

Intense Pulsed Light: review of clinical indications

Luz intensa pulsada: revisão das indicações clínicas

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ABSTRACT

Intense pulsed light is a device that emits high intensity, polychromatic, non-coherent and not collimated light. IPL versatility allows combining parameters to treat a variety of skin vascular and melanocytic lesions, epilation and non ablative photorejuvenation. This article describes classic and innovative indications for intense pulsed light use based on medical literature.

Keywords: intense pulsed light therapy; skin diseases; cosmetic techniques

RESUMO

A luz intensa pulsada é um dispositivo que emite luz de alta intensidade, policromática, não coerente e não colimada. Sua versatilidade permite combinar parâmetros e tratar vários tipos de lesões cutâneas vasculares e melanocíticas, além da realização da epilação e do fotorrejuvenescimento não ablativo. Embasado na literatura médica, o presente artigo descreve indicações clássicas e inovadoras do uso da luz intensa pulsada.

Palavras-chave: terapia de luz pulsada intensa; dermatopatias; técnicas cosméticas

INTRODUCTION

Intense pulsed light (IPL) is a device that emits high-intensity, polychromatic, non-coherent and uncollimated light, whose beams have wavelengths ranging from 400nm to 1,200nm, and pulse duration of 2ms to 200ms. Current IPL devices consist of a chamber containing xenon gas, which is crossed by an electric current that releases pulses of energy in the form of luminous energy via a sapphire or quartz tip.¹ With the assistance of filters – also called cut offs – it is possible to choose the desired wavelength range: only wavelengths above those blocked by the used filter pass through and reach the cutaneous surface.² Wavelengths above 950nm should not be used for they have more affinity with water, entailing they contribute to heat the epidermis, which is not desirable.³ More modern IPL devices emit a square wave with each shot. This wave is fragmented into multiple emission pulses, allowing the energy to be efficiently delivered to the target chromophore, avoiding damage to adjacent structures.¹

The mechanism of action of IPL is based on the capture of energy by certain target tissues – the chromophores – through the principle of selective photothermolysis. The three main human skin chromophores are hemoglobin, melanin, and water;

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each of which has a specific light absorption peak.²

Thus, the versatility of IPL allows the combination of parameters, aiming at treating the several vascular and melanocytic skin lesions, as well as perform epilation and photorejuvenation treatments, with a high skin coverage rate due to the large size of the spot.² This is a useful alternative when patients are not willing to tolerate the adverse effects of other procedures that require longer recovery time. Thus, IPL has an excellent cost / benefit ratio.

METHODOLOGY

The literature search was carried out using the expression *intense pulsed light*, on major databases, including Pubmed, Medline-Cochrane and Lilacs-SciELO. The authors of the present article selected 43 papers based on their titles and abstracts, and only articles relating to human studies were included.

Indications

Vascular lesions

Intense pulsed light based treatment of vascular lesions has the advantage of not causing purpura after the procedure, as compared to pulsed dye laser. This is due to the fact that the laser's very short pulse duration and narrow wavelength range are absorbed by the more superficial portions of the vessels, which rupture and lead to purpura. On the other hand, the spectrum of wavelengths emitted by the IPL allows to heat the vessel completely, and coagulation takes place with less purpura.⁴ Immediately after the application of IPL, a blue-grayish coloration of the vessels is expected in the treated area.³ Intense pulse light heats the vessel's inner side causing their coagulation, with subsequent replacement by fibrous material. In addition, since IPL is polychromatic, it can target the oxyhemoglobin present in lesions red in color, the deoxygenated hemoglobin present in bluish lesions, and the methaemoglobin, which in normal individuals represents 1%-2% of the total hemoglobin. These hemoglobins' peaks are 418nm, 542nm and 577nm, respectively.² Longer wavelengths (515nm to 600nm) allow that deeper vessels be reached.¹

The ideal clinical response is vasoconstriction associated with mild erythema and/or edema. The vessel's rupture is not desired, since this leads to hemosiderin deposition and possible cutaneous hyperpigmentation.

