



# Lumenis' IPL Technology

## Bibliography of Studies & Peer Reviewed Papers





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**Lumenis**, the world's largest medical laser company, is a global developer, manufacturer and distributor of laser and light-based devices for surgical, aesthetic and ophthalmic applications, with more than 900 employees worldwide. **Lumenis** has 265 registered patents, over 260 FDA clearances, an installed base of over 80,000 systems and a presence in over 80 countries.

**Lumenis** endeavors to bring the finest state of the art technology products to the market, fulfilling the highest standards of excellence, quality and reliability, delivering premium value and service to its customers. The name **Lumenis** is derived from the Latin words meaning "Light of Life" highlighting the light - the basis of our technologies - used to enhance life.

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# Bibliography

STUDY	TYPE	TOPIC	TITLE	AUTHORS	RESEARCH SITES	PUBLICATION	YEAR	ABSTRACT
1	Peer reviewed article	IPL Skin Treatments using Photo-rejuvenation	Clinical Effectiveness of Intense Pulsed Light Therapy For Solar Lentiginos of the Hands	Haruyo Sasaya, M.D., Akira Kawada, M.D., Tamae Wada, M.D., Ayaka Hirao, M.D., Naoki Oiso, M.D.	Department of Dermatology, Kinki University Faculty of Medicine, Osaka-Sayama, Osaka, Japan	Dermatol Ther, 2012 Vol. 24, 2011. 584-6.	2012	Intense pulsed light (IPL) treatment, as a nonablative phototherapy, is known to improve various signs of facial photoaging skin, e.g., solar lentiginos, fine wrinkles, and telangiectasias. The purpose of the present study was to investigate the efficacy and tolerability of IPL with a 515-nm filter in patients with solar lentiginos on the back of hands. An open study was performed in 31 patients who were treated with a 1-month interval up to five times. Sixty-two percent of patients had more than 50% improvement and 23% had more than 75% improvement. No patients discontinued due to adverse effects, and no patients showed hyperpigmentation or scarring after the treatments. Phototherapy using this IPL source was effective and well tolerated in the patients, suggesting that this phototherapy may be an appropriate modality for the treatment of solar lentiginos of the hands.
2	Peer reviewed article	Port wine stains	Clinical Analysis of Port Wine Stains Treated by Intense Pulsed Light	Li G, M.D., Lin T, M.D., Wu Q, M.D., Zhou Z, M.D., Gold MH, M.D.	Institute of Dermatology, Chinese Academy of Medical Sciences, Nanjing, China	J Cosmet Laser Ther. 2010 Feb;12(1):2-6	2010	<b>BACKGROUND:</b> Port wine stains (PWS) are formed by dilation and malformation of dermal capillaries without endothelium proliferation. Despite the improvements in lasers and light therapy for PWS therapy in the past 10 years, the 'cure' rate is only about 10%. Intense pulsed light (IPL) is a non-coherent light based on the theory of selective photothermolysis. <b>Objective:</b> To evaluate the efficacy of a new IPL on PWS. <b>METHODS:</b> Seventy-two patients with PWS treated with an IPL with synchronous cooling were retrospectively analyzed. According to AQ1: sentence re-punctuated in places. Please check through and confirm correct the Fitzpatrick skin type, color, location of the lesion, and treatment reaction, light filters of 560 nm 590 nm or 640 nm were used with a single pulse with a pulse width of 6-14 ms and a fluence of 16-29 J/cm <sup>2</sup> ; a double pulse with a pulse width of 3.5-4.0 ms, a pulse delay of 20-30 ms, and a fluence of 17-23 J/cm <sup>2</sup> ; or a triple pulse with a pulse width of 3.0-4.0 ms, a pulse delay of 20-40 ms, and a fluence of 18-22 J/cm <sup>2</sup> . The adverse effects and the relationships among the lesion type, treatments, ages and location were analyzed. <b>RESULTS:</b> Most of the PWS lesions faded significantly and the response rate in this series was 76.4%. Patients resistant to other forms of therapy also showed good clinical results. Adult lesions were easier to remove than those in younger individuals. Further improvement did not occur after three treatments. We failed to find any relationship between efficacy and location of the PWS. <b>CONCLUSION:</b> The IPL treatment modality is safe and efficient for the treatment of PWS and for those which may be resistant to other therapies. The IPL is an alternative method for most PWS lesions.

STUDY	TYPE	TOPIC	TITLE	AUTHORS	RESEARCH SITES	PUBLICATION	YEAR	ABSTRACT
3	Peer reviewed article	IPL Skin Treatments using Photo-rejuvenation	A Split-Face Study of Intense Pulsed Light on Photoaging Skin in Chinese Population	Yuan-Hong Li, M.D., PhD, <sup>1</sup> Yan Wu, M.D., PhD, <sup>1</sup> John Z.S. Chen, M.D., PhD, <sup>2</sup> Xia Zhu, M.D., <sup>1</sup> Yuan-Yuan Xu, M.D., <sup>1</sup> Jing Chen, M.D., PhD, <sup>1</sup> Guang-Hui Dong, M.D., PhD, <sup>3</sup> Xing-Hua Gao, M.D., PhD, <sup>1</sup> and Hong-Duo Chen, M.D. <sup>1</sup>	<sup>1</sup> Department of Dermatology, No. 1 Hospital of China Medical University, Shenyang, PR China <sup>2</sup> Sheftel Associates Dermatology, Tucson, Arizona <sup>3</sup> Department of Biostatistics, China Medical University, Shenyang, PR China	Lasers in Surgery and Medicine; 2010; 42: 185-191	2010	<p><b>BACKGROUND AND OBJECTIVES:</b> Intense pulsed light (IPL) is regarded as the gold standard of nonablative photo-rejuvenation. Yet there is still a need to observe its efficacy and safety on dark skin using a split-face module.</p> <p><b>STUDY DESIGN/MATERIALS AND METHOD:</b> Twenty-four Chinese women with photoaging were enrolled in this study. Patients were randomized to receive four IPL treatments at 3- to 4-week intervals on one side of face, with the other side spared as control. Changes of photoaging were evaluated using a global evaluation, an overall self-assessment, a Mexameter and a Corneometer. Skin biopsies were taken after four sessions of treatment on one side of face. The melanocyte density and the contents of melanin, collagen fibers, and elastic fibers were stained and used to evaluate the improvement on dyschromia and other signs of photoaging.</p> <p><b>RESULTS:</b> The global scores of photoaging on treated side decreased significantly from 3.02 to 1.22, while it remained unchanged on the untreated side. Twenty-one of 24 patients (87.5%) rated their improvement as excellent or good. The difference on the values of melanin index and erythema index on treated side were significantly larger than those on untreated side after the 1st session, the 4th session and at 3-month follow-up (P&lt;0.05). The melanin contents were significantly decreased and the collagen fibers were obviously increased only on treated side (P&lt;0.05). Adverse effects of treated side were limited to mild pain and transient erythema.</p> <p><b>CONCLUSION:</b> Using this split-face module, IPL treatment is proved both clinically and histologically to be effective in treating photoaging skin in Chinese population. Adverse effects were minimal and acceptable.</p>
4	Peer reviewed article	IPL Skin Treatments using Photo-rejuvenation	Clinical Effectiveness of a Novel Intense Pulsed Light Source on Facial Pigmentary Lesions	Natsuko Konishi, M.D., Akira Kawada, M.D., PhD, Shigeru Kawara, M.D., PhD, Naoki Oiso, M.D., PhD, Hideki Endo, M.D., Eiji Yoshinaga, M.D., Tomoyuki Momma	Department of Dermatology, Kinki University School of Medicine	Arch Dermatol Res 2008; 300; (Suppl 1): S65-S67.	2008	<p>Intense pulsed light (IPL) therapy improves various clinical symptoms of photoaging skin. In this study we have investigated clinical effects of a novel IPL Lumenis One™ (LUMENIS, Tokyo) on facial pigmentary lesions in 18 Japanese female patients. Measurement was performed after 3-5 treatments. IPL showed marked and slight improvements in 28 and 39%, respectively. The data of melanin index demonstrated the improvement after IPL therapy. These results indicated that IPL therapy using Lumenis One may be useful to treat solar lentiginos and ephelides on the face.</p>

STUDY	TYPE	TOPIC	TITLE	AUTHORS	RESEARCH SITES	PUBLICATION	YEAR	ABSTRACT
5	Peer reviewed article	IPL Skin Treatments using Photorejuvenation + ALA	Topical 5-Aminolevulinic Acid Combined With Intense Pulsed Light In the Treatment of Photoaging	Jeffrey S. Dover, M.D., FRCP; Ashish C. Bhatia, M.D.; Brigitte Stewart; Kenneth A. Arndt, M.D.	Department of Dermatology, Yale University School of Medicine, New Haven, Conn, USA.	Arch Dermatol, Oct 2005; 141(10): 1247-52.	2005	<p><b>BACKGROUND:</b> The adjunctive use of 5-aminolevulinic acid (5-ALA) with intense pulsed-light (IPL) treatments has been suggested to increase the benefit of IPL for photoaging; however, to our knowledge, no controlled trials have been performed.</p> <p><b>DESIGN:</b> A prospective, randomized, controlled, split-face study was designed. Twenty subjects participated in a series of 3 split-face treatments 3 weeks apart in which half of the face was pretreated with 5-ALA followed by IPL treatment while the other half was treated with IPL alone. Two additional full-face treatments (with IPL alone) were then delivered 3 weeks apart. Assessment of global photodamage, fine lines, mottled pigmentation, tactile roughness, and sallowness (on a scale of 0-4) was performed by a blinded investigator before each treatment and 4 weeks after the final treatment. Patients also completed an assessment at the conclusion of the study comparing their results with pretreatment photographs.</p> <p><b>RESULTS:</b> All 20 volunteers completed the study. Pretreatment with 5-ALA resulted in more improvement in the global score for photoaging (16 [80%] subjects vs 9 [45%] subjects; P = .008) and mottled pigmentation (19 [95%] subjects vs 12 [60%] subjects; P = .008) than IPL treatment alone. More successful results were achieved on the side pretreated with 5-ALA compared with the side treated with IPL alone for fine lines (12 [60%] subjects vs 5 [25%] subjects; P = .008) and mottled pigmentation (17 [85%] subjects vs 4 [20%] subjects; P &lt; .001). While there was noticeable improvement over baseline scores with respect to tactile roughness and sallowness, pretreatment with 5-ALA did not seem to enhance the results of the IPL treatment. The final investigator cosmetic evaluations (P=.0002) and subject satisfaction scores (P=.005) were significantly better for the 5-ALA-pretreated side. Both treatments were well tolerated, with little difference in the incidence or profile of adverse effects with or without 5-ALA pretreatment.</p> <p><b>CONCLUSIONS:</b> The adjunctive use of 5-ALA in the treatment of facial photoaging with IPL provides significantly greater improvement in global photodamage, mottled pigmentation, and fine lines than treatment with IPL alone, without a significant increase in adverse effects. This combination treatment enhances the results of photorejuvenation and improves patient satisfaction.</p>
6	Peer reviewed article	IPL Skin Treatments using Photorejuvenation + ALA	Ultrastructural Changes Seen After ALA-IPL Photorejuvenation: A Pilot Study	Ellen S Marmur, M.D., FAAD. <sup>1,2</sup> , Robert Phelps, M.D. <sup>2</sup> , David J Goldberg, M.D. <sup>1,2</sup>	<sup>1</sup> Skin Laser & Surgery Specialists of New York and New Jersey, USA, and <sup>2</sup> Department of Dermatology, Mount Sinai School of Medicine, New York, NY, USA	J Cosmet Laser Ther. 2005 Mar;7(1):21-4.	2005	<p><b>BACKGROUND:</b> Intense pulse light (IPL) treatment currently represents one of the most popular non-ablative photodamage skin treatments. Recent anecdotal evidence suggests that aminolevulinic acid (ALA) photodynamic therapy using IPL as a light source is superior to IPL alone for photorejuvenation.</p> <p><b>METHODS:</b> Seven adult subjects (six women, one man) with minimal photodamage were treated with full face IPL treatment. Half of the face was pre-treated with topical ALA. Pre-and post-treatment biopsies were analyzed for changes in collagen by electron microscopic ultrastructural analysis.</p> <p><b>RESULTS:</b> An increase in type I collagen fibers was seen after treatment in all subjects. There was a greater increase in type I collagen formation in those subjects who were pre-treated with topical ALA.</p> <p><b>CONCLUSION:</b> This small pilot study is the first to focus on the ultrastructural changes seen after ALA-IPL photorejuvenation. We found a greater shift toward type I collagen synthesis in the ALA-IPL group compared to the IPL group. The addition of ALA to IPL treatment for photorejuvenation may be superior to IPL alone.</p>



