

SHR- New Offer in Photo-Epilation

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Introduction

Photodepilation is the most frequently performed aesthetic medical procedure. Its practice is very common and highly demanded in the United States and Europe. In 2007, more than three and a half million photodepilation were performed in the United States, becoming the second most applied medical procedure after the Botulinus Toxin injections.

Traditional photodepilation, carried out through lasers and intense pulsed light devices, has an undisputed efficacy but it is not exempt from complications such as burns and changes in skin pigmentation. Besides, learning to apply it demands long periods to acquire the necessary experience. Currently, traditional photodepilation has a technological alternative based on a re-interpretation of the concept of *Selective Photothermolysis*.

In fact, the extremely accurate thermal action that takes place on the target and is advocated by selective photothermolysis is offered as a different concept based on progressive heat buildup so as to achieve a low energy depilation, triggered in an almost continuous way through the high repetition frequency pulses suggested by the *Soprano® SHR* laser (Alma Lasers™, Caesarea, Israel).

The “soft” thermal action that produces the effect of hair removal takes place by heat buildup in the dermis, under strict epidermis protection and safety parameters. The original concept of *Progressive Photothermolysis* has been developed by Alma Lasers™ and it is included in the operation of the diode laser *Soprano® SHR* for photo-epilation.

The technological advance offered by this diode laser that delivers 810 nm wavelength pulses is expressed in the **SHR** acronym that stands for **Super Hair Removal**.

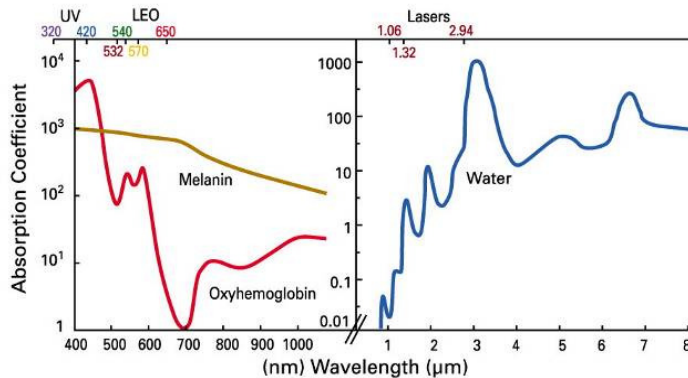
During treatment, the handpiece continuous movement over the depilation area delivers rapid, low-energy pulse sequences that gradually heat melanin as the main chromophore, without producing burns on the epidermis.

During treatment, pulse repetition of the laser system SHR is of 10Hz. Depilation is performed through the continuous movement of the handpiece over the skin surface while delivering laser pulses, which prevents energy from concentrating on a particular point and thus generating burns due to overheating.

When treatment is carried out with a continuous movement of the handpiece at a constant speed, the various skin signs that gradually indicate the end of treatment can be easily controlled. The optimum accumulated energy density usually generates a painful feeling, and together with the perifollicular edema and erythema indicate that the action has been effective in the melanin chromophore particularly in the hair bulb.

The *Soprano*® SHR has a wavelength that precisely fits the optical window for deep light penetration on the skin, that is to say,

the laser beam of 810 nm passes the first cutaneous strata without being absorbed until it causes an effect and destroys the melanin chromophore with heat (Figure 1).



Thanks to the relatively long-duration pulse of the laser SHR and its high repetition frequency, the laser energy penetration is secondarily increased and reaches deeper into the skin through a thermal propagation mechanism.

The spot size also determines the energy density and the fluence per area. Besides, it has a direct impact on the laser light penetration, since the thermal buildup is followed by heat diffusion to the tissue surrounding the hair bulb, once the main target has reached its maximum absorption capacity.