The pulse duration is variable according to the vessel's diameter, and should be shorter than the thermal relaxation time in order to avoid damage to adjacent tissues.²

Rosacea

It is a chronic condition, with periods of exacerbation and remission, being prompted by a great number of triggers. Therapeutic options include topical and systemic treatments, and the use of lasers and other light sources, such as IPL. One of the advantages of IPL is that it allows that the parameters be flexibilized, meaning that it is possible to act in superficial or deep vessels according to the chosen parameters and, in addition, to focus on the caliber of the vessels that will be treated. Another advantage of IPL is its tip's size: for being larger than the laser

devices' tips, it allows the treatment of the area with fewer shots, which results in greater swiftness in the application.⁵

Intense pulsed light is the treatment of choice for the erythematous-telangiectasic stage, for it acts on the vascular hyperreactivity to which rosacea is related. The treatment allows reduction of the blood flow, superficial telangiectasias and erythema intensity. Response to IPL is effective, and because of rosacea's chronicity, maintenance is suggested. The condition's adverse effects profiles, which are usually subtle, also favors IPL based treatment. The combination of IPL with the topical and systemic treatments available is interesting for it allows the synergism of the therapeutic effects, optimizing outcomes.⁵

Telangiectasias

Telangiectasias result from the dilatation of capillary micro vessels, most commonly from post-capillary venules. Intense pulse light, as well as lasers, can be used for the management of this condition. The IPL's mechanism of action in the treatment of telangiectasias is based on the photothermolysis – or thermal damage – the vessels, inducing intravascular coagulation.⁴ Although pulsed dye laser has shown results that are superior to those of IPL, the absence of purpuric lesions after IPL causes many patients to choose this therapeutic modality.⁶

Intense pulsed light is very effective in telangiectasias, which, however, when located in the nasal alae, are more resistant to treatment and usually recurrent.

In general, the reduction in the spot size requires increased energy (higher fluence) and vice versa.

Poikiloderma of Civatte

It is clinically characterized by the triad atrophy, telangiectasias and hyper and hypopigmented reticulated pigmentation. Intense pulsed light is the treatment of choice for it affects both pigment and vessels, and promotes collagen stimulation.

In 2012, a study by Scatone et al. evaluated 14 patients who underwent 3 monthly sessions with IPL.⁷ Two passes were performed in each session: the first with a 570nm filter and the second with a 540nm filter. Clinical results were positive in 13 (92.9%) patients, and the histological analysis demonstrated thickening of the collagen fibers, which were more compact in 12 patients. In addition, basal layer melanin redistribution occurred in 85.7% of the cases, which was consistent with the clinical improvement observed in the pigmentary component. Regarding the vascular component, the histological analysis showed a reduction in vessel diameter in only 35.7% of the cases, however there was superior clinical improvement. The authors' hypothesis for the improvement of the vascular component is that the increase in the amount of the collagen fibers adjacent to the vessels made them less visible.⁷

Stretch marks

Striae occur due to changes in the reticular collagen after rapid cutaneous stretching, caused by physical or hormonal causes. Many treatments can be used, among them the topical methods, such as retinoids that result in the removal of more superficial layers of the skin, in addition to stimulating neocol-

lagogenesis, and the use of lasers and light sources.⁸ Intense pulsed light can act in the initial erythematous–purpuric phase, when there is dilation of dermal capillaries, in addition to thinning and retraction of elastic fibers and collagen. Through dermal heating, IPL stimulates the fibroblasts to produce collagen fibers and reorganize them in the stroma.⁸ In 2013, a study by Al-Dhalimi and Abo Nasyria compared the use of IPL with a 590nm and a 650nm filter. The 590nm filter yielded better results in the treatment of stretch marks, however it also led to a greater number of adverse effects.⁸ Other studies also show that IPL can reduce stretch marks in number and length.⁹

Hypertrophic scars and keloids

They occur in a percentage that varies from 30% to 90% of the patients and can lead to physical, psychological and social damage, with an important impact on the quality of life.¹⁰

The mechanism of action IPL on these conditions is not fully understood, nevertheless it is likely to target vascular proliferation, which is crucial for the excessive proliferation of collagen and its resulting effect on pigmentation.¹¹

The longer wavelengths of the IPL spectrum (close to 1,200nm), have affinity with water, stimulating dermal neocollagenesis. Meanwhile, wavelengths ranging from 400nm to 600nm, heat dermal collagen fibers and promote their contraction, leading to an improvement in the texture of the scars. Finally, the IPL's effect on the inhibition of vasculature yields a reduction in the lesion's thickness and elevation, inhibiting its growth.¹²