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7	Peer reviewed article	IPL Skin Treatments using Photorejuvenation + ALA	Photorejuvenation of Facial Skin with Topical 20% 5-Aminolevulinic Acid and Intense Pulsed Light Treatment: A Split-Face Comparison Study	Tina S. Alster M.D. <sup>1</sup> , Elizabeth L. Tanzi M.D. <sup>2</sup> , Esperanza C. Welsh, M.D. <sup>3</sup>	<sup>1</sup> Director, Washington Institute of Dermatologic Laser Surgery, <sup>2</sup> Co-Director, Washington Institute of Dermatologic Laser Surgery, <sup>3</sup> Department of Dermatology and Cutaneous Surgery, University of Miami School of Medicine	Journal of Cosmetic and Laser Therapy. 2005; 7: 21–24	2005	<p><b>BACKGROUND:</b> Photorejuvenation of facial skin has been reported after intense pulsed light (IPL) therapy alone and in conjunction with topical 5-aminolevulinic acid (5-ALA), but no comparative studies between these regimens have been performed.</p> <p><b>OBJECTIVE:</b> To evaluate the safety and effectiveness of combination topical 5-ALA and IPL compared to IPL treatment alone.</p> <p><b>Methods:</b> Ten patients with mild to moderate photodamage were randomly assigned treatment with 5-ALA + IPL on one facial half and IPL alone on the contralateral side. Two treatments were delivered at 4-week intervals. Clinical improvement scores were determined by masked evaluations of digital photographs obtained at baseline, prior to each treatment session, and at 1, 3, and 6 months after the final treatment.</p> <p><b>RESULTS:</b> Higher clinical improvement scores were noted on the combination 5-ALA +IPL treated areas. Mild edema, erythema, and desquamation were observed on the facial halves where 5-ALA was applied. No scarring or unwanted pigmentary alteration was seen.</p> <p><b>CONCLUSIONS:</b> Photodynamic therapy with combination topical 5-ALA + IPL is safe and more effective for facial rejuvenation than IPL treatment alone.</p>
8	Peer reviewed article	IPL Skin Treatments using Photorejuvenation + ALA	5-Aminolevulinic Acid Photodynamic Therapy: Where We Have Been and Where We Are Going	Gold MH, M.D., Goldman MP, M.D.	Gold Skin Care Center, Nashville, Tennessee, USA.	Dermatol Surg, Aug 2004; 30(8):1077-83; discussion 1083-4.	2004	<p><b>BACKGROUND:</b> Photodynamic therapy, utilizing the topical administration of 20% 5-aminolevulinic acid, has generated a great deal of interest in the dermatology community over the past several years.</p> <p><b>OBJECTIVE:</b> The purpose of this article is to review the history of photodynamic therapy in dermatology and to review recent new advances with this technology that will increase its appeal to all dermatologists.</p> <p><b>METHODS:</b> A literature review and results of new clinical trials with regards to photorejuvenation and acne vulgaris treatments with 5-aminolevulinic acid photodynamic therapy are presented.</p> <p><b>RESULTS:</b> Short-contact, full-face 5-aminolevulinic acid photodynamic therapy treatments with a variety of lasers and light sources have shown to be successful in treating all facets of photorejuvenation and the associated actinic keratoses as well as disorders of sebaceous glands, including acne vulgaris. The treatments are relatively pain-free, efficacious, and safe. They are also making already available laser/light source therapies work better for acne vulgaris and photorejuvenation.</p> <p><b>CONCLUSIONS:</b> The use of 5-aminolevulinic acid photodynamic therapy with short-contact, full-face broad-application therapy is now able to bridge the world of medical and cosmetic dermatologic surgery. This therapy is available for all dermatologists to utilize in the care of their patients.</p>

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9	Peer reviewed article	IPL Skin Treatments using Photo-rejuvenation	Photorejuvenation With Intense Pulsed Light: Results of a Multi-Center Study	Neil S Sadick M.D. <sup>1</sup> , Robert Weiss M.D. <sup>2</sup> , Suzanne Kilmer M.D. <sup>3</sup> , Patrick Bitter M.D. <sup>4</sup>	<sup>1</sup> Weill Medical College of Cornell University, <sup>2</sup> Johns Hopkins University, <sup>3</sup> University of California at Davis, <sup>4</sup> Stanford University	J Drugs Dermatol 2004; 3(1):41-49	2004	This multi-center study evaluating the role of Intense Pulsed Light (IPL) in the non-ablative rejuvenation of Type I and Type II photoaged skin study was conducted in order to evaluate the clinical efficacy and safety of using IPL in treating clinical indications associated with photoaged skin. Ninety-three patients of Fitzpatrick skin phenotypes I-III, Fitzpatrick Wrinkle Classes I-II, and Elastosis Scores 1-6 were enrolled in the study. Up to five treatments were performed at 4-week intervals with follow-up visits at 4 and 6 months after the last treatment. Patients received full-face treatments using the recommended parameters of the Quantum SR/HR (Lumenis Ltd.) with the 560 or 640 nm cutoff filter. Parameters of elastometry, physicians' evaluation of the Elastosis Score ('W/ES'), and global improvement as well as patient satisfaction were analyzed. Results showed that the average Fitzpatrick W/ES improved significantly (p<0.001) by 1.39 and 1.32 units at the 4 and 6 months follow-ups, respectively; an improved W/ES evaluation was recorded for 82% and 75% of the patients at each of these time points. In conclusion, IPL treatment is an effective non-invasive, non-ablative method for rejuvenating photoaged skin with minimal adverse events, no downtime, excellent long-term results, and a very high measure of patient satisfaction.
10	Peer reviewed article	IPL Skin Treatments using Photo-rejuvenation	Nd:YAG Laser Combined With IPL Treatment Improves Clinical Results in Non-Ablative Photorejuvenation	Mario A. Trelles, M.D. PhD <sup>1</sup> , Inés Allones, M.D. <sup>1</sup> , Mariano Vélez, M.D. <sup>1</sup> , Serge Mordon, PhD <sup>2</sup>	<sup>1</sup> Instituto Médico Vilfortuny/ Antoni de Gimbernat Foundation, Cambrils, Spain. <sup>2</sup> INSERM (French national Institute of Health), Lille University Hospital, Lille, France	Cosmet Laser Ther 2004; 6: 69-78	2004	<b>BACKGROUND:</b> Intense pulsed light (IPL) sources have been reported in non-ablative photorejuvenation, but the excellent histological findings do not always coincide with the clinical results and patient satisfaction index (SI). <b>METHODS:</b> Ten female patients (two forehead, four periocular and four perioral), ages ranging from 28 to 46 years, skin types II-IV, wrinkle types I-III, participated in the study. The IPL system was applied with the yellow (570nm) cut-off filter, 30J/cm <sup>2</sup> single pulse, followed by the Nd:YAG at 120J/cm <sup>2</sup> , double pulse (7ms per shot with 20ms between pulses) on the wrinkled areas only. Three sessions were given at monthly intervals, and an assessment was made 1 and 6 months after the third session. Biopsies were taken from four consenting patients as a cross-section before the first treatment and then 1 and 6 months after the third session. For clinical control and contrast of tissue results, a group of 10 patients (two forehead, four periocular and four perioral; ages ranging from 27 to 47 years, skin types II-IV, wrinkle types I-III) was treated only with IPL, using the same parameters and sessions. Histologies were taken from four consenting patients. <b>RESULTS:</b> The histology showed thickening of the epidermis with good dermal collagen organization in both groups. However, the combined treatment showed more dramatic changes in histological tissue condition, and ecstatic blood vessels were seen in the deeper dermis. The patient SI values, related to the results, were lower when IPL was used alone. All patients completed the study. In the combined treatment group, overall SIs of 8 (80%) and 8 (80%) were obtained at the control points of 1 and 6 months, respectively, after session 3, compared with SIs of 6 (60%) and 4 (40%) scored by patients in the IPL group at the same points. Discomfort and side effects were minimal in both groups. <b>CONCLUSIONS:</b> The addition of the Nd:YAG laser to the IPL regimen in non-ablative skin rejuvenation gave very good histological results, which were echoed by stronger patient satisfaction than in the control group treated only with IPL. Visible improvement in the skin condition of both groups was achieved, but was better in the combined treatment group.

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11	Peer reviewed article	IPL Skin Treatments using Photo-rejuvenation	Long-Term Clinical Results of IPL Photorejuvenation	James Brazil, M.D., Patti Owens, R.N.	Olympic Dermatology and Laser Clinic, Olympia, Washington, USA	J Cosmetic & Laser Ther 2003; 5: 168-174	2003	<p><b>BACKGROUND:</b> Non-ablative photorejuvenation is characterized by the reduction of intrinsic and extrinsic changes in photodamaged skin. Only short-term improvement has been documented previously.</p> <p><b>Objective:</b> To evaluate quantitatively the short-term and long-term clinical effectiveness of multiple full-face IPL treatments for non-ablative facial photorejuvenation.</p> <p><b>METHODS:</b> A total of 47 patients with varying degrees of photodamaged skin and rosacea dermatitis underwent a series of four to five IPL treatments with a Vasculight (Lumenis Corp). Treatments were conducted every 3-4 weeks. Photographs were taken at baseline and after the treatment series was completed at both 6 weeks and 6 months. Adverse effects and clinical improvement were documented. A patient satisfaction questionnaire was completed and reviewed at the 6 month evaluation period.</p> <p><b>RESULTS:</b> Standardized evaluation of rhytids showed a statistically significant improvement in wrinkles at both evaluation endpoints. Some degradation occurred over time. Facial vascularity, dyschromia, and large pore size progressively improved from the 6-week measurement to the 6-month measurement.</p> <p><b>CONCLUSION:</b> This clinical study demonstrates that non-ablative facial rejuvenation is associated with long-term clinical improvement of facial rhytids, abnormal vascularity and pigmentary disorders with minimal risks and side effects to the patient.</p>
12	Peer reviewed article	IPL Skin Treatments using Photo-rejuvenation	Intense Pulsed Light Technology and Its Improvement on Skin Aging From the Patients' Perspective Using Photorejuvenation Parameters	Daniel Laury, M.D.	Private practice - Medford, Oregon, USA	Dermatology Online Journal, 2003; 9(1): 5.	2003	<p>Intense pulsed light technology (IPL) has been used for photorejuvenation or the reversal of skin aging. There are few studies to address the putative benefits from the patients' perspective. This information is critical for adequate patient counseling and satisfaction. The goal of this study was to quantify the change in apparent facial age that can be expected from the patients' point of view. Using currently available parameters that have been individualized to patients' responses, five patients underwent treatment with IPL. Their subjective improvement scores were collected using visual analog scales. All patients showed improvement from their perspective. Quantification of this improvement showed that in this population, patients can expect, on average, a two year reduction in perceived age per treatment. This finding may be useful when discussing intense pulsed light technology with current patients and those prospective patients considering this procedure.</p>

STUDY	TYPE	TOPIC	TITLE	AUTHORS	RESEARCH SITES	PUBLICATION	YEAR	ABSTRACT
13	Peer reviewed article	Review of range of treatments available with IPL including vascular and pigmented lesions, hair removal and wrinkles	IPL Technology: A Review	Raulin C, M.D., Greve B, M.D., Grema H, M.D.	Laserklinik Karlsruhe, Karlsruhe, Germany.	Lasers in Surgery and Medicine, 2003; Vol. 32: 78-87.	2003	<p><b>BACKGROUND AND OBJECTIVES:</b> Intense pulsed light (IPL) systems are high-intensity light sources, which emit polychromatic light. Unlike laser systems, these flashlamps work with noncoherent light in a broad wavelength spectrum of 515-1,200 nm. These properties allow for great variability in selecting individual treatment parameters and adapting to different types of skin types and indications. The purpose of this article was to critically review international medical publications of the many indication in which IPL technology can be used, including our own evaluations and experiences.</p> <p><b>STUDY DESIGN/MATERIALS AND METHODS:</b> The range of therapeutic uses for high-intensity flashlamps was reviewed, ranging from benign cavernous hemangiomas, benign venous malformations, essential telangiectasias, leg telangiectasias, poikiloderma of Civatte, and port-wine stains to pigmented lesions, cosmetically undesired hypertrichosis, and facial rhytids. The relative benefits and risks were discussed in detail and compared with other laser systems.</p> <p><b>RESULTS:</b> Because of the wide spectrum of potential combinations of wavelengths, pulse durations, pulse frequency, and fluences, a great deal of experience is required when using IPL technology. Proper patient selection and critical diagnostics serve to keep the adverse effects of the treatment to a minimum.</p> <p><b>CONCLUSIONS:</b> The distinctive technical conditions involved combine to make IPL technology an alternative and auxiliary treatment option to existing laser systems and conventional therapies.</p>
14	Peer reviewed article	Vascular and pigmented lesions	Update on Non-Ablative Light therapy for Rejuvenation: A Review	Neil S. Sadick, M.D., FACP, FAACS	Clinical Professor of Dermatology, Weill Medical College of Cornell University, Ithaca, New York	Lasers Surg. Med. 32:120-128, 2003.	2003	<p><b>BACKGROUND AND OBJECTIVES:</b> Non-ablative technologies are playing an increasing role in the management of photoaging. Newer radiofrequency technologies have added to this therapeutic armamentarium. Shorter wavelength technologies are more effective in targeting pilosebaceous vascular and pigmentary alterations while longer wavelength technologies are most effective in wrinkle reduction mediated through dermal remodeling. An overview of the various technologies available to the practicing laser surgeon are outlined in the present review.</p>
15	Peer reviewed article	Hyperpigmentation on arms	Photorejuvenation of the Forearms by Treating Hyperpigmented Lesions With Intense Pulsed Light Source: A Case Report	MA Adatto, M.D.	Skinpulse Dermatology and Laser Center, Geneva, Switzerland	J Cosmetic & Laser Ther 2003; 5:117-119	2003	<p>A 55 year old Spanish patient, photo type III, wanted a cosmetic improvement of her forearms. She disliked the hyperpigmentation which made her look older.</p> <p><b>METHOD:</b> After having tried several chemical peelings (50% glycolic acid plus 10% kojic acid followed by 15% MM TCA), there was no improvement in the patients's condition and it was decided to initiate intense pulsed light (IPL) treatment.</p> <p><b>RESULTS:</b> Improvement was noted after the first session, with a slight pink coloration. At two months post treatment, we noted more than 90% clearance of the hyperpigmentation on the treated areas.</p> <p><b>CONCLUSION:</b> This case report confirms that photorejuvenation, by treating hyperpigmented lesions with intense pulse light source on extra-facial zones can be very effective and safe.</p>

