

Intense pulsed light: Where we are now?

Patrick Bitter Jr, MD, FAAD 

Advanced Aesthetic Dermatology, Los Gatos,
California, USA

Correspondence

Patrick Bitter Jr, MD, FAAD, Advanced
Aesthetic Dermatology, 16400 Lark Avenue,
Suite 300, Los Gatos, California, USA 95032.
Email: bitterjrmd@aol.com

Abstract

From the introduction of pulsed light broad-spectrum energy in 1995, intense pulsed light (IPL) has evolved to become an extremely popular and well-accepted technology for rejuvenation of photodamaged skin in dermatology and plastic surgery practices as well as medical spas. This paper details where IPL is now, 25 years later, and discusses the wide variety of valuable uses for IPL in medical practices as well as the reasons for IPL's growth in popularity and usefulness.

KEYWORDS

acne, anti-aging, BBL, BBL HERO, Broad Band Light, High Energy Rapid Output, intense pulsed light, IPL, melasma, photodamage, rosacea, skin rejuvenation

1 | INTRODUCTION

Intense pulsed light, or IPL as it has been popularly referred to, was originally introduced and approved by the FDA for use for the treatment of spider telangiectasias of the legs.¹

In 1996, there was only one IPL device available (Photoderm) from the Israeli medical device company ESC and maybe some 100 IPL users worldwide. Over the next two years, IPL began to show promise in the treatment of telangiectasias^{2,3} and benign pigmented lesions of the face⁴ and for hair removal^{5,6} in lighter skin types. The early widespread adoption of IPL as a useful therapeutic option for vascular and pigmented lesions was slowed and limited because of the lack of consensus on ideal treatment parameters and the wide array of parameter choices and the potential for superficial burns, especially in skin of color.⁷

In 1998, the use of IPL for skin rejuvenation was first described.⁸ With the introduction of IPL for skin rejuvenation using specific techniques and parameters that were readily mastered with proper training, the use and popularity of IPL grew dramatically.

2 | GROWTH IN POPULARITY OF IPL

Today in the United States, it is estimated that some 10,000–20,000 IPL treatments are performed each day, making IPL one of the most commonly performed aesthetic procedures and one of the most popular of all energy-based devices. IPL users now have available more than 30 IPL devices from a large number of laser manufacturers to choose from.

Several new technology innovations that were introduced in 2007 with Sciton's IPL device, the Broad Band Light (BBL) have been one of the reasons for the widespread growth in the popularity of IPL. BBL features a large spot size, clip-on variable-sized spot adapters, seven cut-off filters, and a continuous pulsing mode. These innovations in technology have allowed the development of new, carefully designed protocols and techniques that have enhanced the results and safety of former IPL treatments. In 2020, Sciton introduced the latest advancement in BBL technology with the High Energy Rapid Output (HERO) BBL. The new design innovations in BBL HERO have allowed the development of new protocols and techniques that have not been possible or practical with other IPL devices.

3 | PRIMARY REASONS FOR GROWTH IN POPULARITY OF IPL

The three key factors in the growth of popularity of IPL are (1) evolution in treatment techniques; (2) ready availability of proper training in IPL protocols, parameters, and techniques; and (3) evolution in IPL technology.

3.1 | Evolution in IPL treatment techniques

Early IPL techniques typically used single pulses of light targeting only affected areas, such as pigmented lesions or visible vessels.

This single-pass, spot treatment technique for IPL frequently resulted in the common IPL complication of "striping." The uneven result of hypo- or hyperpigmented squares and rectangles garnered a number of critics of IPL in the early years. The early criticism of the value of IPL has now been largely dispelled with the evolution in techniques and widespread training opportunities.

3.1.1 | The four key innovations in IPL treatment technique

Along with defining better parameters for different skin types, there are four innovations in IPL treatment techniques that have been key to advancing the overall usefulness and widespread adaptation of IPL.