Erol et al. prospectively evaluated the safety and efficacy of IPL in hypertrophic scars in 109 patients whose lesions were secondary to trauma, surgery, burn or acne.¹¹ The patients received an average of 8 sessions in intervals ranging from 2 to 4 weeks. The treatment was evaluated using digital photographs, regarding the improvement in the clinical appearance, the decrease in height, erythema and the firmness. The majority of patients (92.5%) had clinical improvement of the parameters evaluated: the outcome was excellent in 31.2% of patients, good in 25.7% and minimum in 9.1%. The study also included a group in which IPL was used to prevent hypertrophic scarring after surgery in 17 patients predisposed to hypertrophic scar formation. The sessions occurred between 3 and 8 weeks after a aesthetic surgery (abdominoplasty and mammary reduction), while the surgical scar was still in the active growth phase. Although 13 patients did not complete the treatment, the improvement was clearly visible at the moment of the measurement, with 65% having experienced good to excellent improvement in the clinical appearance. The study proposes the use of IPL as a preventive treatment in patients with a tendency to hypertrophic and keloid scarring.

In 2014, a study by Meymand evaluated the use of IPL associated with intralesional corticosteroids in the treatment of 86 patients with hypertrophic and keloid scars. Eight sessions were carried out with intervals of 3 weeks. According to the study, the association of treatments accelerated the results without presenting significant adverse effects, with the degree of clinical improvement considered excellent in 73% of the cases.¹³

Intense pulsed light has also been used in combination with “microbotox” and corticoid in hypertrophic and keloid scars – the so called triple therapy.¹⁴ In the “microbotox”, the botulinum toxin injection is very diluted, and is applied intradermally or subdermally. The triple therapy combines IPL (540nm filter) (which reduces erythema and vascularization), intralesional triamcinolone (which flattens the lesion), and “microbotox” (to induce apoptosis, as well as to reduce the binding tension of actin and myosin between the lesion's edges, thus reducing recurrence. Initially, the IPL is applied with a 540nm filter, then the microbotox is injected into the keloid and the perilesional skin, and finally the triamcinolone is injected up until the point at which the keloid whitens. The toxin would have a synergistic effect with triamcinolone, reducing the dose of corticoid and the recurrence of keloid.¹⁵

Angiokeratomas

Angiokeratomas are characterized by violaceous papules, resulting from ectasic and congested vessels in the superficial dermis, with hyperkeratosis of the suprajacent epidermis. Treatment with ablative lasers is described as a therapeutic option, nonetheless the risk of unaesthetic scar should be considered. Intense pulsed light and long pulse Nd:YAG laser are the most indicated systems due to the greater penetration of light into the lesion. The use of IPL presents a variable response, since the keratotic component and the greater depth of the vessels hamper the action of light.

In 2013, Ichikawa et al. reported the use of IPL with 500nm to 635nm filters, which lengths were more closely related to oxyhemoglobin for the treatment of Fordyce angiokeratomas. Four sessions were performed with intervals of two or three weeks between them. There was a partial reduction of the lesions.¹⁶

Hemangioma

Intense pulsed light is considered a safe and effective option for the treatment of hemangiomas. Its tip, which is larger in size than those of the lasers, allows the procedure to be performed in a shorter time and makes it more tolerable, which is extremely important for pediatric patients. In addition, IPL penetrates deeper than pulsed dye laser by changing the filters used.¹⁷

Intense pulsed light is more effective in superficial lesions with thin and medium caliber vessels. Hemangiomas with deep dermal or subcutaneous involvement may show whitening of the superficial portion.¹⁷ Old lesions may present hypertrophy of the structures and formation of nodules on the lesion.