STUDY	TYPE	TOPIC	TITLE	AUTHORS	RESEARCH SITES	PUBLICATION	YEAR	ABSTRACT
16	Peer reviewed article	Long Term Follow-up of 80 Patients Treated for Photo-aging	Rejuvenation of Photo-aged Skin: 5 Years Results With Intense Pulsed Light of the Face, Neck, and Chest	Robert A. Weiss, M.D. <sup>1</sup> , Margaret A. Weiss, M.D. <sup>1</sup> , & Karen L. Beasley, M.D. <sup>2</sup>	<sup>1</sup> Johns Hopkins University School of Medicine and <sup>2</sup> University of Maryland School of Medicine, Baltimore, Maryland	Dermatol Surg 2002;28:1115-1119	2002	<p><b>BACKGROUND:</b> Photorejuvenation involves the use of lasers or light sources to reverse signs of photoaging. Multiple devices have been shown to be effective over the short term.</p> <p><b>Objective:</b> To investigate the long-term clinical results on the face, neck and chest at 4 years using filtered flashlamp intense pulsed light (IPL) for treatment of photoaging changes of telangiectasias, dyspigmentation, and rough skin texture.</p> <p><b>METHODS:</b> A chart review of 80 randomly selected patients with skin types I-IV who were treated by IPL during 1996 and 1997 was performed. Photos and patient self-assessment were graded for features of textural smoothness, telangiectasia severity, and blotchy pigmentation into four categories of worse, no change, slightly better (less than 50% improvement) and much better (greater than 50% improvement).</p> <p><b>RESULTS:</b> At 4 years following initial treatment, skin textural improvement was noted in 83% of the subjects. Telangiectasias were improved in 82% of subjects, while pigmentation remained improved in 79%. The median number of treatments was 3. The face responded slightly better than the chest or neck. Most common side-effects included temporary mild crusting (19%), erythema (15%) and purpura (6%).</p> <p><b>CONCLUSION:</b> Signs of photoaging including telangiectasias and mottled pigmentation of the face, neck, and chest, can be improved by IPL with a long-lasting result. Minimal or no down-time with minimal adverse effects can be achieved with the settings reported. Skin textural smoothing, although not easily quantified, is an additional benefit observed long-term.</p>
17	Peer reviewed article	IPL Skin Treatments using Photo-rejuvenation	Gross and Microscopic Findings in Patients Submitted to Nonablative Full-Face Resurfacing Using Intense Pulsed Light: A Preliminary Study	Enrique Hernández-pérez, M.D. & Eric Valencia Ibiert, M.D.	Center for Dermatology and Cosmetic Surgery, San Salvador, El Salvador	Dermatol Surg 2002;28:651-655	2002	<p><b>BACKGROUND:</b> Intense pulsed light (IPL) is a noncoherent, non-laser, filtered flashlamp emitting a broadband visible light that has been shown to be effective in photoepilation, as well as in a number of vascular and pigmented lesions of the skin. Their efficiency has also been reported recently in the treatment of photodamaged facial skin. In the last condition, however, there are few studies showing the clinical and microscopic changes produced by IPL.</p> <p><b>OBJECTIVE:</b> To assess the gross and microscopic changes that occur in photodamaged skin submitted to nonablative full-face resurfacing (NAFFR) using IPL.</p> <p><b>Methods:</b> Five women were submitted to five NAFFR sessions using IPL, one every 2 weeks. Skin biopsies and photographs were taken on all of the patients before the first procedure and after the last one, as well as weekly clinical assessment. Data concerning skin features (wrinkles, oiliness, thickness, dilated pores, and general appearance) were all assessed. Microscopic improvement of the aging features in the epidermis and dermis were all assessed. For the statistical analysis a t test for small samples was used.</p> <p><b>RESULTS:</b> All the patients showed clinical and microscopic improvements in every one of the parameters assessed. The t test for small samples showed a statistically significant difference (P&lt;0.01) in epidermal thickness.</p> <p><b>CONCLUSION:</b> Facial photodamage was clinically and microscopically improved using IPL. Use of IPL as a rejuvenating method seems to be promising, with minimal side effects, a wide safety margin, and minimal downtime.</p>

STUDY	TYPE	TOPIC	TITLE	AUTHORS	RESEARCH SITES	PUBLICATION	YEAR	ABSTRACT
18	Peer reviewed article	IPL Skin Treatments using Photo-rejuvenation on Asian Skin Type	Full- Face Photorejuvenation of Photodamaged Skin by Intense Pulse Light With Integrated Contact Cooling: Initial Experiences in Asian Patients	Kei Negishi, M.D., Shingo Wakamatsu, M.D., Nobuharu Kushikata, M.D., Yukiko tezuka, M.D., Yauyo Kotani, M.D. & Kyouko Shiba, M.D.	Department of Plastic and Reconstructive Surgery, Tokyo Women's Medical University Daini Hospital, 2-1-10 Nishiogu, Arakawa-ku, 116-8567, Tokyo, Japan	Lasers Surg. Med. 30:298-305, 2002.	2002	<p><b>BACKGROUND AND OBJECTIVES:</b> For Asian skin, recent "non-ablative" skin rejuvenation techniques have become the focus of attention for darker complected patients. In our earlier research, we have shown that intense pulse light (IPL) technology can be applied to Asian skin with a high degree of safety and efficacy. In this study, we performed full-face photorejuvenation using a new IPL device incorporating a 560 nm filter and integrated contact cooling system for the improvement of various symptoms associated with photoaging in Asian patients.</p> <p><b>STUDY DESIGN/MATERIALS AND METHODS:</b> A total of 73 patients were treated with a series of five or more full-face treatments at 3-4 week intervals using IPL with integrated contact cooling. One month after the third and fifth treatments, the patient and the treating physicians subjectively evaluated improvement in five areas- in pigmentation, telangiectasia, fine wrinkles, skin texture, and over-all improvement. In addition, histological changes were evaluated.</p> <p><b>RESULTS:</b> Pigmentation improvement, telangiectasia reduction, fine wrinkle reduction, smoother skin texture, and over-all improvement were evaluated according to five grades of percentage improvement. In addition, the subjective rating by the patients and the physicians was averaged, and the combined results were evaluated. After the fifth treatment, a combined rating of greater than 60% improvement was given to more than 80% of patients for pigmentation improvement, telangiectasia reduction or removal, smoother skin texture, and overall improvement. Histological evaluations showed strong staining of Type I and Type III collagen. Complications were minor and transitory, with burning sensations and erythema in only two patients.</p> <p><b>CONCLUSION:</b> Full-face photorejuvenation for Asian patients using this device is not only effective but is also associated with fewer post-treatment complications than other more invasive modalities. We conclude that IPL photorejuvenation can be the basis for safe and effective skin rejuvenation in Asian patients.</p>

STUDY	TYPE	TOPIC	TITLE	AUTHORS	RESEARCH SITES	PUBLICATION	YEAR	ABSTRACT
19	Peer reviewed article	IPL Skin Treatments using Photo-rejuvenation	Effects of Intense Pulsed Light on Sun-Damaged Human Skin, Routine, and Ultrastructural Analysis	Victor G. Prieto, M.D., Ph.D., <sup>1</sup> Neil S. Sadick, M.D., FACP, FAACS, <sup>2</sup> Josep Lloreta, M.D., Ph.D., <sup>1</sup> Judy Nicholson, R.N., B.S. <sup>3</sup> & Christopher R. Shea, M.D. <sup>4</sup>	<sup>1</sup> Department of Pathology, UT-MD Anderson Cancer Center, Houston, Texas 77030, <sup>2</sup> Department of Dermatology, Joan and Sanford I. Weill Medical College, Cornell University, New York 10021, <sup>3</sup> Department of Laser Specialist, University of Chicago, Chicago, Illinois, <sup>4</sup> Department of Medicine, IMIM and Hospital del Mar, Barcelona, Spain	Lasers in Surgery and Medicine, 2002; Vol. 30 (2): 82-85.	2002	<p><b>BACKGROUND AND OBJECTIVE:</b> New, non-ablative methods can be used in skin rejuvenation. Histologic analysis of non-ablative IPL effects on facial, sun-damaged skin.</p> <p><b>STUDY DESIGN/MATERIALS AND METHODS:</b> Five female subjects, wrinkle class I or II and Fitzpatrick skin types I, II, and III. IPL treatment: once monthly, 560-nm cut-off filters, spot size 8x35 mm, 28-36 J cm. Routine histology or electron microscopy on 2-mm punches, before treatment and then 1 week, 3 months, and 12 months.</p> <p><b>RESULTS:</b> Pre-treatment specimens contained solar elastosis and perifollicular lymphoid infiltrates. Collagen and elastic fibers appeared unaffected by treatment. At 1-week, Demodex organisms appeared coagulated.</p> <p><b>CONCLUSIONS:</b> Under these conditions, IPL induces minimal morphologic changes in mildly sun-damaged skin. Some esthetic improvement may be secondary to clearing of Demodex organisms and reduction of associated lymphocytic infiltrate.</p>
20	Peer reviewed article	IPL Skin Treatments using Photo-rejuvenation	Intense Pulsed Light Is Effective in Treating Pigmentary and Vascular Complications of CO2 Laser Resurfacing	Paraskevas P. Kontoes, M.D. & Co-author Spiros P. Vlachos, M.D.	Athens, Greece	Aesthetic Surg J 2002;22:489-491.	2002	<p>Prolonged erythema and hyperpigmentation are frequently encountered side effects of laser skin resurfacing. The author has found intense pulsed light to be effective in the treatment of erythema and hyperpigmentation resulting from laser skin resurfacing in the periorbital area.</p>
21	Peer reviewed article	IPL Skin Treatments using Photo-rejuvenation + ALA	Photodynamic Photorejuvenation	R. Ruiz-Rodríguez, M.D., T. Sanz-Sánchez, MD, and S. Córdoba, M.D.	Department of Dermatology, Clínica Ruber, Madrid, Spain	Dermatol Surg 2002;28:742-744	2002	<p><b>BACKGROUND:</b> The visible signs of photodamage are characterized by wrinkling, coarse skin texture, pigmentation alterations, telangiectases, and in some case actinic keratosis (AKs). Intense pulsed light (IPL) photorejuvenation has been shown to improve each of the different components of photodamaged skin except AKs.</p> <p><b>OBJECTIVE:</b> To prevent photodynamic therapy with topical 5-aminolevulinic acid (ALA-PDT) using IPL as a light source for treatment of AK in patients having IPL photorejuvenation.</p> <p><b>METHODS:</b> Seventeen patients with varying degrees of photodamage and AKs (total of 38 AKs) were treated with two treatments with a 1-month interval of ALA-PDT using IPL as a light source.</p>

STUDY	TYPE	TOPIC	TITLE	AUTHORS	RESEARCH SITES	PUBLICATION	YEAR	ABSTRACT
22	Peer reviewed article	Rosacea and Dyschromia	Photorejuvenation: Using Intense Pulsed Light Technology in a Cosmetic Surgery Practice	Michael I. Kulick, M.D.	San Francisco, CA, USA	Aesthetic Surg J 2001;21:255-258.	2001	A significant group of patients have had aesthetic procedures but are still concerned with the condition of their skin. Intense pulsed light technology can diminish lines of demarcation and signs of photoaging, and it can provide a 50% to 75% improvement in facial flushing/rosacea and a 40% to 60% improvement in dyschromia. The author provides a protocol for using this technology and pointers for successful treatment.
23	Peer reviewed article	IPL Skin Treatments using Photo-rejuvenation - 97 Asian Skin Type Patients Treated	Photorejuvenation for Asian Skin by Intense Pulsed Light	Kei Negishi, M.D., Yukiko Tezuka, M.D., Nobuharu Kushikata, M.D. & Shingo Wakanatsu, M.D.	Department of Plastic and Reconstructive Surgery, Tokyo Women's Medical University, Daini Hospital, Tokyo, Japan	Dermatol Surg 2001;27:627-632	2001	<p><b>BACKGROUND:</b> Dermabrasion and deep chemical peeling are used in the treatment of photoaged skin. These ablative procedures are effective enough to produce a certain improvement but have often caused postinflammatory hyperpigmentation among Asian patients. To avoid such adverse effects, a new, nonablative procedure has been sought.</p> <p><b>OBJECTIVE:</b> To determine the effectiveness of photorejuvenation for Asian skin using intense pulsed light (IPL). The specific parameters used, improvement ratios, side-effects, and downtime required are also discussed.</p> <p><b>METHODS:</b> Ninety-seven patients were treated for photoaging using IPL. The cutoff filters of 550 nm and 570 nm were utilized for three to six treatments at intervals of 2 to 3 weeks.</p> <p><b>RESULTS:</b> Treatment results were evaluated and rated by both patients and physicians at the end of the third treatment based on improvement in pigmentation, telangiectasia, and skin texture, a combined rating of "good" or "excellent" was given to more than 83% for telangiectasia, and more than 65% for skin texture. There were some minor complications in four cases: one had erythema that continued to the next day and three had minor blisters leaving no marks.</p> <p><b>CONCLUSION:</b> Photorejuvenation using IPL is a completely safe and effective procedure even for Asian skin. It will be increasingly used for skin rejuvenation in the future.</p>
24	Peer reviewed article	Treatment of Rhytids	Intense Pulsed Light and Nd:YAG Laser Non-Ablative Treatment of Facial Rhytids	David J. Goldberg, M.D. & J.A. Samady, M.D.	Division of Dermatology, New Jersey Medical School, Newark, New Jersey, USA	Lasers in Surgery and Medicine 28:141-144 (2001).	2001	<p><b>BACKGROUND AND OBJECTIVE:</b> The aim of this study was to evaluate the efficacy and safety of the intense pulses light source (IPL) and the Nd:YAG laser in the treatment of facial rhytids. Both systems can be used in non-ablative manner and cause a dermal wound. This is thought to stimulate the production of new collagen without epidermal disruption. Non-ablative techniques eliminate the downtime that must be endured by patients treated with ablative methods such as the carbon dioxide and erbium lasers.</p> <p><b>STUDY DESIGN/MATERIALS AND METHODS:</b> Fifteen subjects with perioral rhytids and Fitzpatrick skin types II and III received three-to-five treatments with the IPL using 590 and 755 nm cut-off filters, and the 1,064-nm Nd:YAG laser. The subjects were evaluated at 2, 4, 8, 12, and 24 weeks after the final treatment for improvement in rhytids and presence of any side effects.</p> <p><b>RESULTS:</b> At 6 months, the patient satisfaction score (1-10) was comparable in all three groups. Evaluator assessment of improved skin quality was also similar in all three treatment groups. Side effects such as blistering and erythema were most commonly seen in the subjects treated with the IPL. The least discomfort was seen with the Nd:YAG laser.</p> <p><b>CONCLUSION:</b> Although both non-ablative treatment systems improved facial rhytids presumably by causing a non-specific dermal wound, the Nd:YAG laser was better tolerated and produced fewer side effects.</p>