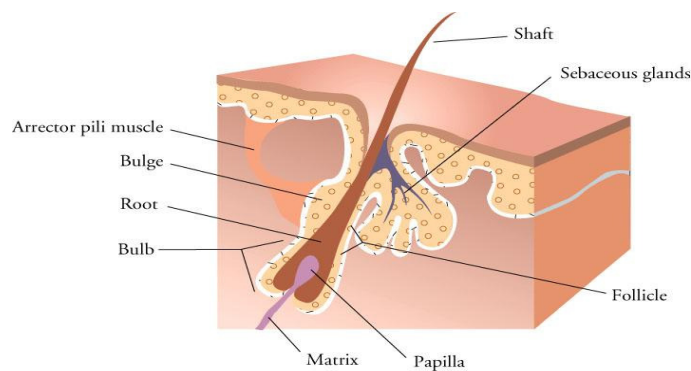
From the beginning of treatment, the low dosage energy of *Soprano*® SHR can gradually build up heat in the target (hair bulb and protuberance) and also slowly in the surrounding dermis, with mild discomfort and virtually no side effects.

As the SHR laser has an 810nm wavelength, depilation treatments can be carried out on dark skin types. From the therapeutic point of view, other wavelengths are, apparently, more effective. For example, wavelengths of 950 and 1200 nm are less absorbed by melanin and more by water, but as water is an important component of the skin it will be absorbed per se before reaching the target and therefore, burns will be more easily produced.

Clinical signs that appear on the skin must be controlled during depilation with the SHR

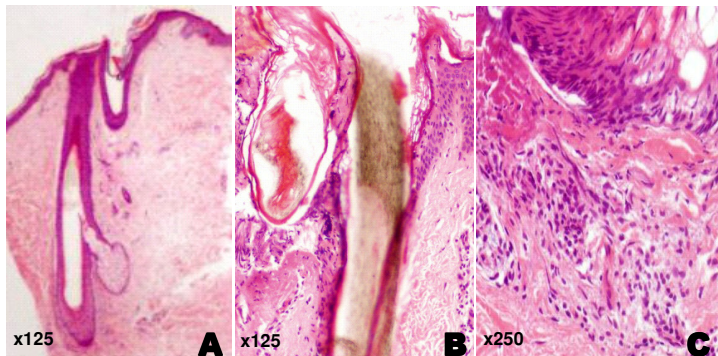
system. Generally, the series of cutaneous signs appear in a sequence, going from: a mild to a moderate erythema, and then an intense one; burnt hair smell; mild discomfort on the part of the patient due to skin heating and, finally, a perifollicular edema is observed.

At the beginning of treatment, the hair follicle is at a thermal balance with the surrounding dermis, but it is more prone to absorb the 810nm wavelength due to the density of its melanin content. Temperature changes at the hair bulb will be faster and its normal temperature will rise more clearly than that of the surrounding tissue (Figure 2).

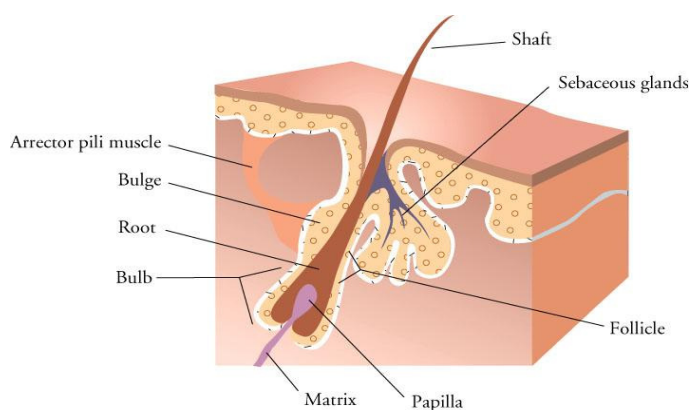


Extended exposure to a temperature of around 45°C generates the destruction of the hair follicle, as we have observed in the histological tests performed on tissue immediately after treatment with the *Soprano*® SHR laser (Figure 3).

HISTOPATHOLOGICAL STUDY OF CHANGES PRODUCED ON THE SKIN AND ON THE HAIR FOLLICLE AFTER APPLICATION OF SHR LASER



The follicle temperature during traditional photodepilation with laser or intense pulsed light (IPL) is risen up to approximately 65°C since a high block of energy is delivered by the pulse. In the traditional photodepilation methods, the low repetition frequency of the pulses and the relative short pulse time increase the possibilities of thermal propagation and thus violently saturate the target. As an immediate consequence of the high energy delivered, the patient feels pain and undesired events such as burns take place, if the skin is not adequately protected with cooling techniques. (Figure 4).



