



# Analytical Report

## Serenity™ Pro Pneumatic Skin Flattening Device

**CANDELA CORPORATION**

*By Patrick J. Clark, CMLSO, Editorial Advisor*



*Enhancing Patient  
Comfort without  
Compromising Results*

Candela Corporation (Wayland, Massachusetts) has added Serenity Pro™ to their product offering. This second generation solution has been in the works since Candela's acquisition of Inolase in March of 2007.

What is Serenity Pro, is it needed, and does it work? Those are the key questions we will attempt to answer in this Analytical Report.

In a recent survey of physicians considering the purchase of a laser or pulsed light device, there were four prevalent concerns. The first two, cost and

obsolescence, had been discussed. The second two might be a small surprise.

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Clearly no one wants to have complications, especially the



Integrated handpiece.

Handpiece and Pneumatic Adapter Options			
Handpiece Options	Single hand operation	Two hands operation	Adaptable to
Standard Handpiece (SHP)		●	Most laser or IPL systems
Integrated Handpiece (IHP)	●		Select Candela laser models
Laser or IPL Pneumatic Adapters	●		Most laser or IPL systems
		●	Most Q-switched laser systems

physician adding aesthetics into their practice for the first time.

Most experienced practitioners appreciate procedures/treatments that can be well tolerated by their patients. Discomfort associated with treatments has been observed as a barrier to future referrals. Likewise, treated patients may never obtain their desired results due to lack of compliance in

completing their treatment series simply due to pain.

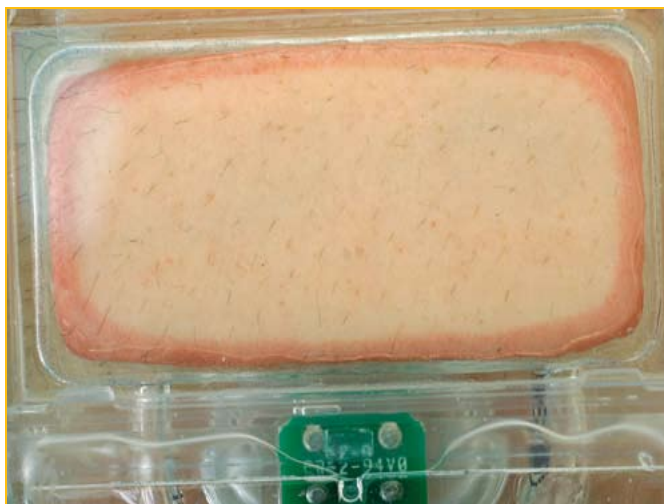
**PNEUMATIC SKIN FLATTENING (PSF)**

Serenity Pro is a unique device that relies on the “Gate Control” theory, a natural way to prevent discomfort during laser/ light treatments. It has been clinically proven to reduce pain perception by up to 80-90%. A

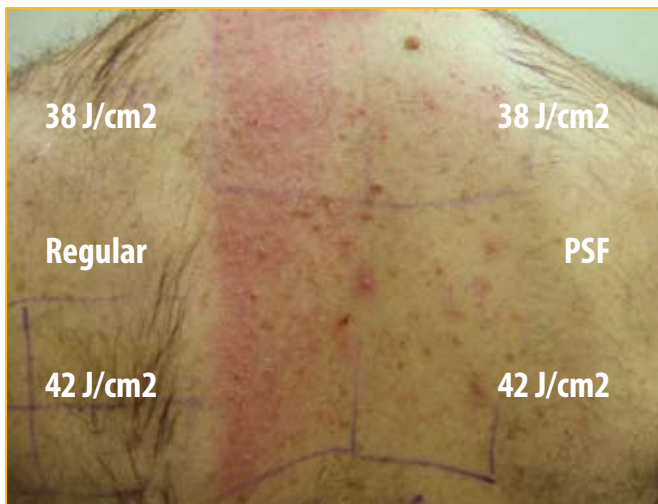
common source of discomfort is the targeting of a second unwanted chromophore, or target, on the way to a selected epidermal or dermal lesion.

There are many clinical papers written about the difficulty of successfully segregating melanin from hemoglobin as one tries to treat skin. The Candela device uses a 26 x 52 millimeter

Specifications	
Standard window sizes	29 x 57 mm and 29 x 29 mm
Laser/IPL wavelengths	400–1800 nm
Operating modes	automatic; hand activated
Cable length	2.2 meters
Console dimensions	43W x 32L x 22H cm (16"W x 12"L x 8"H)
Weight	handpiece: 110 grams (3.8 oz.) console: 9 kg (19 lbs)
Electrical	110/220V; 60/50 Hz, 1 amp



*Pneumatic Skin Flattening renders the skin more transparent.*



*Without PSF (Left). With PSF (Right). 20 min post, Diode Laser (30ms)*

translucent sapphire window, larger than even most pulsed light crystal dimensions, atop a chamber 7 millimeters in depth. Once the periphery of the chamber is in contact with skin, a vacuum is automatically activated and the skin is suctioned against the vacuum chamber.