STUDY	TYPE	TOPIC	TITLE	AUTHORS	RESEARCH SITES	PUBLICATION	YEAR	ABSTRACT
25	Peer reviewed article	IPL Skin Treatments using Photo-rejuvenation	Noninvasive Rejuvenation of Photodamaged Skin Using Serial, Full-Face Intense Pulsed Light Treatments	Patrick H. Bitter, Jr., M.D.	Los Gatos, California	Dermatol Surg 2000;26:835-843	2000	<p><b>BACKGROUND:</b> Photodamaged skin is characterized not only by rhytides, but also by epidermal and dermal atrophy, rough skin texture, irregular pigmentation, telangiectasias, laxity, and enlarged pores. There is growing interest in the development of noninvasive methods to treat photodamaged skin. Skin photorejuvenation is the visible improvement of photodamaged skin using a laser or other light source. A noncoherent, broadband, pulsed light source is effective in the treatment of vascular and pigmented lesions of the skin. This study evaluates the role of intense pulsed light in the rejuvenation of photo aged skin.</p> <p><b>OBJECTIVE:</b> The purpose of this study was to evaluate and quantify the degree of visible improvement in photodamaged skin following a series of full-face, intense pulsed light treatments.</p> <p><b>METHODS:</b> Forty-nine subjects with varying degrees of photo-damage were treated with a series of four or more full-face treatments at 3-week intervals using a nonablative, nonlaser intense pulsed visible light source. Fluences varied from 30 to 50 J/cm<sup>2</sup>. Subject evaluation and skin biopsies were used to assess treatment results.</p> <p><b>RESULTS:</b> All aspects of photodamage including wrinkling, skin coarseness, irregular pigmentation, pore size, and telangiectasias showed visible improvement in more than 90% of subjects with minimal downtime and no scarring. Eighty-eight percent of subjects were satisfied with the overall results of their treatments.</p> <p><b>CONCLUSION:</b> Treatment of photodamaged facial skin using a series of full-face treatments with intense pulsed light is a new and effective noninvasive method of skin rejuvenation with minimal risk and no patient downtime.</p>
26	Peer reviewed article	Treatment of Rhytids	Nonablative Treatment of Rhytids With Intense Pulsed Light	David J. Goldberg, M.D., <sup>1</sup> and Kenneth B. Cutler, M.D. <sup>2</sup>	<sup>1</sup> Division of Dermatology, New Jersey Medical School, Newark, New Jersey 07103 <sup>2</sup> Department of Dermatology, New York Medical College, Valhalla, New York 10021	Lasers in Surgery and Medicine, 2000; Vol. 26: 196-200.	2000	<p><b>BACKGROUND AND OBJECTIVE:</b> The aim of this study was to evaluate the efficacy and complication rate of a nonablative nonlaser light source in the treatment of rhytids. Laser resurfacing, in the treatment of facial rhytids, has involved ablative methods, with their associated complications and limitations. Rhytid improvement requires dermal collagen remodeling. Interest has begun to focus on the use of wavelengths that preserve the epidermis but deliver enough energy to promote rhytid improvement.</p> <p><b>STUDY DESIGN/MATERIALS AND METHODS:</b> Thirty subjects with class I-II rhytids and Fitzpatrick skin types I-II were treated with up to four treatments with an intense pulsed light source. Subjects were evaluated 6 months after the final treatment.</p> <p><b>RESULTS:</b> Twenty-five subjects showed some improvement in the quality of skin. No subjects were found to have total resolution of rhytids.</p> <p><b>CONCLUSION:</b> Nonlaser intense pulsed light may effectively improve some facial rhytids. Such improvement can occur without epidermal ablation.</p>

STUDY	TYPE	TOPIC	TITLE	AUTHORS	RESEARCH SITES	PUBLICATION	YEAR	ABSTRACT
27	Peer reviewed article	Treatment of Rhytids and Dermal Remodeling	New Collagen Formation After Dermal Remodeling With an Intense Pulsed Light Source	David J. Goldberg, M.D.	Division of Dermatology, New Jersey Medical School, Newark, NJ, USA	Journal of Cutaneous Laser Therapy 2000;2:59-61	2000	<p><b>BACKGROUND:</b> Laser resurfacing in the treatment of facial rhytides has traditionally involved ablative methods with their associated complications and limitations. More recently, rhytid improvement and dermal remodeling has been seen with non-ablative approaches. Such laser-induced remodeling may be associated with evidence of new dermal collagen formation.</p> <p><b>OBJECTIVE:</b> The aim of this study was to evaluate the histologic changes seen after the dermal remodeling with a non-laser intense pulsed light source.</p> <p><b>METHODS:</b> Five patients underwent four sessions of dermal remodeling with an intense pulsed light source. All patients received a pretreatment biopsy and a second biopsy 6 months after the final treatment. Biopsies were evaluated for histologic evidence of new collagen formation 6 months after the final treatment.</p> <p><b>RESULTS:</b> All patients showed histologic evidence of new upper papillary dermal collagen formation.</p> <p><b>CONCLUSION:</b> Dermal remodeling with an intense pulsed light source can lead to histologic evidence of new collagen formation with associated clinical improvement.</p>
28	Peer reviewed article	Treatment of 200 Patients for Vascular Lesions with IPL	Treatment of Facial Vascular Lesions With Intense Pulsed Light	Marla C. Angermeier, M.D.	Clinical Assistant Professor, Department of Dermatology, Brown University, Providence, Rhode Island, USA	Journal of Cutaneous Laser Therapy 1999; 1: 95-100	1999	<p><b>BACKGROUND:</b> Various lasers, particularly the flashlamp-pulsed dye laser, have been proven to be effective in the treatment of facial vascular lesions. Nevertheless, the post-treatment side effects, such as pronounced purpura and changes in pigmentation, have been a matter of concern to patients.</p> <p><b>OBJECTIVE:</b> To test the efficacy of an alternative treatment option that uses intense pulsed light to provide patients with a more tolerable post-treatment outcome.</p> <p><b>METHODS:</b> A total of 200 patients were treated with an intense pulsed light source (PhotoDerm® VL) using various treatment parameters. The patients were treated for facial veins (primarily telangiectasia), facial hemangiomas, rosacea and port wine stains.</p> <p><b>RESULTS:</b> Of the 188 patients who returned for follow-up after 2 months, 174 achieved 75% to 100% clearance in one to four treatment sessions. The post-treatment side effects were minimal and well tolerated by the patients. There were no instances of scarring or other permanent side effects.</p> <p><b>CONCLUSION:</b> The PhotoDerm® VL provides a highly effective and safe alternative to the laser for treatment of facial vascular lesions. The device may achieve improved results for lesions that are resistant to laser therapy. The rate and degree of cosmetic side effects are considerably less than with laser treatment.</p>
29	Peer reviewed article	Melasma	Treatment of Melasma and the Use of Intense Pulsed Light: A Review	Lisa Zaleski, D.O. L.C.D.R. M.C. U.S.N., Sabrina Fabi, M.D. & Mitchel P. Goldman, M.D.	Department of Dermatology, US Naval Medical Center Okinawa, Okinawa, Japan.	J Drugs Dermatol. 2012;11(11):1316-1320.	2012	<p>Melasma is a complex multifactorial disorder whose pathogenesis is not well understood. In addition to increased pigmentation, increased vascularity associated with pigmentation is present. A variety of topical treatments targeting pigmentation are available with temporary improvement of mainly the epidermal components of melasma. Intense pulsed light (IPL) is a broadband light source that can target a wide range of cutaneous structures, including deeper pigmentation and vasculature. We describe 5 cases of persistent facial melasma treated with the IPL and a hydroquinone-based skin care system (Obagi Nu-Derm; Obagi Medical Products, Long Beach, CA), showing improvement of facial melasma pigmentation and vascularity.</p>

STUDY	TYPE	TOPIC	TITLE	AUTHORS	RESEARCH SITES	PUBLICATION	YEAR	ABSTRACT
30	Peer reviewed article	Actinic Keratoses	Treatment of Actinic Keratoses With Sequential Combination of 5-Fluorouracil and Photodynamic Therapy	Gilbert DJ, M.D.	Newport Dermatology & Laser Associates, Newport Beach, CA, USA	J Drugs Dermatol, Mar-Apr 2005; 4(2): 161-3.	2005	Actinic keratoses (AKs) are traditionally treated with cryotherapy, curettage, and 5-fluorouracil (5-FU, Efudex, ICN Pharmaceuticals, Inc.), all of which are associated with adverse effects. Although photodynamic therapy (PDT) with topical 5-aminolevulinic acid (ALA) offers a treatment alternative, current protocols require 14 to 18 hours incubation with ALA and patients experience pain during light treatment. Fifteen patients with multiple and diffuse facial AKs applied 5-FU nightly for 5 days and underwent PDT with ALA (Levulan Kerastick, Dusa Pharmaceuticals, Inc.) on the sixth day. ALA was applied to their entire faces and remained in contact with the skin for 30 to 45 minutes under low-intensity visible light. After removing ALA, faces received a single pass of 560- to 1200-nm intense pulsed light (VascuLight or Lumenis One, Lumenis). At 1 month and at 1 year post-treatment, 90% of treated AKs had resolved in all but one patient. Erythema resolved 7 to 10 days after treatment. Patients with multiple diffuse AKs may benefit from the application of 5-FU for 5 days followed by ALA-PDT with intense pulsed light activation.
31	Peer reviewed article	Acne Vulgaris	Effectiveness of Photodynamic Therapy With Topical 5-Aminolevulinic Acid and Intense Pulsed Light Versus Intense Pulsed Light Alone In the Treatment of Acne Vulgaris: Comparative Study	Ma. Arianee V. Santos M.D., Victoria G. Belo M.D., Guada Santos M.D.	Belo Medical Group, Metro Manila, Phillipines	Dermatol Surg, Aug 2005; 31(8 Pt 1): 910-5.	2005	<b>BACKGROUND:</b> Photodynamic therapy (PDT) involves the activation of a photosensitizing agent by light to produce oxygen intermediates that destroy target tissues. Topical 5-aminolevulinic acid (ALA) is converted to protoporphyrin IX, a very potent photosensitizer, which accumulates in human skin, particularly in the epidermis and its appendages. <b>OBJECTIVE:</b> To study the effect of PDT in acne vulgaris using topical ALA and intense pulsed light (IPL). <b>METHODS:</b> Thirteen individuals with varying degrees of acne were treated after a 3-week washout period. Twenty percent ALA hydrochloride (DUSA Pharmaceuticals, Wilmington, MA, USA) was applied to half of the face, and after 3 hours, the whole face was exposed to intense pulsed light (Quantum SR, Lumenis, Santa Clara, CA, USA) using a 560 nm cutoff filter starting at a fluence of 26 J/cm. The procedure was done twice at 2-week intervals, and the patients were clinically evaluated on the second, fourth, and eighth weeks. <b>RESULTS:</b> All patients had no apparent improvement on the second week on both facial halves. In fact, some of the patients developed acute acneiform eruptions on the side treated with ALA. By the fourth week, however, most of the patients had visible improvement of facial acne that was more significant on the ALA-treated side of the face. This persisted until the eighth week post-treatment. On the other hand, the facial half treated with intense pulsed light only showed a return to baseline of their facial acne. <b>CONCLUSION:</b> ALA-IPL are beneficial in the management of acne vulgaris and may be used in combination with other forms of acne treatment or may be an alternative treatment for patients who do not want to take systemic retinoids.

STUDY	TYPE	TOPIC	TITLE	AUTHORS	RESEARCH SITES	PUBLICATION	YEAR	ABSTRACT
32	Peer reviewed article	Sebaceous Gland Hyperplasia	Treatment of Sebaceous Gland Hyperplasia by Photodynamic Therapy With 5-Aminolevulinic Acid and a Blue Light Source or Intense Pulsed Light Source	Michael H. Gold, M.D., Virginia L. Bradshaw, R.N., NPC, Molly M. Boring, R.N., NPC, Tancy M. Bridges, R.N., NPC, Julie A. Biron, BSCy, Tammy Lewis LPN	Gold Skin Care Center, Nashville, TN, USA.	J Drugs Dermatol, Nov-Dec 2004; 3(6 Suppl): S6-9.	2004	Treatment of SGH by ALA-PDT with Blue Light Source or Intense Pulsed Light Activation. Sebaceous gland hyperplasia (SGH) lesions often present as a sign of photoaging and have proven difficult to treat. Photodynamic therapy (PDT) may be an effective treatment option. Twelve patients with SGH received PDT with 5-aminolevulinic acid (ALA, Levulan Kerastick, DUSA Pharmaceuticals, Inc) photosensitizing agent topically applied with a 30- to 60-minute drug incubation period. Patients received either 405-420 nm blue light (ClearLight PhotoClearing System, CureLight, Lumenis) for 15 minutes or intense pulsed light (IPL), 500-1,200 nm and 550 nm cut-off filter (VascuLight System, Lumenis) according to a randomization protocol. ALA-PDT was administered once per month for 4 consecutive months. Progress was evaluated at 4 and 12 weeks after the final treatment. More than a 50% reduction in the number of SGH lesions was achieved for patients in both treatment arms without lesional recurrence during the treatment and follow-up periods. All treatments were well-tolerated. Adverse effects were limited to mild, transient erythema (n = 2) and blisters (n = 1), which resolved without sequelae. ALA-PDT with either blue light or IPL photoactivation may provide therapeutic benefit without significant adverse effects in patients with SGH. with combination therapy. In addition, an added improvement in the full-face aesthetic with both BTX-A and BBL therapy combined was obvious. These results suggest that both treatments--although evidently complementary--may also act synergistically to produce optimal clinical effects, revolutionizing the treatment of facial aging.