Moving from spot treatments to global treatments

Rather than targeting just the visible pigmented and vascular lesions, as was the standard method of doing IPL treatments 20 years ago, treating the entire cosmetic area such as the entire face has transformed the way IPL treatments are now done. Treating the entire face or chest or dorsum of the hand produces a much more patient-pleasing result with overall clearer and smoother skin. In addition to obtaining a result that is more pleasing to the patient, the result is now apparent to other people. What other people notice is not the absence of spots or reduced vessels or erythema, but overall better-looking skin. It is this smoother, clearer appearing skin that has helped propel the increase in people seeking IPL treatments. Smoother, clearer skin after IPL treatments is one of the main reasons people choose to add other areas to be treated.

Moving from a single-pass technique to a multiple pass technique

The simple change from performing a single pass as was the standard method of performing IPL treatments for skin rejuvenation to two or more passes at each treatment session had the profound effect of making IPL treatments more effective, safer, and more comfortable while virtually eliminating the common undesirable side effect of striping. The basis for a more effective result is that performing two or more passes over a treatment area enhances the clearing of pigmented lesions, particularly lighter pigmented spots, while creating a greater textural improvement in fine lines and pores. The reason the multiple pass technique is safer is that gentler, more conservative parameters are used than with the single-pass technique. To obtain a visible result with the single-pass IPL technique, more aggressive parameters with higher fluences are required. It is precisely this technique of a single-pass with higher fluences and more aggressive parameters that have been largely responsible for the common and undesirable side effects of superficial burns and striping. To avoid these complications, IPL practitioners have resorted to less aggressive parameters using lower fluences. However, milder, less aggressive parameters with a single-pass technique frequently resulted in the most common IPL complication, which is a lack of result.

Both superficial burns, striping, and lack of result are largely eliminated by the multiple pass technique.

Using a two-step technique versus a single-step technique

The traditional one-pass technique for IPL would use one parameter to treat the entire area, such as the face. It is well appreciated now that different targets, such as pigmented lesions and vessels, respond to different parameters. The two-step technique utilizes the first step of two or more passes over the entire area with a gentle parameter and then a second step where pigmented lesions and vessels are selectively targeted with a more aggressive parameter and a spot size appropriate for the size of the lesion being treated. The two-step technique increases efficacy while keeping the IPL treatment safer and more comfortable. While a multiple pass technique is possible with most available IPL devices, not all IPL devices are readily amenable to being able to do a two-step technique.

Performing a series of treatments

It is now well appreciated with IPL that the more treatment sessions a patient receives, the better the final results. This is especially true for the erythema and flushing of rosacea, for improvement in fine lines and wrinkles, and for improvement in skin laxity. The more treatments that are done, the greater the improvement in erythema and flushing and the greater textural improvement in fine lines and skin laxity. It is recommended to perform a series of at least three to five treatments with each treatment at 3–4-week intervals. By educating our patients that the best results with IPL are obtained by doing a series of at least three or more treatments, we set more reasonable expectations for our patients and avoid being put into the difficult position of trying to deliver results that try to meet the patient's expectations in one treatment.

3.2 | The second key factor in the growth in IPL popularity is the ready availability of proper training in IPL protocols, parameters, and techniques

Proper training is essential to every aspect of aesthetic medicine. Whereas the early days of IPL saw a very small number of luminaries all doing and teaching different parameters and techniques, the present-day learning opportunities now available teach new IPL practitioners a standard, methodical approach to IPL treatments with well-defined parameters that produce consistent, predictable results with minimal complications further increasing the rise in popularity of IPL. Practitioners who delegate IPL treatments to staff members should expect and ensure that their staff have the most up-to-date training in IPL indications, proper patient selection, proper parameter selection, protocols, and treatment technique, and have knowledge in how to manage potential complications that may arise from treatment.