A 2011 study by Caucanas et al. presented a series of 14 cases of infantile hemangiomas treated with IPL filters 550 and 590nm during the proliferative phase. Patients had an average of 4.8 months of age and underwent on average 3 IPL sessions. All patients presented regression of the lesion 1 month after the last session. Only 1 had adverse effects: bleeding, ulceration and crusting after the first 2 sessions.¹⁸

Port wine stain

The port wine stain is a vascular malformation resulting from an increase in the number and diameter of blood vessels, being present since birth. The lesion is initially reddish and flat, however nodosities emerge over the years, due to tissue hypertrophy. Pulsed dye laser is the treatment of choice, nevertheless IPL and Nd:YAG laser are therapeutic options.¹⁷ Intense pulsed light is an alternative when lasers are not available, and when the patient desires to undergo a treatment that does not result in purpura in the post-procedure.¹⁹

Due to the IPL's variety of pulse durations and fluences, it is possible to reach vessels of different depths and diameters. Dermoscopic examination shows a change in the coloration of vessels from reddish to bluish, immediately after the application of IPL.¹²

Grillo et al. evaluated the histological effects of IPL on port wine stain type capillary malformations, concluding that those red in color present the best results with the treatment. The purpuric ones – especially in high phototypes – should undergo intense epidermal cooling during the treatment and present high risk of burns. Those pink in color are the most resistant, meaning that other therapeutic methods should be tried.²⁰

Ochre dermatitis

It involves a pigmentary alteration secondary to venous stasis and an increase in intravascular pressure, in which there is extravasation of erythrocytes and deposition of hemosiderin and melanocytes in the skin. It yields good results to the treatment with IPL, however literature data are scarce. In 2008, Pimentel et al. published a case report using IPL with 570nm filter in a patient with ochre dermatitis. Three monthly sessions were conducted with excellent outcomes. The authors report that lesions initially became darkened, with subsequent whitening.²¹

Pyogenic granuloma

The lesion clinically corresponds to a red-purplish papule with a peripheral desquamation ring. The treatments described include surgical excision, chemical cauterization, cryotherapy, electrocoagulation and laser therapy. The use of IPL in the management of these lesions is described by Paradela et al. in 2007 and later on by Scalvenzi et al. in 2013. Paradela et al. describe the treatment of a pyogenic granuloma that developed with adjacent lesions and was previously removed with CO₂ laser therapy. The treatment was performed with 2 sessions of IPL with 570nm filter, resulting in the total regression of the lesion. On the other hand, Scalvenzi et al. emphasized the benefit of non-surgical therapies for recurrent pyogenic granuloma lesions – in special IPL – since it targets dermal hemoglobin, reducing hypervascularization, but keeping the epidermis untouched.^{22,23}

Melanocytic lesions

Several benign melanocytic lesions can be treated with IPL. The best outcomes are observed in those with more superficial pigment.²⁴

The treatment of hyperchromic lesions is effected via the rapid differentiation of keratinocytes, induced by the IPL's

photothermal phenomenon, which promotes the removal of melanosomes with necrotic keratinocytes through the cutaneous surface, when it is possible to see micro crusts eliminated on the days following the treatment.^{1,2} In general 3 to 6 sessions, with intervals of 3 to 4 weeks, are necessary. The expected immediate result of IPL application is the darkening of the treated melanosomes, with formation of crusts within 24 to 48 hours, which will be eliminated during the first 7 subsequent days.² Melanocytic lesions in extrafacial areas treated with IPL may become topped by micro crusts during a period ranging from 15 to 20 days.

Solar Melanoses

Intense pulsed light has the advantage of allowing localized treatment, reducing the risk of complications in the extrafacial areas, especially in the dorsum of the hands. The lesions with the best therapeutic response are those with greater amount of melanin pigment and more intense color. In 2015, Tanaka et al. evaluated the use of 500nm and 635nm IPL in the treatment of face, neck and hand melanoses of 40 Japanese patients (phototypes III and V), with a single IPL session using a well located tip. Satisfaction with the outcomes was observed in 90% of the patients. Clinical analysis with photographs revealed improvement of lesions in all treated patients.²⁵

Ephelides

Intense pulsed light is indicated, however most patients tend to experience recurrence of the lesions.²⁴ Filters between 500nm and 600nm are the most indicated.¹⁷ Photoprotection is extremely important for the maintenance of the results obtained with IPL.

Café-au-lait spots

Café-au-lait spots are well-delimited hyperpigmented lesions of epidermal origin that can measure from 1cm to 30cm in diameter and are often located in the trunk. Intense pulsed light is an alternative that requires many sessions, and whitening may be only partial. The best choice is Q-switched lasers, however responses are varied, and there may be recurrence in half of the cases.

