility in fat extraction and finessed sculpting in difficult areas such as medial thighs, upper abdomen, periumbilical, submental area, and upper arms. Traditional liposuction can occasionally result in unwelcome contouring irregularities and does not always offer considerable improvement in skin laxity³.

First generation laser systems were slow, underpowered and many still have costly disposable fees associated with their use. The ProLipo PLUS™ laser (Sciton, Inc., Palo Alto, Calif) combines 1064 nm and 1319 nm wavelengths producing an optimal blend for efficient and uniform preparation of the fat for suction while initiating a dermal collagen response for clinically observable tightening of lax skin. This Sciton laser also has an option for adding other lipolysis wavelengths and can be part of an entire multi-laser aesthetic platform.

This paper will discuss the advantages for both physician and patient of using the ProLipo PLUS laser platform in an office-based setting over frictional lipolysis. My outpatient method used for LAL will be described by examining three clinical cases resulting in high patient satisfaction.

TECHNIQUE

Routine history and physical evaluation and surgical consultation are performed for patients seeking reduction of observable fat and skin laxity improvement in specific areas. My patient selection inclusion criteria are limited to small to moderate areas, less than 1 liter of removed volume, two or fewer areas at one session, and conform to the criteria for ASA 1⁴. On women, these areas typically include neck, periumbilical, back or bra rolls, flanks, medial and lateral thighs, axillae, brachia, knees, and ankles. On men, these areas can include neck, breasts, abdomen, and flanks or “love-handles.”

The patient’s treatment area(s) is marked with a surgical pen while standing. To ensure symmetry, a topographic method of marking the area is used, inscribing high points where fat resides and then the outer perimeter or boundary of the treatment area. Measuring the body fat with calipers and a ruler aids in assessing the volume to be liquefied and the area to be tightened by the laser. A simple formula is: Length x Width x Thickness (1/2 the caliper measurement) equals the Volume to be treated. Once the volume is assessed, the amount of laser energy can be calculated. Based on data from Havenith⁵, it takes 2.51 joules of laser energy to raise the temperature of 1 milliliter of fat 1 °C. Since the density of fat is 0.9 grams per cc this becomes 2.3 joules per cc. If a 5 °C temperature rise is desired from a baseline of 37 °C, then the temperature after the optimal dosage is reached is 42 °C. The mathematical equation now incorporates the Volume x 2.3 x 5 °C (desired temperature rise). The product is expressed in joules and reflects the calculated energy requirements.

The patient is positioned with the appropriate body area prepped and draped for introduction of local anesthetic and tumescent infiltration. A typical tumescent mixture is 1000 cc of Lactated Ringers solution with 1 cc of epinephrine added, 50 cc of 1% plain lidocaine and 10 cc of 8.4% sodium bicarbonate. A tiny 2 mm puncture with an 11 blade is made. The tumescent mixture is infused via a pump and small infiltrating cannula, situating the cannula into the fat plane below the dermis. The laser is set according to the proposed energy requirement from the previous calculations and assessment of the body part. My preference is a two-step method that delivers the total energy in two passes and utilizes the wavelength blend option. The benefit of having two wavelengths is as follows:

- The 1064 nm wavelength is chosen for constructing the fat channels and preparing the fat for lipolysis by breaking up the more vascular superficial fat.
- The 1064 nm wavelength is absorbed by oxyhemoglobin for better hemostasis and also generates thermal heating. The fat cell is ruptured and tumefaction takes place. It is an efficient wavelength for lipolysis⁶.
- The 1319 nm wavelength is used for its high absorption in water and its lower scattering in fat, so the majority of its thermal energy can be confined to the area just beyond the tip of the fiber.
- The 1319 nm wavelength is used to preferentially damage collagen in fibrous septae. This is the precursor to tissue retraction and observable improvement in skin laxity⁷.

Benefiting from the best properties of each wavelength, the total energy calculated for the volume of fat to be liquefied can be divided in a 60/40 ratio of both 1064/1319 blend. In other words, 60% of the total energy is given in the first pass of preparing the fat for lipolysis.

For example, in treating a volume of 1230 cc the power needed would be calculated as follows:

$$\begin{array}{rcccccc} \text{Volume} & \times & \text{Factor} & \times & \text{Desired temperature increase} & = & \text{Total energy to be delivered} \\ 1230 \text{ cc} & \times & 2.3 & \times & 5 \text{ }^\circ\text{C} & = & 14\,145 \text{ J} \end{array}$$

Since the total energy to be delivered is 14 145 joules, then 60% of the energy, or 8487 joules, will be delivered in the first pass. The second pass is for superficial tightening and would use 40% of the total energy. This would mean that 5658 joules would be delivered in the second pass. Further, the laser offers a unique blend of each wavelength that the user can select in 10% increments from 0 to 100% for either wavelength. A typical blend is 70% of 1064 and 30% of 1319 for laser lipolysis or 60% of laser energy (1st pass), and 30% of 1064 and 70% of 1319 for the remaining 40% favoring the 1319 for tightening (2nd pass). The wattage settings range from 10-15 W for face and neck to 28 W for extremities to abdomen and flanks (Table 1).