3.3 | The third key factor in the growth in IPL popularity is the evolution of IPL technology

Several new technology innovations that were introduced in 2007 by Sciton's IPL device, the BBL, have been one of the reasons for the widespread popularity of IPL. BBL technology features four design innovations over that have helped lead the industry growth in IPL. There are four key innovations in IPL technology that have had the most significant impact on the present-day usefulness and popularity of IPL.

4 | FOUR KEY TECHNOLOGY INNOVATIONS INTRODUCED WITH BBL

4.1 | Large spot size and more rapid pulsing (1 Hz and up to 4 Hz with BBL HERO)

The large 45 mm by 15 mm crystal treatment size and pulsing at one pulse per second (1 Hz) have changed how IPL treatments are now performed. These technology innovations have made practical the development of the multiple pass two-step technique as described earlier. The introduction of BBL HERO in 2020 using pulse frequencies of up to 4 Hz has made possible and practical for the first time much more rapid treatment of large areas of skin anywhere on the body with the multiple pass technique. In addition, BBL HERO has been adapted for use on the face. The rapid pulse rates of 4 Hz coupled with higher peak powers at lower fluence allow for an evolution in IPL skin rejuvenation technique, where many more passes can be performed at one treatment session. It is now apparent that doing 8–10 passes over the cheek produces a degree of textural improvement of pores and fine lines beyond what has ever been seen or expected with other IPL technologies. Eight passes can be done at the same time as two passes when pulsing at the maximal pulse rate of 4 Hz (four pulses per second). Early treatments with BBL HERO on the face results have shown higher patient satisfaction because of faster results, greater improvement in fine lines and skin laxity, and more comfortable treatments compared with traditional IPL treatments.

4.2 | Expanded range of cut-off filters that are readily interchangeable

BBL has seven separate cut-off filters that include the 420-nm narrow-band blue light filter, 515-, 560-, 590-, 640-, 690-, and 800-nm cut-off filters. By making these seven filters available on one system, it is now possible to treat all skin types and patients of all color with IPL. By making the cut-off filters readily interchangeable, it is more practical to change the color spectrum of the light during the treatment by simply removing the filter from the handpiece and placing one of the other seven filters back into the handpiece without needing to remove the entire handpiece.

4.3 | Variable-sized spot adapters that fit over the large crystal allowing easy targeting of lesions with higher settings while keeping the patient comfortable and the treatment safe

The use of variable-sized spot adapters that fit directly over the 45 mm × 15 mm large crystal has made the targeting of specific pigmented and vascular lesions very easy for the practitioner. BBL technology allows a choice of easily applied spot adapters ranging from 15 mm, square and 11 mm, 7 and 3 mm circular adapters. The use of spot adapters has helped evolve IPL treatments to a two-step technique, where persistent or more discrete vascular and pigmented lesions can be readily targeted using more aggressive parameters after the initial passes have been completed.

Targeting the individual lesions with smaller spot sizes prevents the surrounding skin from being treated with higher, more aggressive settings and makes the treatment more comfortable for the patient. Being able to target spots such as vessels with more aggressive parameters using small spot adapters after the full field has been treated increases the clearance of pigmented and vascular lesions that would otherwise not clear with the milder settings used to treat the entire face. Using smaller spot adapters to target individual spots is much more comfortable for patients than using the large spot and an aggressive setting.

4.4 | Continuous pulsing mode (SkinTyte)

A unique feature of the BBL system is a continuous pulsing mode of light that is referred to as SkinTyte mode. This mode delivers a large amount of light in the red and infrared spectrum producing skin and subcutaneous heating. One effect of this continuous pulsing mode is to produce some degree of skin tightening. It is worth taking time to discuss the unique and intriguing effects of continuous pulsing BBL. BBL in the continuous pulsing mode of SkinTyte is most commonly used to achieve some degree of temporary improvement in laxity of facial, neck, and nonfacial skin. The objective of treatment for skin tightening with BBL SkinTyte is to achieve skin and subcutaneous tissue temperatures of 40–42°C and to maintain this temperature for a period of 2–4 min. More recently, BBL SkinTyte has been used for body contouring, localized reduction of fat, enhancing circulation, reduction of hyaluronic acid filler on the face, the treatment of soft tissue pain, and to enlarge the penis. Most of these other uses remain anecdotal. BBL SkinTyte with the 800 nm cut-off filter can be used to treat skin types 5 and 6.