Nevus of Ota

Q-switched lasers are the most indicated.¹⁷ Due to the fact that melanin pigment is located in the dermis, deeper wavelengths that reach deep planes without epidermal damage are necessary. Intense pulsed light has a variable response, with incomplete whitening and recurrence being common. Residual hypochromia may occur in response to treatment with IPL, and represents a negative outcome.

Infraorbital hyperpigmentation (dark circles)

Intense pulsed light may be beneficial in dark circles with exogenous or melanin pigmentary component – hyperpigmentation induced by penicillamine and bimatoprost – and also with vascular component. Outcomes are considerably variable, and patients with predominance of the vascular component respond

better. Dark circles of hereditary origin present a partial or very mild response to IPL. Higher phototypes require the use of longer wavelength filters, lower fluences, and longer pulse durations, for epidermal protection. In addition, the use of smaller tips facilitates application in this region, also reaching greater depths. Patients need an average of 3 sessions to achieve results. Erythema occurs after the procedure and lasts from some hours to 3 days. In addition, crust formation may occur in hyperchromic areas. A 10% overlap between passes is recommended aimed at avoiding untreated areas.²⁶

Post-inflammatory hyperpigmentation (PIH)

Intense pulsed light is most indicated in epidermal PIH. In patients with high phototypes it is necessary to avoid burns and secondary hypochromia. In dermal PIH, treatments are limited and Q-switched lasers are the best option.

Melasma

The treatment of melasma with IPL is controversial, with variable outcomes and risk of exacerbation after application. Skin preparation with whitening agents and performing IPL with long pulse duration and low energy are necessary to reduce this risk.

Becker's nevus

Intense pulse light can be used initially to remove hairs and subsequently to treat the pigment component.¹²

Seborrheic keratosis

It can be treated with IPL, which acts on the melanin component. Dermoscopic evaluation immediately after IPL changes in the lesion's color from brown to gray.¹²

Epilation

Intense pulse light is aimed at reaching and thermally destructing the melanin present in the hairs' roots, which are located in the deep dermis. In addition, epidermal melanin should be spared to avoid damage to the skin's surface.¹ In order for this to occur, pulse duration should be longer than the epidermis' thermal relaxation time (3ms to 10ms) and approximately similar to that of the hair follicle (30ms to 100ms). Hairs in the anagen phase are the most responsive to IPL-based epilation, as it is at this stage that they contain the greatest amount of melanin.² Thus, darker and larger diameter hairs – rather than fair and thin hairs – tend to absorb more energy and respond better to IPL-based photoepilation.² The permanent removal of the hair occurs when the capillary bulb cells and those located close to the hair erecting muscle's insertion are destroyed.¹ The ideal wavelength to selectively act on the follicles' dense melanin deposits without causing epidermal damage ranges from 590nm to 900nm.¹

It should not be performed on phototypes higher than III or in tanned patients due to the risk of epidermal damage.²⁷ It is important that an adequate level of energy be used in order to prevent complications such as hyper or hypopigmentation

and paradoxical hypertrichosis.^{2,3} The risk of paradoxical hypertrichosis should be quoted in the Term of Consent. It occurs by activation of inactive follicles in areas located near to the treated area due to the use of subtherapeutic doses.³

Non-ablative photorejuvenation

Intense pulsed light has proven effective in photorejuvenation, acting not only on the vascular and pigmentary components, but also influencing neocollagenesis, improving the cutaneous texture.^{28,29} The principle of the use of IPL for this purpose is based on the theory that heating dermal collagen fibers with high intensity energy would cause their contraction, reducing skin looseness. In addition, heat stimulates fibroblasts that synthesize extracellular matrix proteins.¹ The final pathway of this stimulus is the production of collagen type I and type III, and elastin.²

Intense pulse light can be used for rejuvenation in extra facial areas, such as the hands. A study by Cignachi et al. compared the use of 2,940nm fractional laser with isolated non-ablative 1,340nm laser or associated with IPL with 540nm filter. The study observed that the group treated with the combination of the 1,340nm tip and IPL achieved the best results in terms of overall rejuvenation.³⁰ Another study compared the use of isolated long pulse 1,064nm Nd:YAG with the same laser associated with IPL with 580nm filter (also for rejuvenating the dorsum of the hands) concluding that the combination treatment is more effective.³¹