PRACTICAL GUIDE FOR DEPILATION WITH *SOPRANO*® SHR LASER

Clinical Indications

From the first photodepilation session, *Soprano*® SHR laser has a higher efficacy than that of the traditional systems because its effect on thick and dark hair is better tolerated by the patient and it is less risky. Unlike the traditional IPL systems, the gradual energy delivery and the fluences used per pulse function adequately, without threatening thermal propagation towards tissue surrounding the hair follicle and the epidermis. When heat increase is perceived on the skin surface by the nociceptive nervous receptors, the operator moves the handpiece to neighboring tissue and laser energy does not produce burns. Besides, it is indicated both for facial and bodily depilation as well as for all of skin phototypes.

Masculine Photodepilation: It is the chosen system due to its progressive efficacy and safety during energy delivery and, above all, due to the almost complete absence of pain during treatment of any phototype. With traditional systems, pain is often intense during depilation, specially when the hair is thick and dense. Depilation with the *Soprano*® SHR system does not require preparation of the skin nor any anesthetic creams; however, after shaving the area to be treated, it is advisable to use cold air as cryoprotection of the skin and to avoid pain, thus increasing patients' comfort during treatment.

Photodepilation of Phototypes III to V: The *Soprano*® system is very safe for photodepilation of dark skins. Its mode of operation, moving the handpiece, quickly and easily covers large treatment areas.

Photodepilation and Sun Exposure. The *Soprano*® SHR system allows performing photodepilation sessions on suntanned patients, even when they have been exposed to the sun the day before the treatment. The safety offered by the progressive delivery of energy through the laser handpiece passes over the skin enables controlling the signs that appear as a consequence of the thermal buildup, being oriented by the pain and heat the patient experiences and informs the therapist.

Photodepilation in Difficult Cases: The SHR laser is a good alternative for the cases of thin and fair hair, both facial and bodily. In these cases, treatment should be carried out by approaching the iatrogenic threshold of fluences and thermal buildup in the tissue.

With this treatment technique, the patient usually informs pain. Its action is effective and does not present risks if the rhythm of laser shots is coordinated and controlled by the repetition frequency and the movement of the handpiece over the skin. The therapist operates the laser and the patient should pay attention to any feelings of pain. Once the skin and features of the hair in the areas to be treated have been explored, the areas should be marked by shaving them with a razor blade so as to systematize the different passes of the handpiece over the skin.

Subsequently, a cold gel is placed on the skin so as to allow easy movement of the handpiece tip over the skin surface and to better control the frequency of the laser shots.

In the programming of the treatment parameters of the *Soprano*® SHR laser system it should be taken into account that fluences can be selected between 5 and 10 Joules, with the fixed repetition frequency of 10Hz offered by the system. Each pulse duration ranges between 8 and 20 ms. The pulse duration, which is directly related to the programmed energy, automatically adapts to the selected fluence. For example, a fluence of 5 J

corresponds to pulses of 8 ms and a fluence of 10 J corresponds to pulses of 20 ms.

Treatment demands a dynamic technique, where the therapist moves the head, placing it on the skin, sweeping with laser pulses all the selected area. Speed, which should be constant, will depend on clinical signs appearing on the skin and/or pain and burning sensation the patient might experience. Thick hair will be treated with medium or high pulses, selected between 16 and 20 ms, that correspond to fluences of 8 and 10 J respectively. Less laser passes should be performed on this type of hair. On the contrary, thin hair will be treated with short pulses, between 8 and 14 ms, that correspond to 5 and 7 J fluences respectively. In the case of thin hair, more laser passes will be needed to obtain clinical signs that indicate the treatment end point.

The end of the treatment, known as *end point*, is an important guide to avoid complications. The handpiece must be slid over the skin in a constant fashion, controlling the emergence of intense erythema that usually also generates discomfort in the patient as well as the emergence of a perifollicular edema.