STUDY	TYPE	TOPIC	TITLE	AUTHORS	RESEARCH SITES	PUBLICATION	YEAR	ABSTRACT
33	Peer reviewed article	IPL Skin Treatments Using Photorejuvenation and Wrinkles	The Effect of Full-Face Broadband Light Treatments Alone and in Combination With Bilateral Crow's Feet Botulinum Toxin Type A Chemodeneration	Carruthers J, M.D., Carruthers A. M.D.	Ophthalmology, University of British Columbia, Vancouver, BC, Canada.	Dermatol Surg, Mar 2004; 30(3): 355-66; discussion 366.	2004	<p><b>BACKGROUND:</b> Broadband light (BBL; Intense Pulsed Light; Lumenis Ltd., Yokneam, Israel) is a powerful, nonablative, light-based technology that targets melanin and hemoglobin and stimulates the formation of collagen and elastin. Botulinum toxin type A (BTX-A; BOTOX; Allergan Inc., Irvine, CA) treatment of the lateral periorcular region relaxes the vertical fibers of the orbicularis oculi and results in softening of the lateral orbital crow's feet rhytides and widening of the palpebral aperture.</p> <p><b>OBJECTIVE:</b> To compare the effects of full-face BBL in combination with BTX-A and BBL alone in female subjects with Fitzpatrick I-III skin types, Glogau II-III rhytides, and significant associated facial lentigines and telangiectasia.</p> <p><b>METHODS:</b> This was a prospective, randomized study of 30 women with moderate to severe crow's feet rhytides. Half of the subjects were treated with BTX-A and BBL and the other half with BBL alone. Their response was assessed clinically and photographically. Skin biopsies of the temporal skin were taken from two subjects in each group and were stained with Masson trichrome.</p> <p><b>RESULTS:</b> Patients treated with a combination of BTX-A and BBL experienced a better response to treatment, both at rest and on maximum smile, as well as a slightly improved response in associated lentigines, telangiectasia, pore size, and facial skin texture compared with patients who received BBL treatment alone. Skin biopsies showed an increase in dermal collagen in each group.</p> <p><b>CONCLUSIONS:</b> The patients in this study benefited from both treatments. Although BBL led to a remarkable improvement in full-face telangiectasias, lentigines, and skin texture, the improvement increased in all categories with combination therapy. In addition, an added improvement in the full-face aesthetic with both BTX-A and BBL therapy combined was obvious. These results suggest that both treatments--although evidently complementary--may also act synergistically to produce optimal clinical effects, revolutionizing the treatment of facial aging.</p>
34	Peer reviewed article	Vascular-ity and Pigmentation of Scars	The Use of Intense Pulsed Light in the Treatment of Scars	P.P. Kontoes, M.D., K.V. Marayian-nis, M.D., S.P.Vlachos, M.D.	Laserlight Clinic for Plastic and Laser Surgery, Laser Aesthetic Surgery Department, Hygeia Hospital, Athens Greece	European Journal of Plastic Surgery, 2003; Vol. 25: 374-377.	2003	<p>Skin healing results in scar formation, which can be atrophic, proliferative, erythematous, or pigmented. Many different procedures are available for improving scars: surgical, topical medications, local irradiation, cryosurgery, and ablative or nonablative lasers. Intense pulsed light sources emit noncoherent, broadband wavelength, pulsed light that can treat vascular and pigmented lesions and therefore act on the vasculature and the pigmentation of a scar to improve its appearance and/or symptoms that may coexist. We present our experience with intense pulsed light in the treatment of scars over a 3-year period. Patient satisfaction is high in the majority of cases, and combination with other treatments has yielded the best results. Intense pulsed light treatments are applicable to and effective in almost all types of scars and can easily be combined with other treatment methods.</p>

STUDY	TYPE	TOPIC	TITLE	AUTHORS	RESEARCH SITES	PUBLICATION	YEAR	ABSTRACT
35	Peer reviewed article	Striae Treatment	Intense Pulsed Light in the Treatment of Striae Distensae	Enrique Hernández-Pérez, M.D., Emilio Colombo-Charrier, M.D. & Erick Valencia-Ibieta, M.D.	Center for Dermatology and Cosmetic Surgery, San Salvador, El Salvador	Dermatologic Surgery, 2002; Vol. 28(12): 1124-1130	2002	<p><b>BACKGROUND:</b> Intense Pulsed Light (IPL) is a noncoherent, nonlaser, filtered flashlamp, emitting a broadband visible light. Its efficacy has been reported recently in the treatment of photodamaged facial skin, promoting the production of neo collagen and ordering of elastic fibers. We don't know however, its efficacy in the treatment of striae distensae.</p> <p><b>OBJECTIVE:</b> To assess gross and microscopical changes that occur in the striae distensae when treated by IPL.</p> <p><b>METHODS:</b> A prospective study was carried out in 15 women, all of them having late stage striae distensae of the abdomen. Five sessions of IPL were performed in each one, once every two weeks. Skin biopsies and before and after photographs were taken of all the patients. Data concerning skin features (number of stretch marks in a square of 5 cm per side, sum of all the stretch marks to determine the total length, discolorations and general appearance) were all assessed before each session and at the end of the study. Microscopical changes were all carefully assessed. For the statistical analysis a "t" test for small samples was used.</p> <p><b>RESULTS:</b> All patients showed clinical and microscopical improvement in each one of the parameters assessed. The "t" test for small samples showed a statistically significant difference (<math>p &lt; 0.01</math>) in the post treatment dermal thickness.</p> <p><b>CONCLUSION:</b> Striae distensae improved clinically and microscopically after IPL. It seems to be a promising method of treatment for this common problem with minimal side-effects, a wide safety margin and no downtime.</p>
36	Peer reviewed article	Facial Teleangectasias Treated in 518 Patients	Facial Telangectasias: Our Experience in Treatment With IPL	Matteo Tretti Clementoni, M.D. <sup>1</sup> , Patrizia Gi-lardino, M.D. <sup>1</sup> , Massimo Signorini, M.D. <sup>1</sup> , Antonio Pistorale, M.D. <sup>2</sup> , Paolo G. Morselli, M.D. <sup>2</sup> , & Carlo Cavina, M.D. <sup>2</sup>	<sup>1</sup> Surgery and Laser Section, European Dermatologic Institute, Milan, Italy <sup>2</sup> Plastic Surgery Department, Bologna's University, Bologna, Italy	Lasers Surg Med, Jul 2005; 37(1): 9-13.	2005	<p><b>BACKGROUND AND OBJECTIVES:</b> Facial teleangectasias can be a relevant cosmetic problem, which the patient usually hides with a thick layer of makeup. This study will describe the response on these vascular lesions using the intense pulsed light (IPL) source.</p> <p><b>METHODS:</b> Five hundred eighteen consecutive patients were treated with Photoderm VL (Lumenis Ltd.). The average age of patients of various skin types (Fitzpatrick I to IV) was 48.5 years. They were subjected to a mean of 1.69 treatments (range 1-9) followed up 48 hours, 72 hours, 1 week, 3 weeks, and 1 month after each treatment. All patients were followed up after 2 months from the last treatment and the percentage of clearance was assessed by comparing pre- and post-treatment photographs. The patients also answered a questionnaire in which they expressed personal satisfaction. The physicians evaluation was also recorded on the same form.</p> <p><b>RESULTS:</b> Patients (87.64%) presented a clearance of 75%-100%. The results appear not correlated with lesions size, age, skin type but with operator experience. Minimal side adverse effects occurred in 20% of the patients.</p> <p><b>CONCLUSION:</b> The IPL source, Photoderm VL, can be considered an alternative or a supplement to the existing laser devices for facial teleangectasias treatment.</p>

STUDY	TYPE	TOPIC	TITLE	AUTHORS	RESEARCH SITES	PUBLICATION	YEAR	ABSTRACT
37	Peer reviewed article	Melasma	Intense Pulsed Light For the Treatment of Refractory Melasma in Asian Persons	Wang CC, Hui CY, Sue YM, Wong WR, Hong HS.	Department of Dermatology, Cardinal Tien Hospital, Hsintien, Taipei, Taiwan.	Dermatol Surg, Sep 2004; 30(9):1196-200.	2004	<p><b>BACKGROUND:</b> Patients with dermal or mixed-type melasmas are often refractory to various treatments. Intense pulsed light has been used to treat melanocytic lesions with promising results.</p> <p><b>OBJECTIVE:</b> The purpose of this study was to clarify the effectiveness of intense pulsed light for refractory melasma in Asian persons.</p> <p><b>METHODS:</b> Seventeen patients were treated with intense pulsed light, during four sessions at 4-week intervals. The patients were also given 4% hydroquinone cream and broad-spectrum sunscreens to prevent and treat postinflammatory hyperpigmentation. Sixteen patients in the control group were treated with hydroquinone cream and sunscreens. The treatment efficacy was evaluated using reflectance spectrophotometer and patient satisfaction questionnaire.</p> <p><b>RESULTS:</b> Patients in the intense pulsed light group achieved an average of 39.8% improvement in relative melanin index, compared to 11.6% improvement in the control group (<math>p &lt; 0.05</math>) at Week 16. Six (35%) patients in the intense pulsed light group had more than 50% improvement, compared to two (14%) patients in the control group. Two patients in the intense pulsed light group, however, experienced transient postinflammatory hyperpigmentation, and partial repigmentation was noted 24 weeks after the last treatment session.</p> <p><b>CONCLUSION:</b> Intense pulsed light is a safe and effective treatment for refractory melasma in Asian persons, with minimal side effects. Further treatment sessions are required for maintenance therapy.</p>
38	Peer reviewed article	Rosacea	Objective and Quantitative Improvement of Rosacea-Associated Erythema After Intense Pulsed Light Treatment	Mark KA, Sparacio RM, Voigt A, Marenus K, Samoff DS.	Department of Dermatology, New York University School of Medicine, New York, USA.	Dermatol Surg, Jun 2003; 29(6): 600-4.	2003	<p><b>BACKGROUND:</b> Despite the widespread and quite successful use of various lasers and light sources to treat facial erythema, the literature contains little, if any, objective and quantitative improvement. In addition, very few studies specifically address rosacea-associated erythema.</p> <p><b>OBJECTIVE:</b> To assess quantitatively the degree of improvement in patients with rosacea after intense pulsed light treatment. The three main parameters that were objectively measured were blood flow, telangiectasia, and erythema.</p> <p><b>METHODS:</b> Four patients with rosacea-associated erythema and telangiectasia were treated five times at 3-week intervals with the Photoderm VL (Lumenis, Needham, MA). The 515-nm filter, a single pulse duration of 3 ms, and various fluences were used. Blood flow was measured by the scanning laser Doppler. Close-up photography ensured reproducibility and enabled quantification of telangiectasia and erythema by subsequent computer image analysis. Measurements were taken at baseline and at 1 month after the last treatment.</p> <p><b>RESULTS:</b> The scanning laser Doppler demonstrated a 30% decrease in blood flow (<math>P &lt; 0.05</math>). A 29% decrease in actual area of the cheek occupied by telangiectasia was noted (<math>P &lt; 0.05</math>). A 21% decrease in the intensity of erythema was noted (<math>P &lt; 0.05</math>).</p> <p><b>CONCLUSION:</b> As demonstrated by truly objective and quantitative means, intense pulsed light is effective for reducing rosacea-associated blood flow, telangiectasia, and erythema.</p>