5 | MOST RECENT ADVANCES IN IPL: BBL HERO

The newest IPL device to become available in 2020 is the BBL HERO device from Sciton. BBL HERO features several new technology innovations that are revolutionizing how we think of and use IPL today.

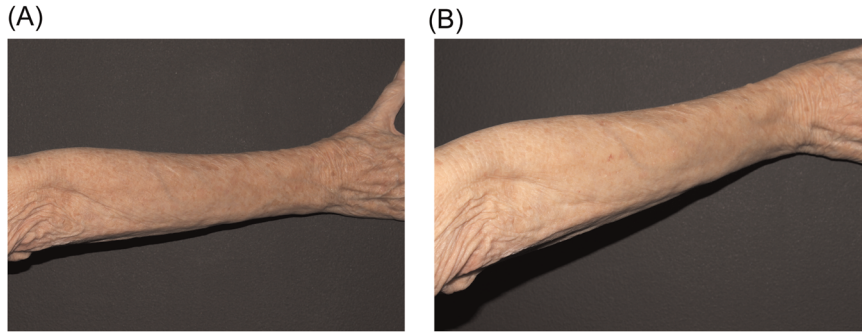


FIGURE 1 Seventy four years old female before and after one BBL HERO treatment. Total of 600 pulses

Key to BBL Hero is a four times faster pulse rate (4 Hz), three times greater peak power, and enhanced cooling. These innovations have proven to be advantageous in the development of new protocols and techniques for treating the face and body. Compared with traditional IPL treatments, many more pulses are used to treat the face and other areas such as the neck, chest, arms, and hands (Figure 1). Even though more pulses are used, treatment times are similar or greatly reduced for large body areas with BBL HERO compared with traditional IPL treatments. With the advent of four times faster pulse rates, a new technique of continual motion over the treatment area has been developed. A continual motion technique is easier to perform and more comfortable for patients than the traditional “stamping” technique with IPL. Additionally, an extra step using a milder setting and hundreds of additional pulses has been added to treatments that were never possible before with other IPL devices. This extra step adds additional heating to the skin with greater tightening and wrinkle reduction than previously seen with IPL. A final advantage of BBL HERO is that the treatment techniques and protocols are more easily learned and mastered than with traditional IPL techniques and protocols.

6 | PRIMARY ROLE OF IPL IN MEDICINE AND AESTHETICS: WHERE WE ARE TODAY?

Twenty-five years ago, we could have hardly imagined where we are today with IPL. IPL has evolved from a spot treatment for spider veins to having four distinct and very important roles in medicine and aesthetics.

IPL today has four very important roles in aesthetics: (1) skin correction; (2) as an adjunctive treatment for other treatments; (3) as a treatment strategy to maintain healthy skin; and (4) as a treatment strategy to delay skin aging.

7 | WHAT IPL DOES VERY WELL

7.1 | IPL skin correction

The purpose of IPL skin correction is to improve the appearance of aged and damaged skin. The biggest breakthroughs and advantages

of the most recent advances in IPL technology such as Sciton's BBL HERO are noninvasive, rapid skin rejuvenation of sun-damaged skin on the face and anywhere on the body. There have been practical limitations like lengthy treatment times to rejuvenating large areas of skin, such as over the arms, legs, and torso, with IPL. With the advent of BBL HERO technology, these disadvantages have been mostly eliminated. It is now practical to treat the face, neck, chest, and full arms of a patient in a single treatment session comfortably with a predictable result in a reasonable amount of time and with no downtime.