TABLE 1. Example of ProLipo PLUS™ wavelength blend and energy delivery in a two-step process

General		Wavelength Blend			Energy Delivered		
Pass	Region	Ratio % 1064/1319	Watts	Watts 1064/1319	Volume of the Region	% of Total Energy/Pass	Joules Pre-SAL*
1st	Hip	70/30	28	19.6 / 8.4	1230 cc	60%	8487
							Joules Post-SAL*
2nd	Hip	30/70	26	7.8 / 18.2	1230 cc	40%	5658
Total							14 145 J

*SAL (Suction-assisted lipolysis)

After the tumescent is infiltrated, the cannula with a 1000 µm fiber extending 2 mm beyond the cannula tip is introduced in the area of the fat plane. The laser is set for the first pass of 1064/1319 with a 70%/30% blend and the appropriate wattage dependent on the location chosen. Using a back and forth, bow and violin-like motion, the laser fiber is monitored visually by trans-illumination of the red aiming beam in tissue while the other hand is positioned on the body area for directing and monitoring cannula placement. The red light seen through the skin is the size of a nickel. The back and forth movement is advanced to cover the area in an inverted triangular or fan-like pattern with the entry port as the apex, making sure to deposit energy uniformly. Attention to cannula angle keeps

the laser at a consistent depth and in the intended plane of treatment. As lasing proceeds, the resistance that was first felt diminishes as the fat is liquefied. The laser counts and displays the accumulated energy. When the previously calculated total energy is reached, the area is assessed for appearance and symmetry. There should be no more resistance felt when lasing. The fiber is removed and aspiration of the treated tissue containing fragmented cells, free fatty acids, and residual tumescent fluid is facilitated with a suction device or a special Toomey syringe that has a locking mechanism to maintain suction.

The remaining joules from the original 60%/40% total energy calculation are given in the 2nd pass of 1064/1319 at 30%/70% blend. Again, close monitoring of the area via transillumination is advised to ensure the position of the cannula. The non-cannula hand that maintains contact with the body area also detects temperature elevation of the skin. This tactile feedback and the accumulated energy are indicators for endpoints. External and internal temperatures can be taken at various times during the whole procedure for further validation of parameters.

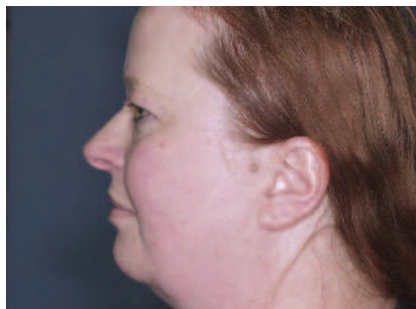
Once the final assessment of the area is made by visual inspection and joule accumulation, the skin puncture(s) is closed with a suture or surgical glue and dressing is applied. Patients are given post-op instructions. Most return to their daily routine by the next day. Some swelling and bruising is sometimes seen for up to 10 days. Areas such as the medial thigh, periumbilical, and arms are treated with a series of SkinTyte™ (Sciton, Inc., Palo Alto, Calif) sessions using deep dermal heating after two weeks post-op for additional improvement of skin laxity.

CASE STUDIES

Case 1

This 44-year-old woman wanted a more defined jawline and wished to avoid any scars around her ears. ProLipo *PLUS* was chosen for this delicate area. Treatment parameters were:

Tumescent infiltration: 200 cc
First pass: 1064 nm, 10 watts, 4740 joules
Second pass: 1319 nm, 8 watts, 1895 joules
Aspirate: 75 cc



Pre-ProLipo



2 months post-ProLipo

At two months out, the patient enjoys a more distinct profile without observable detection of having the procedure performed.

Case 2

A 64-year-old woman with moderate weight loss had undergone a prior tummy tuck and face lift. She wanted to avoid, if possible, a long scar of a Brachioplasty. Treatment parameters were:

Tumescent infiltration: 275 cc

First pass: 1064 nm, 15 watts, 5575 joules

Second pass: 1319 nm, 12 watts, 3119 joules

Aspirate: 215 cc



Left upper arm pre-ProLipo



5 weeks post-ProLipo



Right upper arm pre-ProLipo



5 weeks post-ProLipo

Follow-up photo demonstrates considerably less volume, improved contour, and textural skin retraction.

Case 3

A 27-year-old male expressed a desire for limited downtime for the removal of “love handles”. “Walk in, walk out” is one of the ProLipo *PLUS* key advantages for patients quickly returning to daily activities. Treatment parameters were:

Tumescent infiltration: 500 cc
First pass: 1064 nm, 15 watts, 7053 joules
Second pass: 1319 nm, 15 watts, 4330 joules
Aspirate: 270 cc per side



Pre-ProLipo



4 months post-ProLipo

The patient now benefits from a sculpted and defined torso.

DISCUSSION AND SUMMARY

LAL offers patients an effective option for their small-scale sculpting areas (less than 1 liter). The ProLipo *PLUS* is uniquely designed to offer a robustly powered laser with two or more wavelengths that have been identified and validated as efficient and effective for lipolysis and reducing post-treatment flaccidity and laxity of tissue. Further, appropriate tumescent anesthetic renders the procedure safe and comfortable for the patient and physician. The physician does not have to pay extenuating costs for an OR suite, including personnel and anesthesia fees, or artificial equipment fees such as proprietary fibers and accessories that translate to higher costs to the patient. These benefits allow an impressive solution that is safe, effective, reproducible, and requires little downtime and recovery for an age-old and expanding problem. The ProLipo *PLUS* laser module offers a tangible opportunity for those physicians who embark on meeting the demand for one of today's most popular procedures.

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