STUDY	TYPE	TOPIC	TITLE	AUTHORS	RESEARCH SITES	PUBLICATION	YEAR	ABSTRACT
39	Peer reviewed article	Port Wine Stains	Treatment of Widespread Generalized Congenital Aberrant Telangiectasia With a Flash-light Source	Podmore P. M.D.	Altnagelvin Area Hospital, Glenshar Road, Londonderry, Northern Ireland.	Journal of Cutaneous Laser Therapy, 2000; Vol. 2: 79-80.	2000	Port wine stains have been in the past successfully treated with various different types of laser. Variable results have been achieved. Treatment programmes tend to be prolonged, which can cause considerable patient inconvenience in terms of post-treatment morbidity. This young man underwent successful treatment with the Photoderm VL with minimal post-treatment morbidity and therefore minimal disruption of his lifestyle. During the course of treatment as a result of the changing nature of his lesion due to response to treatment, different wavelength cut-off filters were required.
40	Peer reviewed article	Erythema and Rosacea	Intense Pulsed Light Treatment for Chronic Facial Erythema of Systemic Lupus Erythematosus: A Case Report	Levy JL. M.D.	Centre Laser Dermatologique, 3, bd Lord Duveen, Marseille, France.	Journal of Cutaneous Laser Therapy, 2000; Vol. 2: 195-198.	2000	<b>BACKGROUND:</b> A 33-year-old woman, who had been diagnosed previously with systemic lupus erythematosus, presented with chronic erythema and rosacea of the face. The patient suffered from flushing and burning of the facial skin and sought prior treatment with anti-malarial drugs. <b>METHOD:</b> After various treatment options were discussed with the patient, she agreed to undergo intense pulsed light therapy. <b>RESULTS:</b> Improvement was noted after the first session and 75% clearance was observed at 1 month after a second session. There were no adverse effects associated with the treatment. One year later it was observed that the results of the two treatments had been maintained. <b>CONCLUSION:</b> This case report suggests that there is another safe and efficacious alternative for treatment of chronic erythema and rosacea.
41	Peer reviewed article	Poikiloderma of Civatte - 135 Patients	Treatment of Poikiloderma of Civatte with an Intense Pulsed Light Source	Robert A. Weiss M.D. <sup>1</sup> , Mitchel P. Goldman M.D. <sup>2</sup> , Margaret A. Weiss M.D. <sup>1</sup>	<sup>1</sup> Johns Hopkins University School of Medicine, Baltimore, Maryland, USA. <sup>2</sup> University of California, San Diego, San Diego, California	Dermatologic Surgery, 2000; Vol. 26: 823-828	2000	<b>BACKGROUND:</b> Effective treatment of poikiloderma of Civatte combines elimination of both the vascular and pigmented components simultaneously. A broad spectrum, noncoherent, intense pulsed light (IPL) source delivers multiple wavelengths with software controlled pulse durations and sequencing, which permits treatment of both vascular and pigmented lesions simultaneously. <b>OBJECTIVE:</b> To determine response and side effects of poikiloderma of Civatte of the neck and chest when treated by IPL. <b>METHODS:</b> One hundred and thirty-five patients randomly selected with typical changes of poikiloderma of Civatte on the neck and/or upper chest were treated with one to five treatments using IPL. <b>RESULTS:</b> Clearance of more than 75% of telangiectasias and hyperpigmentation comprising poikiloderma was observed. The incidence of side effects was 5%, including pigment changes. In many cases, improved skin texture was noted both by physician and patient. <b>CONCLUSION:</b> IPL is an effective mode of therapy for poikiloderma of Civatte. It offers a reduction of pigment and telangiectasias with a low risk profile. Additional benefits include subjective changes of improvement in skin texture.





STUDY	TYPE	TOPIC	TITLE	AUTHORS	RESEARCH SITES	PUBLICATION	YEAR	ABSTRACT
42	Peer reviewed article	Port Wine Stains	New Approaches to the Treatment of Vascular Lesions	Dover JS, M.D., Arndt KA. M.D.	Cosmetic Surgery and Laser Center, Department of Dermatology, Beth Israel Deaconess Medical Center, Harvard Medical School, Boston, Massachusetts, USA.	Lasers in Surgery and Medicine, 2000; Vol. 26: 158-163.	2000	<p><b>BACKGROUND AND OBJECTIVE:</b> The pulsed dye laser was developed based on the concept of selective photothermolysis. By using a wavelength of light well absorbed by the target and pulse duration short enough to spatially confine thermal injury, specific vascular injury could be produced.</p> <p><b>STUDY DESIGN/MATERIALS AND METHODS:</b> Although the pulsed dye laser revolutionized the treatment of port wine stains (PWS) and a variety of other vascular lesions, the ideal thermal relaxation time for the vessels in PWS is actually 1-10 ms, not 450 micros of the original pulsed dye laser machines. These original theoretical calculations recently have been proven correct in a study that used both an animal vessel model and in human PWS.</p> <p><b>RESULTS:</b> Longer wavelengths of light, within the visible spectrum, penetrate more deeply into the skin and are more suitable for deeper vessels, whereas longer pulse durations are required for larger caliber vessels.</p> <p><b>CONCLUSION:</b> A variety of lasers recently have been developed for the treatment of vascular lesions which incorporate these concepts into their design, including pulsed dye lasers at 1.5 ms, a filtered flash-lamp pulsed light source with pulse durations of 1-20 ms, several 532-nm pulsed lasers with pulse durations of 1 ms to as high as 100 ms, long pulsed alexandrite lasers at 755 nm with pulse durations up to 20 ms, pulsed diode lasers in the 800 to 900 nm range, and long pulsed 1064 Nd:YAG sources.</p>
43	Peer reviewed article	Port Wine Stains	Treatment of Port-wine Stains With a Noncoherent Pulsed Light Source: A Retrospective Study	Christian Raulin, M.D. <sup>1</sup> ; Careen A. Schroeter, M.D. <sup>2</sup> ; Robert A. Weiss, M.D. <sup>3</sup> ; Michael Keiner, M.D. <sup>4</sup> ; Saskia Werner, M.D. <sup>1</sup>	<sup>1</sup> Laserklinik, Karlsruhe, Germany; <sup>2</sup> Department of Lasertherapy, Medical Centre, Maastricht, the Netherlands; Department of Dermatology, <sup>3</sup> Johns Hopkins University, Baltimore, Md; and <sup>4</sup> Center for Laser Therapy, Braunfels, Germany.	Archives of Dermatology, 1999; Vol. 135: 679-683	1999	<p><b>OBJECTIVE:</b> We investigated whether a noncoherent intense pulsed light source (IPLS) would be effective in therapy of port-wine stains (PWSs).</p> <p><b>DESIGN:</b> To evaluate the efficacy in treatment of PWSs with IPLS, a retrospective study was initiated.</p> <p><b>SETTING:</b> The data were collected by physicians working in private practices and departments of university hospitals and medical centers, respectively.</p> <p><b>PATIENTS:</b> A total of 37 randomly selected patients with a total of 40 PWSs were included in the study. Clinical PWS characteristics recorded were color and location of the PWS.</p> <p><b>Interventions:</b> All patients were treated with IPLS.</p> <p><b>MAIN OUTCOME MEASURES:</b> Data collected included treatment parameter (filters, pulse duration, fluence, and pulse sequencing), percentage of clearance, and side effects (purpura, blisters, crusting, altered pigmentation, and scarring).</p> <p><b>RESULTS:</b> Good and complete (70%-100%) clearance was achieved in 28 of 40 PWSs treated with IPLS. The average number of treatment sessions in PWSs reaching 100% clearance included 4.0 for pink PWSs and 1.5 for red PWSs. The average number of sessions for purple PWSs reaching good clearance (70%-99%) was 4.2 sessions. Parameters used most frequently were 515- and 550-nm cutoff filters, pulse duration of 2.5 to 5.0 milliseconds, and fluences of 24 to 60 J/cm<sup>2</sup>. Side effects included purpura in 133 (76%), superficial blisters in 14 (8%), and crusting in 35 (20%). Transient pigmentation changes were seen in 10.8% of patients (hypopigmentation in 3 [8.1%], hyperpigmentation in 1 [2.7%]). No scarring was observed.</p> <p><b>CONCLUSION:</b> Intense pulsed light source presents an effective and safe method for treating PWSs, especially purple PWSs.</p>

STUDY	TYPE	TOPIC	TITLE	AUTHORS	RESEARCH SITES	PUBLICATION	YEAR	ABSTRACT
44	Peer reviewed article	Port Wine Stains	Treatment of Mature Port Wine Stains With the PhotoDerm VL	Sandeep Cliff, MRCP, M.D. & Klaus Misch, FRCP, M.D.	Department of Dermatology, Kingston Hospital, Surrey, UK.	Journal of Cutaneous Laser Therapy, 1999; Vol 1: 101-104.	1999	Port wine stains (PWS) are congenital vascular naevi. Their presence is the cause of significant psychological morbidity due to their cosmetic appearance. The flashlamp-pumped dye laser (FPDL) is considered to be the treatment of choice for PWS. However, there is a recognized morbidity related to the use of the FPDL. The PhotoDerm VL is a broad spectrum, non-coherent, intense pulsed light source which has been shown to be an effective tool in the treatment of a number of vascular lesions including PWS. Our strategy was to assess the effectiveness of the PhotoDerm VL in the treatment of mature PWS in three fair skinned subjects. Three patients with mature PWS were recruited. They were treated at 6-weekly intervals with the PhotoDerm VL machine using predetermined parameters and assessed at each visit prior to treatment. In all three patients there was at least a 50% improvement in the clinical appearance of the lesions as assessed by both operator and patient. No complications were reported. Further treatments in two patients, however, failed to produce any further clinical improvement. We conclude that the PhotoDerm VL appears to be a promising treatment for PWS with no post-operative complications. However, a comparative study with the FPDL needs to be undertaken to determine the most effective therapy option for patients with this disfiguring cutaneous lesion.
45	Peer reviewed article	Vascular Lesions with IPL - 200 Patients	Treatment of Facial Vascular Lesions With Intense Pulsed Light	Angermeier MC, M.D.	Department of Dermatology, Brown University, Providence, Rhode Island, USA.	Journal of Cutaneous Therapy, 1999; Vol. 1: 95-100. (AR2000019)	1999	<b>BACKGROUND:</b> Various lasers, particularly the flashlamp-pulsed dye laser, have been proven to be effective in the treatment of facial vascular lesions. Nevertheless, the post-treatment side effects, such as pronounced purpura and changes in pigmentation, have been a matter of concern to patients. <b>OBJECTIVE:</b> To test the efficacy of an alternative treatment option that uses intense pulsed light to provide patients with a more tolerable post-treatment outcome. <b>METHODS:</b> A total of 200 patients were treated with an intense pulsed light source (PhotoDerm VL) using various treatment parameters. The patients were treated for facial veins (primarily telangiectasia), facial hemangiomas, rosacea and port wine stains. <b>RESULTS:</b> Of the 188 patients who returned for follow-up after 2 months, 174 achieved 75% to 100% clearance in one to four treatment sessions. The post-treatment side effects were minimal and well tolerated by the patients. There were no instances of scarring or other permanent side effects. <b>CONCLUSION:</b> The PhotoDerm VL provides a highly effective and safe alternative to the laser for treatment of facial vascular lesions. The device may achieve improved results for lesions that are resistant to laser therapy. The rate and degree of cosmetic side effects are considerably less than with laser treatment.

STUDY	TYPE	TOPIC	TITLE	AUTHORS	RESEARCH SITES	PUBLICATION	YEAR	ABSTRACT
46	Peer reviewed article	Venous Malformations	Treatment of Venous Malformations With an Intense Pulsed Light Source (IPLS) Technology: A Retrospective Study	Christian Raulin M.D., Saskia Werner M.D.	Laserklinik Karlsruhe, Karlsruhe, Germany	Lasers in Surgery and Medicine, 1999; Vol. 25: 170-177.	1999	<p><b>BACKGROUND AND OBJECTIVE:</b> The intense pulsed light source (IPLS) technology provides an innovative concept in the treatment of vascular lesions. We investigated the effectiveness of IPLS in the treatment of venous malformations.</p> <p><b>STUDY DESIGN/MATERIALS AND METHODS:</b> A retrospective study of 11 patients with venous malformations (VMA) treated with IPLS was initiated. Clinical VMA characteristics recorded were size and location. Data collected included treatment parameters (filters, pulse duration, fluence, and pulse sequencing), % clearance, and side effects (e.g., swelling, blisters, crusting, pain, altered pigmentation, and scarring).</p> <p><b>RESULTS:</b> Good and very good (70–100%) clearance was achieved in 8 malformations smaller than 100 cm<sup>2</sup>. Especially small lesions needed only 2–3 treatments. Three VMA larger than 100 cm<sup>2</sup> could be cleared well in an average of 18 sessions. The most frequently used parameters were the 590 nm filter in long pulse mode, triple pulses, and fluences at an average of 80.4 J/cm<sup>2</sup>. Side effects included prolonged erythema in 23.6, swelling in 17.9%, crusting in 4.7%. Bleeding, hypo-, hyperpigmentation, and scarring were rare (0.9% respectively).</p> <p><b>CONCLUSION:</b> IPLS presents an effective method for treating VMA, especially small malformations, with a justifiable rate of side effects when optimal parameters are chosen.</p>
47	Peer reviewed article	Vascular Lesions with IPL	Treatment of a Venous-Lake Angioma With Intense Pulsed Light	Harvey H. Jay, M.D. <sup>1</sup> , Carmia Borek, Ph.D. <sup>2</sup>	<sup>1</sup> Cornell University Medical College, New York, NY, USA; <sup>2</sup> Department of Community Health, Tufts University School of Medicine, Boston, MA, USA.	The Lancet, 1998; Vol. 351(9096): 112.	1998	<p>Venous-lake angiomas are dilated venules in the upper dermis that are lined by a layer of endothelial cells and a thin wall of fibrous tissue. They appear as tender dark blue nodules and are usually seen on the lips and ears of older people.</p> <p>Treatment is for cosmetic reasons or because of recurrent bleeding. Treatment of venous lakes by excision, cyrosurgery, or electrocoagulation has been complicated by bleeding, swelling, and pain. Treatment with the argon laser may leave scars, and the flashlamp-pulsed-dye laser produces purpura lasting several weeks. A new intense pulsed light source (IPL), the PhotoDerm VL (ESC Medical Systems, Yokneam Israel), characterised by a broad spectrum and a longer variable pulse duration, is effective in the treatment of various vascular lesions with minimal side-effects. A pulse width is chosen to deliver light energy within the thermal relaxation time (cooling time) of the target vessels. The large spot size (8 X 35 mm) allows deeper photon penetration. We report treatment of venous angioma with the Photoderm VL IPL. The treated lesion was 11 mm in diameter and 4 mm deep on the right upper lip of a 70 year-old woman (figure top), and had been present for over 3 years. A cool thermosculpting gel, BVL (ESC Medical Systems), was applied to the area of the venous lake before treatment. We used wavelengths above 599nm, a triple pulsemode delivering an average fluence of 67.5 J/cm<sup>2</sup> in three consecutive pulses, separated by an average 50ms delay, with an average 5.1 ms duration per pulse. Six such triple pulses were delivered to the lesion during one treatment session. No anaesthesia was required. The lesion lightened immediately after treatment, with no purpura. 33 days after treatment the area was normal in appearance and to palpation.</p>