7.2 | Conditions best treated by IPL

The following conditions are those in which IPL treatments are very effective and in some cases are the preferred or most effective treatment:

- Photodamage of the face
- Photodamage of non-facial skin
- Benign pigmentation
- Post-inflammatory hyperpigmentation
- Facial erythema
- Non-facial erythema of neck and chest
- Poikiloderma
- Rosacea, telangiectasias, erythema, and flushing
- Erythematous and new traumatic and surgical scars.

7.3 | Photodamage

Numerous studies and papers have reported and described the efficacy and role of IPL and BBL in the treatment of photodamaged skin of the face and body.⁸⁻¹⁰ Perhaps the most common use for IPL in the clinical and medical spa setting is as a no-downtime treatment to correct photoaged skin. A series of IPL treatments using the multiple pass two-step technique as described earlier has a high likelihood of resulting in a visible improvement in the appearance of photodamaged and aged skin and a high degree of patient satisfaction. Skin anywhere on the body can now be safely treated. Optimal parameters for the different skin types and the different steps have been well defined.

7.4 | Rosacea, erythema, telangiectasias

The use of IPL to treat the signs and symptoms of rosacea has been well-documented for nearly 20 years. Taub was one of the early investigators to report on the efficacy of IPL in the treatment of erythema and telangiectasias of rosacea.¹¹ In the author's experience, for erythematous and rosacea-prone complexions, erythema of the neck and chest and poikiloderma, IPL treatments are among the most effective methods of treatment available. The 560-nm filter is used with higher fluences to resolve the areas of erythema and flushing. BBL parameters that are effective for erythema are 560-nm filter, 15 J/cm², 15-ms pulse duration, 15°C contact cooling of the crystal (Figure 2). Two passes are recommended. For skin types 4 and 5, the 590-nm filter is used. In the author's extensive experience treating rosacea with IPL, all of the signs and symptoms of rosacea, including erythema, flushing, inflammatory papules, telangiectasias, burning, and stinging visibly improve with a series of five or more IPL treatments. In the author's experience, the multiple pass, two-step technique with BBL has been a very effective treatment for rosacea. In the majority of cases, improvement in the symptoms and signs of rosacea remain for 6 months to several years, even without additional treatments. Most patients continue to keep their rosacea well-controlled with one treatment every 6 months.

7.5 | Scars

Perhaps one of the more valuable benefits of IPL and yet less well-appreciated is the improvement in scars.^{12,13} New scars with erythema that are flat, elevated, or depressed improve significantly with IPL. Elevated scars will flatten, depressed scars become more elevated and erythema fades. The sooner the treatment is started with IPL on a new surgical scar, the faster and better the final result. It is possible that the early IPL treatment of scars may help reduce the likelihood of the development of a keloid or hypertrophic scarring. The author's preferred parameters for scars are the same as those used for treating the erythema of rosacea. Two or three passes over the scar using a spot adapter that approximates the size of the

scar and three or more treatments at 2- to 4-week intervals are recommended. IPL treatment of facial cosmetic surgical scars can be initiated at 2 weeks and for body scars at 3–4 weeks.

Pitted type acne scars and hypopigmented scars tend to not improve with IPL. Striae that are new and still erythematous or purple improve with the same technique as for other scars and erythema.

8 | WHAT IPL TREATS WELL

8.1 | Acne

Inflammatory acne responds very well to a series of IPL¹⁴ and BBL¹⁵ treatments.

Inflammatory papules and cysts resolve in the majority of patients who undergo a series of five or more IPL treatments and remain improved for 6–12 weeks after treatment. Multiple passes using the blue light spectrum (420–480 nm), followed by the 560-nm filter with higher fluences to target active inflammatory lesions as well as erythematous scars and hyperpigmentation, are used in combination. A third step using BBL SkinTyte with the 590-nm filter (red and infrared light) can be added to help resolve active inflammatory lesions faster and to safely treat the beard area of young men without reducing hair growth. The advantage of this multipass and multistep approach is the rapid improvement in inflammatory acne as well as the simultaneous improvement in acne scars without the use of drugs. Treatments can be performed weekly until the skin is clear.