That slight vacuum, (approximately -400-500 mbar) is reported in clinical articles (Lask<sup>1</sup>, et al) to create some amazing and repeatable changes in the skin.

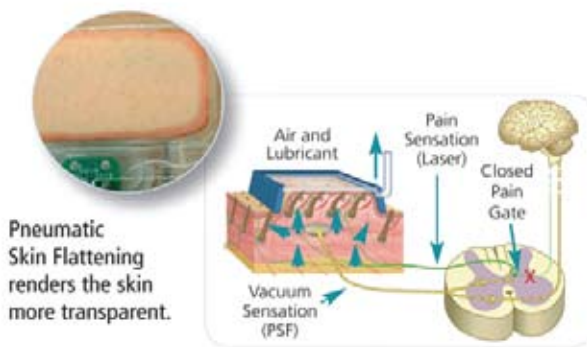
1. Competing Chromophores are expelled away from the target area because the light vacuum is greater than the pressure within the capillaries and smaller vessels.
2. The window does not chill the skin but in the absence of blood in the treatment area, competing chromophores are significantly reduced. As a result skin heating and resulting erythema are avoided.

3. The suctioning of the skin issues a light sensory trigger to the skin's nerve endings allowing for a surge into the neural pathway to the brain that will reduce the sensation of the following light pulse on a selected target within the window.

In treating hair with light, a significant challenge has been transmitting light to the follicle and bulge at a depth of up to 5 millimeters or more. Even the deepest Nd:YAG and pulsed light wavelengths find penetrating 5 to 6 millimeters without significant scatter a true task. The vacuum

### Theory of Operation

Suction, elevation, upward vacuum and flattening of a large area of the skin. Pneumatic Skin Flattening blocks pain transmission through the dorsal horn, the "gate theory".



*The Gate Theory of Operation.*

applied by the Serenity Pro pulls those targets closer, as much as 50%, and dispels blood to the outer edges of the vacuum chamber, allowing for better penetration and less scattering.

This concept has been applied as far back as the original ruby hair reduction lasers, but was accomplished through compression of the handpiece and not through the Serenity's novel application of vacuum. Compression often was uneven when compared across a number of adjacent sites creating a varied change in tissue and varied results.

Not so in the clinical reviews of the Serenity Pro device. In the treatment of superficial pigmented lesions the challenge has been the underlying but adjacent vascular component. The suctioning effect by the Serenity Pro significantly clears this competing target.

### Thermal Stabilization

Clinical research has shown high efficiency of sapphire as both an optical coupler between air and skin, and the unused heat energy from the laser is conducted away from the epidermis by a translucent sapphire window.

Since at least the 1980s, practitioners protected the epidermis from heat damage when using lasers or other optical radiation to treat targets below the skin surface by cooling the epidermis before or during treatment. Cooling lowers the epidermis temperature below

## Clinical Study

A controlled, peer reviewed hair removal study, which compared PSF to non-PSF treatments has been conducted with two lasers, an Alexandrite, Diode and an IPL.

### RESULTS:

- Higher efficacy in many cases was due to a more transparent skin and the elevation of hair follicles closer to the skin's surface.
- Remarkable reduction of pain by pneumatic flattening of the skin even at high energy densities.
- Considerably less post-treatment erythema. Treatment energy could be increased by 30% without erythema.
- Pneumatic flattening of the skin enhances discrimination between unwanted skin pigments and competing chromophores.

normal prior to the laser pulse so that the epidermis does not reach a temperature that would cause damage when heated by the laser. The paper thin epidermis and its interface with the dermis, the E/D junction, are the vicinity of the three most common complications, hyperpigmentation, hypopigmentation, and blistering or Nikolsky effect (in essence a fluidless blister).

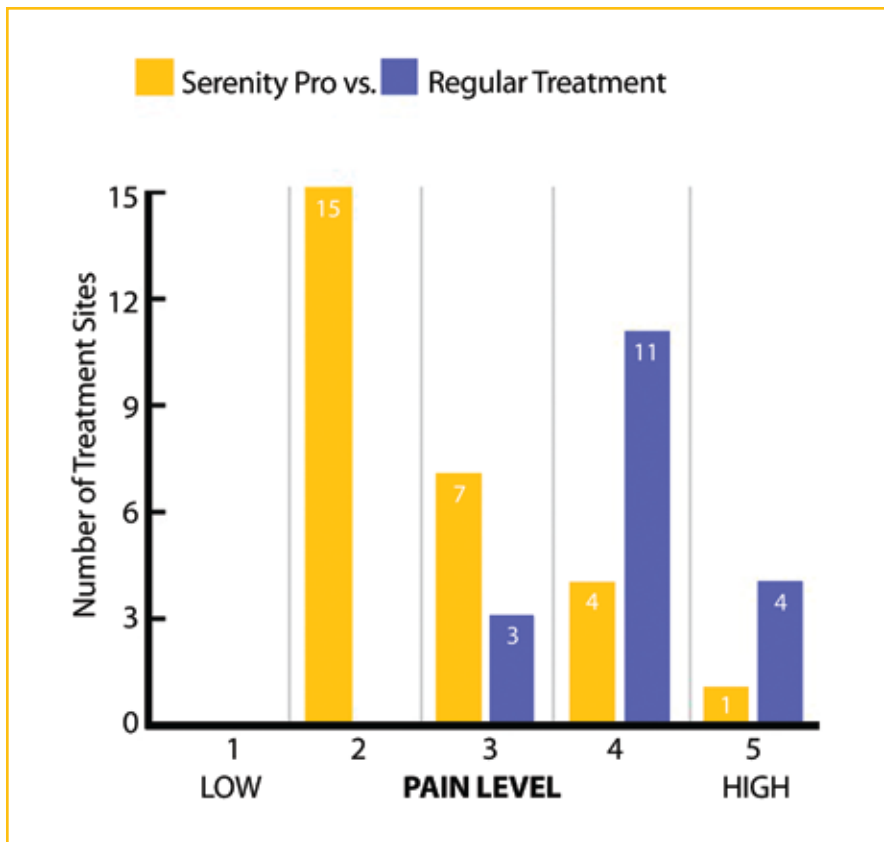
Cooling has been accomplished by pre-cooling through cryogen applied directly to skin or onto a transparent plate in contact with skin, through cold compress