STUDY	TYPE	TOPIC	TITLE	AUTHORS	RESEARCH SITES	PUBLICATION	YEAR	ABSTRACT
48	Peer reviewed article	Vascular Lesions with IPL	An Intense Light Source. The Photoderm VL-Flashlamp As a New Treatment Possibility for Vascular Skin Lesions	Schroeter CA, M.D., Neumann HA, M.D.	Department of Laser-therapy, Medical Centre Maastricht, The Netherlands.	Dermatologic Surgery, 1998; Vol. 24: 743-748.	1998	<p><b>BACKGROUND:</b> Up to now, vascular diseases were treated with various lasers, such as argon, pulsed dye, and copper vapor lasers, which can lead to side effects like hypopigmentations, hyperpigmentations, and scarring. We treated patients with vascular lesions with an incoherent intense light source, the PhotoDerm VL-flashlamp.</p> <p><b>OBJECTIVE:</b> The aim of the study was to test the effectiveness and safety of the PhotoDerm VL for vascular skin lesions.</p> <p><b>METHODS:</b> One hundred and twenty patients with facial or leg telangiectasias, spider nevi, erythrosis interfollicularis, and senile angiomas were treated with the PhotoDerm VL.</p> <p><b>RESULTS:</b> In 73.6% of patients there was an immediate clearing, and in 84.3% a clearing after 1 month was found of leg telangiectasias up to 1 mm in diameter. Facial telangiectasias and erythrosis interfollicularis colli showed clearance up to 90%. Spider nevi and senile angiomas often only needed to be treated once.</p> <p><b>CONCLUSION:</b> From our experience we conclude that the PhotoDerm VL is an excellent device to treat vascular lesions as there were hardly any side effects seen, however, the user needs a sufficient experience to get good results.</p>
49	Book	Vascular Lesions with IPL	Treatment of Benign Vascular Lesions with the Photoderm VL High-Intensity Pulsed Light Source	Mitchel P. Goldman M.D.	Associate Clinical Professor of Dermatology, University of California, San Diego.	Advances in Dermatology, 1997; Vol. 13(Chapter 15): 503-521.	1997	
50	Peer reviewed article	Port Wine Stains	Treatment of a Nonresponding Port-Wine Stain with a New Pulsed Light Source (PhotoDerm VL)	Raulin C, Hellwig S, Schönemark MP.	Center for Dermatologic Laser Surgery, Karlsruhe, Germany.	Lasers in Surgery and Medicine, 1997; Vol. 21: 203-208.	1997	<p><b>BACKGROUND AND OBJECTIVE:</b> The pulsed dye laser is effective and safe in the treatment of port-wine stains. It is the laser of choice for port-wine stains and initial superficial hemangiomas in children. For the treatment of darker port-wine stains in adults that have not responded to pulsed dye laser treatment, excellent results can be achieved using the PhotoDerm VL, a new technology based upon the emission of wide band, noncoherent intense pulsed light.</p> <p><b>STUDY DESIGN/PATIENT AND METHODS:</b> Our report presents a patient with a facial port-wine stain that hardly responded to previous pulsed dye laser therapy. After the first ineffective treatment trial, the patient refused further dye laser applications. An intense pulsed light source (Photoderm VL) was applied instead.</p> <p><b>RESULTS:</b> The lesion responded well after the first treatment session and was completely resolved after four treatments with the PhotoDerm VL.</p> <p><b>CONCLUSIONS:</b> The new intense pulsed light source Photoderm VL seems to be a promising treatment alternative for the therapy of otherwise nonresponding port-wine stains due to its special technical features.</p>

STUDY	TYPE	TOPIC	TITLE	AUTHORS	RESEARCH SITES	PUBLICATION	YEAR	ABSTRACT
51	Peer reviewed article	Vascular Lesions with IPL	Treatment of Benign Venous Malformations with an Intense Pulsed Light Source (PhotoDerm®VL)	C. Raulin, M.D., S.J. Raulin, M.D., S. Hellwig, M.D., M.P. Schönemark, M.D.	Centre for Dermatologic Laser Therapy, Kaiserstrasse 104, Karlsruhe, Germany.	European Journal of Dermatology. Volume 7, Number 4, 279-82, June 1997, Thérapie	1997	Deep-seated, hemangiomatic lesions may be treated by surgical excision, sclerosing therapy, laser treatment and possibly by radiotherapy. An intense, non-coherent pulsed light source, the PhotoDerm® VL, offers an innovative therapeutic concept. We report on two of our patients, who suffered from benign, but extensive, vascular venous malformations, which had not been amenable to other treatments available. With wavelengths of > 590 nm, fluences between 40 and 70 J/cm <sup>2</sup> , and relatively long pulses, lesions at depths of up to 1.2 cm could be targeted effectively. The more superficial vessels were treated by shorter, but multiple pulses and lower fluences. There was a very good response, as post-therapeutic sonography showed a complete obliteration of the respective vessels. The PhotoDerm® VL device turned out to be extremely effective in the treatment of these otherwise resistant, vascular deformities and led to very good functional and aesthetic results.
52	Peer reviewed article	Vascular Lesions with IPL	Treatment of Essential Telangiectasias with an Intense Pulsed Light Source (PhotoDerm VL)	C. Raulin, M.D., R.A. Weiss, M.D., M.P. Schönemark M.D.	Center for Dermatologic Laser Therapy, Karlsruhe, Germany.	Dermatologic Surgery, 1997; Vol. 23(10): 941-946.	1997	<b>BACKGROUND:</b> The flashlamp-pumped pulsed dye laser (585 and 577 nm) has proven to be a very effective and safe treatment option in the therapy of essential telangiectasias (ETE). Nevertheless, the postoperative intracutaneous hematoma, which most patients see as cosmetically disfiguring, always has been a matter of concern. <b>OBJECTIVE:</b> To test the efficacy and safety of a new, large spot size, intense pulsed light source, the PhotoDerm VL, which omits noncoherent light adjustable within the 515-1200-nm range, in the treatment of ETE. <b>METHODS:</b> Fourteen patients were treated with the PhotoDerm VL. They suffered from ETE of the face, postoperative teleangiectasis of the nose, ETE of both legs, and poikiloderma of Civatte. <b>RESULTS:</b> All treated lesions could be abrogated with excellent results by this new device. There were no unpleasant side effects of the treatment. Additionally, due to the large spot size (2.8 cm <sup>2</sup> ), a larger area could be treated within one session. No anesthesia was required. <b>CONCLUSION:</b> The PhotoDerm VL is an innovative, highly effective, and comparably safe therapeutic alternative to the laser in the treatment of ETE. The rate of cosmetically relevant side effects is considerably smaller, the patient compliance is excellent, and the method can be applied easily in an outpatient setting.
53	Peer reviewed clinical report	Port Wine Stains	Treatment of Adult Port-Wine Stains Using Intense Pulsed Light Therapy (PhotoDerm VL): Brief Initial Clinical Report	Christian Raulin, M.D. <sup>1</sup> , Mitchel P. Goldman, M.D. <sup>2</sup> , Margaret A. Weiss, M.D. <sup>3</sup> , Robert A. Weiss, M.D. <sup>3</sup>	<sup>1</sup> Karlsruhe, Germany, <sup>2</sup> San Diego, California, <sup>3</sup> Baltimore, Maryland	Dermatologic Surgery, 1997; Vol. 23: 594-601.	1997	<b>CONCLUSION:</b> We believe that the IPL device may prove to be a better alternative to FLPDL for adults and for relatively common "laser-resistant" PWS. Unlike the 3-6 month time between treatments required for complete clearing with the FLPDL, the new device achieves clearance in 3-6 weeks allowing for more closely spaced treatments and more rapid resolution with fewer side effects. The very large spot size accounts for less scatter and deeper penetration. In these few cases treatment of larger and deeper vessels of adult PWS was more readily accomplished by IPL than by FLPDL. A larger cooperative study is presently being completed based on these initial encouraging results.

STUDY	TYPE	TOPIC	TITLE	AUTHORS	RESEARCH SITES	PUBLICATION	YEAR	ABSTRACT
54	Peer reviewed clinical report	Hemangioma	The Successful Use of the Photoderm VL in the Treatment of a Cavernous Hemangioma in a Dark-Skinned Infant	Teresa D. Foster, R.N., Michael H. Gold, M.D.	Gold Skin Care Center, Nashville, Tennessee, USA.	Minimally Invasive Surgical Nursing, 1996; Vol. 10 (3): 102-104.	1996	CONCLUSION: The case described is the first successful use of the Photoderm VL system in the treatment of an ulcerated cavernous hemangioma in a dark-skinned infant. The potential risk of hypopigmentation was weighed versus the potential benefit of this system. Within 3 full treatment sessions the lesion regressed with minimal pigment alteration. Thus, the Photoderm VL should be considered useful in these cases.
55	Peer reviewed article	Hair Removal with IPL - 108 Patients	Hair Removal Using Intense Pulsed Light (EpiLight): Patient Satisfaction, Our Experience and Literature Review	Lucian Fodor, M.D., Meital Menachem, M.D., Ytzhack Ramon, M.D., Oren Shoshani, M.D., Yaron Rissin, M.D., Liron Eldor, M.D., Dana Egozi, M.D., Isaac J Peled, M.D., Yehuda Ullmann M.D.	Rambam Medical Center, Bruce Rappaport Faculty of Medicine, Department of Plastic and Reconstructive Surgery, Technion University, Haifa, Israel.	Ann Plast Surg, Jan 2005; 54(1): 8-14. (Review)	2005	Applications for intense pulsed light (IPL) for hair removal are gaining favor among other methods, including lasers, because of its noninvasive nature, versatility regarding different skin and hair types, safety, and ease of use. Hair removal using IPL was performed from January 2002 to December 2003 on 108 consecutive patients. Eighty of these patients answered a questionnaire and were enrolled in the study group. The investigated parameters were hair and skin type, number of pulses, fluence, pulse duration, pulse delay, the filters used, and the treated area. The patient assessment of improvement (satisfaction) rate was graded from 1 to 5 points: 1, worse; 2, no improvement; 3, mild improvement; 4, good result; and 5, excellent result. The patients had between 1 and 13 treatments most of them during 2 to 6 sessions. Sixty-seven percent of the patients reported no complications. Prolonged erythema for more than 7 days was reported by 16.25%, blisters by 6.25%, temporary hyperpigmentation by 8.75%, leukotrichia was present in 1 case, and 1 case of persistent hypopigmentation was noted in a young girl. An increased number of complications and a decreased satisfaction rate were noted with higher skin types, but it was not statistically significant. Patients who underwent fewer treatments (1-3 treatments) were more satisfied compared with those who had more than 7 treatments ( $P < 0.02$ ). Sixty percent of the patients rated their satisfaction to be good to excellent and 65% would ill recommend this treatment to their friends. To minimize the complication rate the authors found that the preset parameters should be adjusted at every treatment session according to the skin response at the previous one. Permanent hair removal cannot be guaranteed and it is not possible to predict the improvement rate. Nevertheless, based on patient satisfaction rate in this study, the authors recommend using IPL for hair removal.

STUDY	TYPE	TOPIC	TITLE	AUTHORS	RESEARCH SITES	PUBLICATION	YEAR	ABSTRACT
56	Peer reviewed article	Hair Removal with IPL	Intense Pulsed Light for Hairy Grafts and Flaps	Moreno-Arias GA, M.D., Vilalta-Solsona A, M.D., Serra-Renom JM, M.D., Benito-Ruiz J, M.D., Ferrando J, M.D.	Department of Dermatology, Hospital Clinic, University of Barcelona, Barcelona, Spain.	Dermatologic Surgery, 2002; Vol. 28: 402-404.	2002	<p><b>BACKGROUND:</b> Intense pulsed light (IPL) is an effective and safe method of hair removal.</p> <p><b>OBJECTIVE:</b> To evaluate the clinical response of hairy grafts and flaps of different anatomic areas to an IPL source.</p> <p><b>METHODS:</b> Four patients (three men, one woman; 17-72 years old) with hairy skin grafts (n = 2) or flaps (n = 2) were included. Donor skin areas included the forehead (n = 1), supraclavicular (n = 1), abdomen (n = 1), and groin (n = 1). Excisional surgery was performed because of basal cell carcinoma (BCC) of the nasal wall (n = 1), squamous cell carcinoma (SCC) of the forehead (n = 1), congenital nevus of the malar region (n = 1), and breast carcinoma (n = 1). The treatment was IPL with the following parameters: wavelength 695-755 nm, pulse width 3.8-4.5 msec, delay 20-30 msec, spot size 10 mm x 45 mm, fluence 38-42 J/cm<sup>2</sup>, and an interval of 4 weeks. A total of one to six treatment sessions were administered.</p> <p><b>RESULTS:</b> A progressive decrease in terminal hair and delayed hair growth rate (more than 8 months) were observed in all the patients. Improvement of skin coarseness, pigmentation, and erythema was also observed in the graft and its periphery in one patient. Persistent erythema (more than 48 hours) was the only side effect, observed in one patient.</p> <p><b>CONCLUSION:</b> IPL is an effective method to depilate hairy grafts and flaps.</p>
57	Peer reviewed article	Hair Removal with IPL	Long Term Photoepilation Using a Broad-Spectrum Intense Pulsed Light Source	Neil S. Sadick, M.D.; Robert A. Weiss, M.D.; Christopher R. Shea, M.D.; Hila Nagel; Judith Nicholson, R.N.; Victor G. Prieto, M.D., Ph.D.	Department of Dermatology, Weill Medical College of Cornell University, New York, NY, USA.	Archives of Dermatology, 2000; Vol.136: 1336-1340.	2000	<p><b>BACKGROUND:</b> The goal of laser or flashlamp photoepilation is to produce long-term, cosmetically significant hair removal. We document the long-term efficacy achieved with an intense pulsed light source for photoepilation.</p> <p><b>DESIGN:</b> Prospective study comparing long-term results of single vs multiple treatments, and effects of anatomic site and skin type on efficacy of photoepilation with a device emitting broad-spectrum, noncoherent (nonlaser) radiation from 550- to 1200-nm wavelengths, in macropulses divided into 2 to 5 minipulses.</p> <p><b>SETTING:</b> Private dermatology practice.</p> <p><b>PATIENTS:</b> Thirty-four patients (8 men, 26 women) with hirsutism.</p> <p><b>INTERVENTIONS:</b> Parameters for the study were wavelength of 615 to 695 nm, pulse duration of 2.6 to 3.3 milliseconds, fluence of 34 to 42 J/cm<sup>2</sup>, 10 x 45-mm exposure field, and application of 1°C cooling gel.</p> <p><b>MAIN OUTCOME MEASURES:</b> Hair removal efficiency, calculated as percentage ratio of the number of hairs present compared with baseline counts, and patient satisfaction questionnaire completed at last follow-up.</p> <p><b>RESULTS:</b> The mean hair removal efficiency achieved was 76% after a mean of 3.7 treatments. More than 94% of the sites reached mean hair removal efficiency values greater than 50%. Hair removal efficiency was not significantly related to skin type, hair color, anatomic site, or number of treatments. Side effects were mild and reversible and occurred in a minority of patients (hyperpigmentation in 3 and superficial crusting in 2).</p> <p><b>CONCLUSIONS:</b> Our data document the long-term clinical efficacy of intense pulsed light source-induced hair removal in light and dark skin phenotypes. Maximal photoepilation was achieved from the initial 1 to 3 treatments; only a small added benefit was seen after more treatments.</p>