8.2 | Correction of IPL and laser complications

Complications from energy-based treatments like lasers, IPL, and radiofrequency devices do occur. Many of these complications can be satisfactorily resolved with IPL. Erythema, hyperpigmentation, and striping after IPL treatments can all be improved with IPL. The recommended treatment approach is to use milder parameters with



FIGURE 2 Fifty two years old female before and after two BBL HERO treatments. Total of 1150 pulses per treatment

lower fluences and do two full passes over the entire area. The IPL complications of hyperpigmentation and striping can generally be blended in with three or more IPL treatments. The 560-nm filter is recommended for skin types 1 through 3 and 590-nm filter for skin types 4 and 5. Post-laser erythema responds very well to the parameters used for rosacea and scars.

9 | WHAT IPL TREATS REASONABLY WELL

9.1 | Wrinkles and skin laxity

With the newer techniques using four to five times the number of pulses made available with the introduction of BBL HERO, wrinkles and skin laxity are showing more visible improvement than seen with earlier traditional IPL treatments. Before the introduction of BBL HERO, wrinkle improvement with IPL while generally showing some improvement was fairly limited. Wrinkle reduction with BBL HERO has been considerably more noticeable and is one of the visible differences patients comment on after a series of three or more treatments. Improvements have been most noticeable around the eyes, on the cheeks and forehead, on the neck, chest, and dorsum of the hand. Likewise, skin laxity improvement of the lower face and neck as well as on the abdomen and extremities is proving to be more dramatic with BBL HERO than expected with traditional IPL treatments (Figure 3). A more extensive study of the wrinkle-reducing and skin-tightening effects of BBL will need to be done to further clarify the extent of improvement possible.

9.2 | Melasma

The patchy facial hyperpigmentation of melasma does respond to BBL treatments¹⁶; however, the results are not consistent and the use of overly aggressive parameters may create even more hyperpigmentation. The general guidelines for treating a patient with melasma with BBL is to pretreat with a pigment-inhibiting topical agent such as hydroquinone along with a physical sunblock and the possible addition of tretinoin for 4–6 weeks before treatment. It is recommended to use a conservative parameter with low fluence and perform a full face treatment with only a single pass over the area of hyperpigmentation. It is recommended to perform IPL treatments for

melasma-prone patients during less sunny months of the year. With this regimen, some 50% of melasma patients will see a 50% or greater resolution of melasma with five or more treatments. Recurrence is to be expected; however, improvement can be long lasting in some patients.

9.3 | Dermatologic conditions that may improve with IPL

In addition to the above conditions that are corrected with IPL treatments, the author has experience with treating a variety of other skin conditions with IPL.

9.4 | Port wine hemangiomas

Both flat pink port wine hemangiomas and purple, nodular type hemangiomas can be improved dramatically with IPL.¹⁷ Typically, the lighter the port wine hemangioma (PWA), the higher the fluence needed. For erythematous and nodular PWA, the same settings used for rosacea with two to three passes over five or more treatments have dramatically reduced the appearance of the PWA. Treatments are well-tolerated and other than the possibility of purpura there is no downtime.

9.5 | Disseminated actinic prokeratosis

Disseminated superficial porokeratoses may respond to a series of IPL treatments either alone¹³ or in combinations with aminolevulinic acid or imiquimod. Although lesions may not completely resolve, they do become smoother with reduced erythema and pigmentation. Recurrence is common after IPL treatments; however, there may be a period of months to years with few lesions recurring. Optimal parameters are the same as used for rosacea.