immediately before treatment, cooled rollers, plates chilled with methods other than cryogen, or forced chilled air. Concurrent cooling has been accomplished through transparent plates

*SerenityPro takes on a whole new approach by attempting thermal stability at normal body temperature by expressing away any unused energy sent to or released from the target.*

(cooled or not), and forced air. And, post-pulse cooling has been accomplished with many of the same tools as pre-cooling.

The final analysis is not primarily



the need to cool, but moreover the need to thermally stabilize the non-target for the purposes of both protection and comfort. Serenity takes on a whole new approach by attempting thermal stability at normal body temperature by expressing away any unused energy sent to or released from the target.

The non-target may virtually ignore transient thermal shift.

### CHANGE IN PATIENT TRENDS

Physicians like David E. Auer, M.D.<sup>2</sup> of Houston, Texas, report that the need for topical cooling, before or after light application, is significantly reduced or eliminated with the application of Serenity. The subtle

but thorough stimulation of nerves within the treatment area acts to reduce or eliminate the need of topical anesthesia prior to treatment. We have seen this in a trip to the dentist where he will pinch and shake the cheek prior to and during an oral injection to trick the neural pathways with signals before the pain begins.

Dr. Auer reports that some male patients who previously stopped him and declined continued treatment due to pain now find the same treatment at the same energies to be very tolerable.

### PATIENT SATISFACTION

In fact, Dr. Auer reports that higher, more effective energies can be applied comfortably. The result is both happier patients and the selection of treatment in additional areas, resulting in higher revenues per patient. Also patient referrals from procedures performed with his GentleYAG and Serenity Pro have increased reportedly due in large part to the reduced pain. One of the most interesting aspects of the Serenity Pro is the ability to work across a full spectrum of laser and light devices with apparent ease.

Reports from the short nanosecond pulse of a Q-switched tattoo laser to the long and often repeated millisecond pulses from a pulsed light device show application of equal or increased energies to the patient with reduced trauma and discomfort. The practitioner, to the delight

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of the patient, must learn new, less traumatic endpoints for procedures.

### GENTLEYAG COUPLED WITH THE SERENITY PRO

At application Dr. Auer reports that the results and patient comfort levels from his GentleYAG (1,064 nm) and the accessory device, the


# Serenity<sup>TM</sup> PRO

Powered by PSF<sup>TM</sup>

Serenity Pro are quite a change. The Candela GentleYAG is the laser of choice for a broad base of patients including the darkest skin types according to Dr. Elliot Battle. Spot sizes for hair including a 12mm, 15mm, and 18 mm spot size allow for rapid treatment in even large applications like backs

and chests. The full range of pulse widths allows for successful treatment of fine hair where many other devices fail, according to Dr. Suzanne Kilmer.

Dr. Auer finds that the time in the office is less due to the elimination of topical anesthetics and their activation times. He also finds that the reduction in sensation encourages patients to have treatments performed in additional areas than originally planned. Reports<sup>1,3</sup> show efficacy

is not compromised (reported to be improved), additional energy is not required to compensate for cooling of the device, and pain, measured on a modified McGill Pain Questionnaire, drops as much as 1 to 2 points on a 5 point scale when compared to sites treated with other cooling/protection methods. 

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**Patrick J. Clark, CMLSO** has been active in clinical light applications since 1988. Pat moved from his first

administrative and clinical exposure of laser use and control at the University of North Carolina Memorial Hospitals in Chapel Hill, North Carolina, to being a member of the team to first accomplish and teach routine laser laparoscopic cholecystectomy in several Northeast states. In 1992 he was selected as the founding director of the laser program at the University of Texas Southwestern Medical Center at Dallas and the allied hospitals. In that position he refined a teaching and administrative process that included the control of some 117 laser and light sources in a myriad of applications and a recurring education process for physicians, residents, nurses, and paramedicals. Mr. Clark has given over 400 clinical and lay lectures in the last 20 years.

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