Longer IPL wavelengths – above 515nm – have more affinity with water and for this reason can activate the dermis more effectively for the stimulation of collagen. On the other hand, shorter wavelengths have a greater affinity for melanin and hemoglobin, which allows improving the dyschromias and telangiectasias resulting from the aging process. Thus, it can be seen that IPL can act on the various elements of aging with minimal adverse effects.¹

In IPL-based extrafacial rejuvenation, some of the recommendations aimed at achieving positive results and avoiding complications are: to consider risks, weigh parameters, opt for a less aggressive treatment and a greater number of sessions. The fluence in extrafacial treatments should be 10% lower than that used in the face.

With IPL, therefore, it is possible to treat all the visible elements of aging (fine wrinkles, sagging, telangiectasia, irregular pigmentation) with a low rate of adverse effects and rapid recovery.

Other Uses

Acne

Two mechanisms of action of IPL promote improvement of active acne: the first is the photodynamic effect caused by the visible light's and UV's spectrum, which are absorbed by the porphyrins produced by the *Propionibacterium acnes*, culminating with the formation of oxygen free radicals responsible for the bactericidal effect. The second mechanism is based on the selective photothermolysis of blood vessels that nourish the sebaceous gland: by reducing the blood flow, the gland's rate of

secretion decreases.^{3,32}

Although it is not the first line treatment of mild to moderate inflammatory acne, IPL is an option in patients who present contraindications to the available treatments and can be associated with topical treatments.¹

A 2014 study by El-Latif et al. compared the treatment of 50 patients bearing mild to moderate inflammatory acne using 5% benzoyl peroxide at night daily versus the application of 530nm IPL in weekly sessions for five weeks. At the end of the study, both groups achieved similar results, with a reduction of inflammatory lesions of 61.56% in the IPL group and of 69.4% in the benzoyl peroxide group (the difference was not statistically significant).³²

Intense pulsed light has also been cited as an option in the treatment of acne scars, especially if erythematous and hypertrophic, with an effect similar to that of pulsed dye laser, with the advantage of the absence of purpura and a larger treated area. Notwithstanding, it is considered more painful.³³

Photodynamic Therapy

Intense pulsed light can be used associated with 5- δ -aminolevulinic acid (ALA) for the treatment of photoaging associated with non-hyperkeratotic actinic keratoses and acne. There is an improvement in fine wrinkles, texture, telangiectasias and solar melanoses, possibly due to the photosensitizer's strengthening effect on the IPL's photothermolysis capacity. Its use has also been described by Kalil et al. in the treatment of recalcitrant periungual viral warts. The 560nm filter was used, and IPL was proven to destroy the proliferative vascular component, while the photosensitizing active principle allows it to reach deeper planes, leading to more effectiveness in the treatment.³⁴ Intense pulsed light is adequate for the activation of ALA, since the highest absorption peaks include 410nm, 504nm, 538nm, 576nm and 630nm, all within the IPL's spectrum.³

Drug delivery

In IPL, the transdermal delivery of drugs occurs through the photothermal effect, which increases the permeability of the stratum corneum without affecting the viability of the skin. Intense pulsed light facilitates the permeation of macromolecules and formulations, such as nanoencapsulated and liposomes, with modified permeation systems. Based on the type of damage caused – in special photothermal damage – there is a decrease in the skin's barrier function, leading to increased penetration of the active principles for a short period of time (15 to 30 minutes).³⁵ Vehicles used to optimize drug delivery must be fluid, not contain propylene glycol, and contain chemical permeators.³⁵

Sarcoidosis

Although there is absence of randomized clinical trials on IPL and sarcoidosis in the literature, many published articles report lasers and other light systems, including IPL, as therapeutic alternatives in cases resistant to other treatments. The mechanism of action is probably based on the destruction of the lesions' nourishing vessels, which deliver the proinflammatory

cytokines to the skin. This anti-inflammatory and anti-proliferative action ends up destroying the granuloma in formation.¹ In 2012, Rodende et al. describes the treatment of lupus pernio – the most common form of presentation of cutaneous sarcoidosis – with IPL associated with 1,064nm Nd:YAG laser with an excellent response.³⁶

Onychomycosis

Although not considered the first choice, the use of lasers and other light sources for the treatment of onychomycosis has been shown to be effective for this purpose. A 2015 study by Vieira Machado Vila et al. evaluated the fungicidal effect of 1,064nm Nd:YAG laser and 420nm IPL for *Candida* and *Fusarium*, demonstrating a reduction in fungal cell viability with the two proposed treatments.³⁷

Pilonidal cyst

It is a foreign body reaction with chronic inflammation, which occurs most commonly in the sacrococcygeal region.