9.6 | Purpura and skin fragility

Age-related skin thinning with subsequent fragility and purpura do improve following IPL treatments.^{18,19} Most commonly, arms and hands are the affected areas. When skin shows extensive purpura

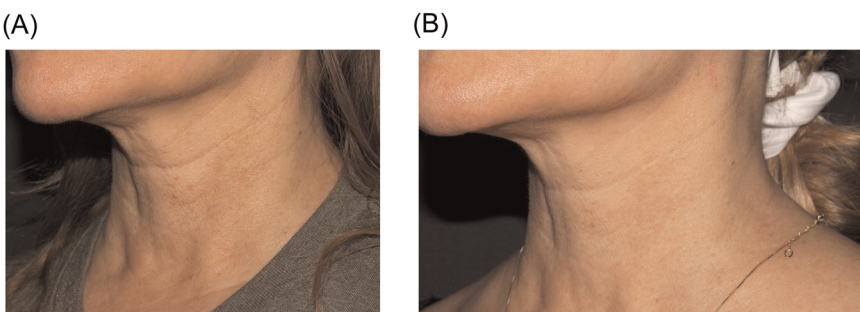


FIGURE 3 Fifty four years old female before and after one BBL HERO treatment. Total of 700 pulses

and post-purpura hyperpigmentation, it is recommended to use the 560-nm filter with lower fluences and perform two passes with standard IPL or five to eight passes with BBL HERO. Regular treatments at 3-month intervals can help keep skin more resilient and less prone to bruising.

9.7 | Grover's disease

The author has experience with one case of Grover's disease refractory to treatment with oral medications and fractionated lasers that responded dramatically to BBL treatments. Two passes over all involved areas on the torso produced prompt and nearly complete remission for 3–4 months following the first treatment. The effective parameters using Sciton's BBL were 560-nm filter, 8 J/cm², 10-ms pulse duration, 15°C cooling of the crystal and a total of 350 pulses to treat the abdomen and 400 pulses to treat the upper and mid-back. Disease activity has been controlled nearly completely, with periodic BBL treatments every 3–4 months. For this one patient, the BBL treatments have been the most effective treatment to control their symptoms of itching and lesions.

9.8 | Hidradenitis suppurativa

There are a few reports using IPL to treat hidradenitis suppurativa that have produced promising results in reducing pain, inflammation, and scarring.^{13,20} Recently, the author has utilized the continuous pulse mode of BBL (SkinTyte mode) to treat axillary and genital hidradenitis suppurativa in one patient. Treatments with the 590-nm filter (590–1200 nm spectrum) in a continuous motion fashion for 2 min over each affected area improved the active inflammatory lesions and reduced the occurrence of new lesions. Erythematous and hypertrophic scarring also showed noticeable improvement. Treatments were well-tolerated. Initial results in this one patient have been positive and BBL SkinTyte may have promise for some patients with hidradenitis suppurativa, including those patients with skin types 4 and 5.

9.9 | Incipient actinic keratoses (AKs)

Some early, incipient AKs may resolve to the visible eye with regular IPL treatments. Not all AKs seem to resolve with IPL; however, there does appear to be resolution of some and development of fewer new lesions with a series of five or more treatments and regular maintenance treatments. In the author's experience, while IPL greatly improves the appearance of photodamaged skin, most AKs appear to remain after IPL treatments and require other methods of treatment for resolution. One benefit of IPL treatments in patients with extensive photodamage, where early AKs may be difficult to identify, is that as skin clears from the IPL treatment, the AKs remaining become easier to identify.

The role of IPL in treating photodamaged skin with AKs may prove to best be as a preventative therapy once the AKs have been treated by other effective methods.

9.10 | IPL as an adjunctive treatment to other treatments

There has been a growing role for the adjunctive use of IPL with a variety of other aesthetic procedures. Where IPL is especially useful is in combination with both ablative and nonablative laser treatments. IPL can be used at the same time as the ablative laser treatment. Post-laser erythema responds very well to IPL. I begin IPL treatments about 2–3 weeks after ablative laser resurfacing and generally will perform three treatments at 2-week intervals for a faster resolution of laser-induced erythema. For nonablative laser treatments, IPL can be used at the same treatment session or starting 1 to 2 weeks after the laser treatment. With both ablative and nonablative laser treatments, IPL is performed as the first step. The advantages of adding IPL to any laser treatment is generally a better overall result with greater improvement in pigmentation and telangiectasias. This is especially true with nonablative laser treatments. The use of IPL post-laser treatments is primarily to resolve any laser-induced erythema and post-inflammatory hyperpigmentation. The choice of parameters for post-laser erythema is the same as used for treating rosacea and scars.