It is important to bear in mind when providing explanations to the patients that unlike the traditional photodepilation systems, hair will gradually disappear and not immediately after the laser session. In the next two or three weeks following treatment with *Soprano*® SHR laser, hair will be seen to appear on the skin surface, but it will fall when rubbed.

Treatment intervals between sessions are the same as those for the traditional photodepilation.

It is necessary to respect the follicular growth cycles in order to perform the least possible number of sessions. The anagenic phase of hair growth is the one that will have the best results for the patient. It should be remembered that it is precisely in this phase where concentration of the melanin chromophore is at its peak.

Contraindications and Side Effects of Depilation with the *Soprano*® SHR Laser

In general, the common contraindications of the traditional photodepilation systems should be taken into account. Except for contraindications as regards sun exposure prior to treatment. Thanks to the technology of this laser, it is possible to apply treatment in the abovementioned situation and also to phototypes V and VI.

It should be borne in mind that during pregnancy the level of prolactin increases, the hypophyseal hormone responsible for milk secretions and with melanocyte-stimulant action. This is the reason why all light therapies, included but not limited to photodepilation, are contraindicated. The same happens in cases of hyperprolactinemia, as in the amenorrhea and galactorrhea syndromes.

Patients who suffer from heat urticaria could develop urticarial eruptions during or after a light therapy or when exposed to a heat source. If this happens with photodepilation, the necessary treatment will be with corticoids.

Likewise, intake of photosensitive drugs on the part of the patients is contraindicated for light therapies due to the danger of developing cutaneous dyschromia. A clear example are patients who suffer from acne and take 15-cis retinoic acid. In these cases, to be able to undergo photo-treatments more than 6 months should elapse without taking the abovementioned medication. Besides, autoimmune diseases, such as lupus erythematosus, present cutaneous disorders with photosensitivity, so it is advisable to avoid photodepilation in these cases.

Patients affected by melasma must be treated with extreme caution due to the possibility of reproducing or increasing the pigmentary problem in the facial areas where the treatment is performed. Cicatrization disorders, typical of patients for whom any scar formation process

implies the origin of a hypertrophic or keloid scar, have to be very well assessed and thus avoid producing an epidermolysis as a result of the photodepilation.

It has been noted that decompensated diabetic patients do not cicatrize well. Although we have not noticed any problems in applying treatment to patients who suffer from this disease, it is reasonable to make sure the diabetic patient is stabilized as regards the levels of glycemia before having a photodepilation treatment.

The side effects of the *Soprano*® SHR laser system are the same as those of traditional photodepilation treatments, but with some particular features:

When there are burns, they will be of 1st degree. We have not observed any 2nd degree burns. Therefore, there are no sequelae. To avoid burns, the operator must move the laser handpiece adequately and at a *constant* speed. If at any time the handpiece is stopped and the trigger that controls the laser shots continues to be active, there will be burns; however, the *Soprano*® SHR laser prevents this possibility through a double control mechanism of the shot: to activate the handpiece it is necessary both to press the handpiece trigger and the pedal, otherwise the trigger will not work. This safety double mechanism prevents undesired thermal effects on the skin.

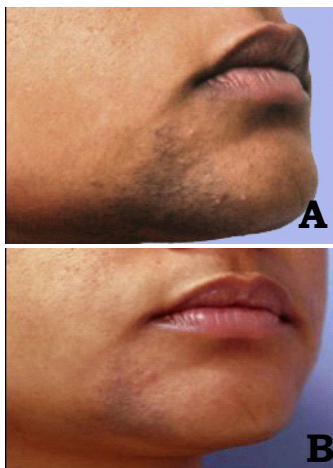
Hyperpigmentations may appear in patients with a predisposition, such as patients with phototypes IV and V, or in patients with post inflammatory hyperpigmentations and/or melasma. Hyperpigmentations produced by light treatments, in phototypes I-III have a spontaneous evolution towards healing. Healing of hyperpigmentations can be activated with depigmenting topical treatments. In case of reactive pigmentations in phototypes IV and V, depigmenting agents together with IPL therapies will be used.