It is believed that hair fragments in the cyst area create a granulomatous foreign body reaction. Surgical intervention remains the treatment of choice, however this is an invasive method with a risk of recurrence ranging from 30% to 40%.³⁸ The use of IPL in recurrences or in patients already operated to prevent recurrences has been receiving attention.³⁸ The mechanism of action of IPL consists of reducing hairs in the area adjacent to the cyst in order to prevent recurrences. Shafiqh et al. treated 30 patients with 6 sessions of 590nm IPL in intervals of 4 to 6 weeks, up until the removal of the hairs. These patients were reassessed 2.5 years after, with recurrence rates of 13.3%.³⁸

In addition, the IPL's anti-inflammatory mechanism also acts to prevent recurrences.¹²

Hidradenitis suppurativa

Suppurative hidradenitis has an etiopathogenesis similar to that of active acne, which is why IPL is effective in treating this dermatosis. It is speculated that the mechanism of action is linked to the antibacterial and anti-inflammatory effects, and selective vascular photothermolysis, in addition to the destruction of the follicle with resulting epilation.^{39,40} Intense pulsed light can be used in isolation or associated with photodynamic therapy.

Other uses already described include: pigmented actinic lichen planus, recalcitrant warts, atopic dermatitis, and plaque and unguinal psoriasis.⁴¹

Final considerations

Patient selection is critical to successful treatment. Patients who are tanned, have high phototypes and are not willing to avoid exposure to the sunlight are not good candidates for treatment with IPL.^{1,20} Patients should be advised to avoid exposure to the sun for up to 8 weeks in the treated area.³

Criteria that contraindicate undergoing IPL are: pregnancy, use of systemic retinoids and drugs photosensibilizantes.³ Patients with herpes simplex history in the region to be treated should receive prophylaxis antiviral.³

The cooling of the epidermis is extremely important as it increases the effectiveness of the treatment, and reduces complications and discomfort during the procedure. Topical anesthetics can be used.³ Proper eye protection is of utmost importance for the iris has a high concentration of melanin, which absorbs the IPL's energy, possibly resulting in iritis with permanent eye damage. External or intraocular eye shields can be used.³ Any pigments and/or makeup present on the skin surface must be carefully removed in order to prevent burns.

The correct coupling of the spot across the entire cutaneous surface is also important to prevent burns. The application should be performed carefully, with minimum overlapping of the spot, aimed at preventing that any area is left untreated.

It is crucial to observe the immediate or short-term tissue reactions to the application, which are a reliable and safe guide to the appropriate treatment. This is much more important than following guidelines or "recipes", and crucial for the setting of parameters, for both increasing the effectiveness of the treatment and avoiding side effects.^{42,43}

It is important to bear in mind that extrafacial areas have few pilosebaceous follicles as compared to the face; therefore healing in the first is not as fast as it is in the latter. This factor should be remembered when the parameters are being set.⁶

The patients must sign a Term of Informed Consent contemplating possible adverse effects, including hypo- or hyperpigmentation, atrophy, blisters, hypertrophic scars and keloids. They should also be properly photographed.^{3,27}

CONCLUSION

Intense pulsed light is already part of the therapeutic armamentarium of dermatologist physicians for a variety of lesions, due to its ability to act in different chromophores. Its versatility and cost effectiveness are attractive both from the patient's the dermatologist physician's points of view. The combination of technologies using IPL, lasers and chemical peels can and should be kept in mind, according to the therapeutic objective. The combination of techniques results in greater convenience, with fewer sessions required.

Dermatologist physicians should deepen their expertise in IPL for optimizing the their application techniques. ●

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