IPL can be used with RF microneedling procedures either at the same treatment session or post-RF microneedling.

IPL treatments can be performed at the same time as a neuro-modulator and injectable filler treatments. This has become a very popular combination treatment. When done on the same day, the IPL treatment is performed as the first step.

9.11 | IPL in maintaining healthy skin

One of the most important roles of IPL treatments that has emerged over the past 5 years has been the recognition of IPL in helping to maintain healthy skin. Although still not widely appreciated, there is growing evidence to support that IPL improves much more than just "reds and browns." IPL treatments certainly improve the appearance of aged skin, helping skin to not only look clearer and smoother but healthier. So, can we keep healthy skin healthy with regular IPL treatments? The answer to that question appears more and more to be YES. Considering how photodamaged skin treated with a series of IPL treatments maintains clearer skin for a period of years after the last treatment and that acne and rosacea-prone skin often go into remission with greatly resolved symptoms for months to years after a series of IPL treatments, there is likely to be multiple factors functioning at the cellular level that improves the function of cells following exposure to IPL.

We may see a decrease in the development of skin lesions associated with aging, such as seborrheic keratoses, lentiginos, AKs,

and possibly nonmelanoma skin cancer with regular treatments of IPL.

9.12 | IPL in delaying skin aging

One of the most exciting benefits of IPL to be discovered in the past 5 years has been the role of BBL in delaying skin aging. After 25 years of IPL in the United States, there is growing evidence to support the age-delaying benefits of IPL. Chang and Bitter showed that biopsies of aged forearm skin receiving three monthly treatments with the multiple pass technique rejuvenated nearly 1300 genes to be similar to gene expression patterns of young skin.²¹ Bitter and Pozner showed that one to three annual facial treatments with BBL over 9 years helped to maintain more youthful skin that appeared to not have aged as judged by blinded evaluators.²²

The optimal treatment schedule to delay skin aging with IPL is not yet clearly known. What is known is that there is no upper limit to the number of treatments with IPL that someone can have and that the more IPL treatments one receives, the better appearing skin becomes. Current regimens to delay skin aging with IPL vary from two to six treatments per year. Some individuals choose to receive monthly IPL treatments. Receiving numerous IPL treatments over an extended period of time appears safe with no reported adverse effects as long as proper parameters and treatment protocols are used. There has been no adverse long-term sequelae in individuals who have received even more than 100 treatments over a 20-year period of time.

Indeed, it appears that those people receiving numerous treatments are able to maintain clear and smooth skin over a period of years. We may see a decrease in the development of skin lesions associated with aging, such as seborrheic keratoses, lentiginos, AKs, and possibly nonmelanoma skin cancer with regular IPL treatments.

10 | CONCLUSION

10.1 | The future of IPL

It is clear that after 25 years of clinical experience with broad-spectrum light-based devices IPL is here to stay. IPL has continued to grow in popularity, particularly in the past 5 years, primarily due to innovations in IPL technology, better treatment protocols, and techniques, and readily available training in these protocols and techniques. Recent innovations like the BBL HERO devices that are now available continue to enhance results while making treatments safer and more comfortable. The future of IPL will certainly see new clinical applications added to the many useful roles IPL currently plays. The future will see a better understanding and wider use of the health maintaining and age-delaying benefits of IPL as it becomes clearer to more practitioners and the public that regular treatments with IPL help to keep skin healthy and slow skin aging.

CONFLICT OF INTERESTS

The author declares that there are no conflict of interests.

ORCID

Patrick Bitter  <http://orcid.org/0000-0002-1696-8177>

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