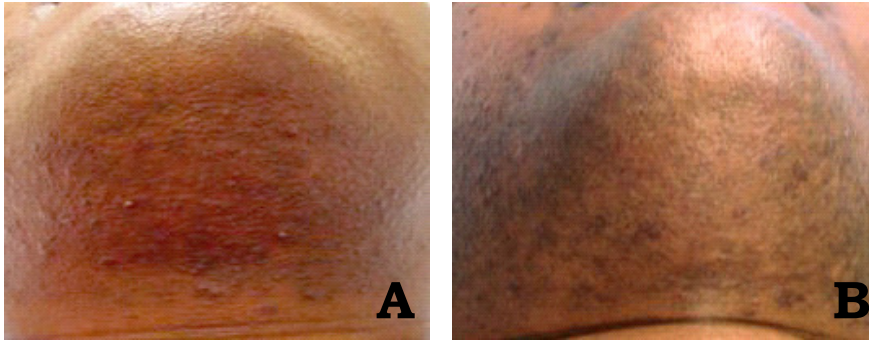
Hypopigmentations may occur in phototypes IV and V. In our case histories of more than 200 long-term controlled patients, after several sessions, we have not observed this

complication. It should be expected that, as in the case of traditional photodepilations where it is not necessary to treat this complication, it will evolve by spontaneously repigmenting after some months. To stimulate recovery of pigment, some narrow-band ultraviolet light sessions could be applied (300-380nm) in various sessions, trying to originate a small erythema. The erythematous dose should be minimal (*Dosis Mínima Eritematosa*, DME), repeated in each treatment so that results are effective and not counterproductive.

Scars are the result of a burn due to a wrongly performed depilation, and do not happen with the *Soprano*® SHR system. In our case histories we have not found any. But on the other hand, folliculitis occur in a 6-7% of photodepilations, especially in the inguinal region and thighs, and above all, in the armpits. These are patients who have a predisposition to repeated folliculitis and they suffer it with any depilatory system, be it light or not. Their *special* skin is recognized since it is usually marked, due to post inflammatory hyperpigmentations that happened in previous folliculitis. Curiously enough, treatment for these patients is often photodepilation itself, since once the hair has been removed, the repeated folliculitis will also be eliminated (See examples of case reports). We propose the use of a chlorhexidine lotion or cream before and after photodepilation, since we have observed that it reduces incidence of folliculitis.

EXAMPLES OF CASE REPORTS





ABSTRACT

Photodepilation with the *Soprano*® SHR laser system is conceptually different from depilation with traditional laser or intense pulsed light (IPL) systems.

With this technology immediate clinical effects are not achieved, which are a consequence of the high energy load of the pulses in the traditional systems that produce an intense burnt hair smell and perifollicular edema that becomes immediately evident. Hair vaporization with the *Soprano*® SHR laser rises the temperature of the hair follicle to a level between 45 and 50°C, which is a minimum temperature and effective enough to ensure an efficacious depilation.

Photodepilation with the *Soprano*® SHR laser system can be carried out in patients with phototypes IV and V, at any time of the year, with almost no possibilities of side effects. It is not necessary to avoid sun light exposure prior to the depilation session.

Compared with traditional systems, photodepilation with this technology is very efficient, especially when treating thick and medium-size hair, but it is less effective for patients with thin and fair hair.


Photodepilation with *Soprano*® SHR is virtually not painful due to the excellent isolation of the thermal effects in the tissue surrounding the follicle. The use of low fluences and relatively long pulses with high repetition frequency, together with a skin surface air-cooling, result in a well-tolerated treatment by patients, particularly those with dark

phototypes. This photodepilation is safe and can be assigned to well-trained health technical staff to carry out the treatments. The selection of parameters must be supervised and instructed by a doctor based on an honest agreement arising from experience.

Photodepilation with the *Soprano*® SHR laser system must be carried out with the same session intervals as the traditional photodepilation. Facial and bodily area treatments must be performed according to the hair growth cycle of each area.

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