STUDY	TYPE	TOPIC	TITLE	AUTHORS	RESEARCH SITES	PUBLICATION	YEAR	ABSTRACT
58	Peer reviewed article	Hair Removal with IPL	Corrective Photoepilation for Improper Hairline Placement After Hair Transplantation	Moreno-Arias GA, M.D., Navarra E, Vilalta A, M.D., Ferrando J, M.D.	Department of Dermatology, Hospital Clínic, University of Barcelona, Spain.	Dermatologic Surgery, 2000; Vol. 26: 1-3.	2000	<p><b>BACKGROUND:</b> Noncoherent filtered flashlamp pulsed light has not been used for correction of surgical problems after hair transplantation.</p> <p><b>OBJECTIVE:</b> The present study examined the clinical efficacy and long-term follow-up (12 months) of o evaluate the clinical results of photoepilation in a patient with improper hairline placement after hair transplantation.</p> <p><b>METHODS:</b> A noncoherent filtered flashlamp pulsed light source was used to photoepilate the misplaced frontal hairline in a 37-year-old Caucasian man, skin phototype IV (Fitzpatrick scale), who suffered from common baldness grade IV (Ebling scale) and had undergone a hair transplant 6 years before. The frontal hairline received three treatment sessions at 2-month intervals with the following treatment parameters: 695 nm cutoff filter, fluence 38 J/cm<sup>2</sup>, 3.5-msec pulse duration, triple-pulse mode, and 30-msec delay. The gulfs received two treatment sessions with the same protocol.</p> <p><b>RESULTS:</b> Final clinical aspect was good and no hair regrowth in the frontal hairline has been observed after 1.5 years of follow-up.</p> <p><b>CONCLUSION:</b> Noncoherent filtered flashlamp pulsed light is a novel therapeutic choice that offers a nonsurgical solution to unnatural hairline after hair transplantation.</p>
59	Peer reviewed article	Hair Removal with IPL	Intense Pulsed Light Treatment of Hirsutism: Case Reports of Skin Phototypes V and VI	Franklin Johnson, M.D., Maria DoVale, C.M.A.	Private Practice, Long Island, Yew York, USA	Journal of Cutaneous Laser Therapy, 1999; Vol. 1: 233-237. (PBS00001)	1999	<p>Removal of unwanted hair is a common cosmetic concern. For hirsute women, treatment often requires drug therapy and various methods to physically remove the hair. Traditional methods of hair removal include shaving, waxing, tweezing, depilatory creams and electrolysis. Hair removal methods based on light technology, such as lasers and intense pulsed light systems, are alternative methods for longer-term hair removal. Intense pulsed light has been used in our clinic during the past 2 years to treat light-to-dark skinned patients, including skin types V and VI. We present here the treatment, using an intense pulsed light source, of three dark skinned patients with hirsutism. Patients were treated during multiple sessions (five to seven) for unwanted facial hair. Sessions were conducted monthly and patients were evaluated at follow-up sessions 2-7 months after the final treatment. Successful clearance of unwanted hair was achieved in all three patients with no pigmentary changes observed during the final follow-up sessions. Folliculitis and hyperpigmentation from tweezing were also treated by the intense pulsed light source. These results suggest that intense pulsed light is an effective source for hair removal and may, with proper parameter selection, be useful in the treatment of very dark skin types.</p>
60	Peer reviewed article	Hair Removal with IPL	Photo-assisted Epilation – Review and Personal Observations	Vanessa M. Weir, M.D., Tom Y. Woo, M.D.	University of Calgary Medical School and Laser Rejuvenation Clinic and Spa, Calgary, Alberta, Canada	Journal of Cutaneous Laser Therapy 1999, 1(3):135-143	1999	<p>The perception of unwanted hair is culturally dependent, and its removal is a multibillion-dollar business in North America each year. Examples of hair removal techniques on the market today include shaving, depilatories, wax, epilation, electrolysis and photo-epilation. Electrolysis, or electrothermolysis, was the only known permanent hair removal modality to date. However, long term or permanent hair removal with lasers is becoming a reality for treatment of hirsutism or unwanted hair. Laser hair removal is an exciting new field with improvements occurring continually, making it difficult to stay abreast of the newest treatments and their effectiveness. This review provides an overview of hair follicle anatomy, mechanisms of photo-destruction to hair follicles and physics of lasers and the skin. The different types of lasers used for hair removal, their mechanisms and clinical research are reviewed.</p>





STUDY	TYPE	TOPIC	TITLE	AUTHORS	RESEARCH SITES	PUBLICATION	YEAR	ABSTRACT
61	Peer reviewed article	Hair Removal with IPL	The Role of Laser and Intense Light Sources in Photo-Epilation: A Comparative Evaluation	Gary Lask, M.D. <sup>1</sup> , Shimon Eckhouse, PhD <sup>2</sup> , Michael Slatkine, PhD <sup>2</sup> , Amir Waldman, PhD <sup>2</sup> , Michael Kreindel, PhD <sup>2</sup> , Varda Gottfried, PhD <sup>2</sup>	<sup>1</sup> Dermatologic Laser Center, University of California at Los Angeles, USA, <sup>2</sup> ESC Medical Systems, Yokneam, Israel	Journal of Cutaneous Laser Therapy, 1999; Vol. 1: 3-13	1999	The method for laser and light assisted hair removal is based on the theory of selective photothermolysis. Selective absorption of hair chromophores from lasers and broad band light sources results in destruction of hair follicles while leaving the skin undamaged. A discussion of the basic principles of selective photothermolysis as it applies to hair removal by lasers and light sources is presented, followed by a comparative review of three melanin target based systems: Ruby laser, Alexandrite laser, and a broad band intense pulsed light. These systems are efficient and safe with proper patient selection. Multiple treatments are necessary due to the nature of the hair growth cycle.
62	Peer reviewed article	Hair Removal with IPL	One Year Follow-up Using Intense Pulsed Light Source for Long Term Hair Removal	Michael H. Gold, M.D., Michael W. Bell, M.D., Teresa D. Foster, R.N., Sherri T. Street, C.C.E.	Gold Skin Care Center, Nashville, TN, USA	Journal of Cutaneous Laser Therapy, 1999; Vol. 1: 167-171	1999	<b>BACKGROUND:</b> The long-term removal of unwanted hair is a challenge for health care providers. Peer-reviewed scientific data for many of the hair removal laser systems is lacking. <b>OBJECTIVE:</b> This paper provides a chronicle of 24 of the 31 patients who participated in the original 3-month trial for hair removal utilizing an intense pulsed light source. <b>METHODS:</b> A total of 24 of the original 31 patients who took part in the one treatment, 3-month, intense pulsed light trial were examined again at 1 year following the treatment. <b>RESULTS:</b> Long-term epilation of 75% hair removal was found in this group of patients after 1 year with a single treatment. <b>CONCLUSION:</b> The intense pulsed light source is an effective method for providing long-term epilation of unwanted hair.
63	Peer reviewed article	Hair Removal with IPL	Hair Removal With a Non-Coherent Filtered Flashlamp Intense Pulsed Light Source	Robert A. Weiss, Margaret A. Weiss, Sangeeta Marwaha, Allan C. Harrington	Johns Hopkins University School of Medicine, Baltimore, Maryland, USA.	Lasers in Surgery and Medicine, Volume 24, issue 2 (1999), p. 128 - 132.	1999	<b>BACKGROUND AND OBJECTIVE:</b> To evaluate the effects on disruption of hair growth of the non-coherent filtered flashlamp intense pulsed light (IPL) source. <b>MATERIALS AND METHODS:</b> Twenty-eight sites on 23 patients with Fitzpatrick type I-III were enrolled using a single treatment IPL followed for three months post-treatment. Another 56 on 48 patients with Fitzpatrick skin types I-V randomly enrolled for two treatments one month apart and followed for six months. <b>STUDY DESIGN:</b> Prior to beginning treatment and at each follow-up visit hair counts were obtained by averaging three 1-cm <sup>2</sup> areas on a clear acetate template placed over the skin. Repeat hair counts and photographs were obtained at 2, 4, 8, and 12 weeks for the single treatment protocol and at additional 4, 5, and 6 months for the double treatment protocol. Parameters utilized were a 2.8-3.2 millisecond pulse duration typically for three pulses with thermal relaxation intervals of 20-30 milliseconds with a total fluence of 40-42 J/cm <sup>2</sup> . <b>RESULTS:</b> For the double treatment protocol hair clearance of 64% was achieved immediately following the second treatment. By week 8 reduction of hair counts was 42%. At 6 months, hair counts were reduced by 33%. <b>CONCLUSIONS:</b> Non-coherent IPL is an effective modality for long-term hair removal. IPL is safe with minimal side effects of epidermal injury or pigmentation change.

STUDY	TYPE	TOPIC	TITLE	AUTHORS	RESEARCH SITES	PUBLICATION	YEAR	ABSTRACT
64	Peer reviewed case report	Hair Removal with IPL	Successful Treatment of Blond Hair with the Intense Pulsed Light Source	Michael H. Gold, M.D., Michael W. Bell, M.D., Teresa D. Foster, R.N., Sherri T. Street, C.C.E.	Gold Skin Care Center, Nashville, Tennessee.	Journal of Aesthetic Dermatology and Cosmetic Surgery, 1999; Vol. 1(3).	1999	The intense pulsed light source is a broad-spectrum noncoherent medical device useful in the long-term epilation of unwanted hair. By adjusting parameters in this software-driven system, various hair colors and skin types can be successfully treated. This case report demonstrates the effectiveness of the intense pulsed light source in treating blond hair.
65	Peer reviewed article	Hair Removal with IPL	Hair Removal Using A Pulsed-Intense Light Source	Tse Y., M.D.	Department of Dermatology, University of California San Diego, USA.	Dermatologic Clinics, 1999; Vol. 17(2).	1999	Many new laser and light sources have been developed for removal of unwanted body and facial hair. A multiple wavelength pulsed-intense light source (Epilight) has been shown to be effective for long-lasting hair removal. This system is most effective on patients with dark hair and light skin. Further studies are needed to fully elucidate the role of the pulsed-intense light source in permanent hair removal.
66	Peer reviewed article	Hair Removal with IPL	Laser and Flashlamp Photoepilation: A Critical Review of Modern Concepts Bridging Basic Science and Clinical Applications	Neil S. Sadick, M.D., F.A.C.P	Department of Dermatology, Cornell University Medical College, New York, New York	Journal of Aesthetic Dermatology and Cosmetic Surgery, 1999; Vol. 1(2).	1999	<p><b>CONCLUSION:</b> Laser and intense pulsed light sources show great promise in inducing prolonged growth delay and, in a subset of treated individuals, “permanent” photoepilation. The predominant mechanism appears to be selective photothermal destruction of large, pigmented hair follicles, related to transfer of energy to areas containing melanin rather than induction of a programmed state of follicular cycle arrest. Scientific studies have defined that destruction of the entire germinative region of the hair follicle is probably necessary for potential permanent photoepilation. Incomplete germinative damage may lead to miniaturized dystrophic hairs with decreased pigmentation. Hair shaft injury by itself will lead to “exogen dropout,” with rapid associated regrowth. The effectiveness of a given laser or intense pulse light source treatment is related to the number of anagen hairs available as chromophore targets (relation to degree of melanization), depth of hair follicles, as well as threshold fluence and pulse duration</p> <p>It has also been shown in studies from the author’s laboratory, as well as that of others, that degeneration of hair follicles may be replaced by dermal changes of collagen remodeling and/ or fibrosis.</p> <p>In the future, we hope that comparative studies will define the optimal laser/ intense pulsed light or photodynamic source for achieving efficient, consistent long-term photoepilation. Further studies will perhaps provide optimal laser/ intense pulsed light source parameters and treatment intervals as well as new technologies that may be helpful in treating light-haired individuals, who remains a refractory subgroup at present.</p>

STUDY	TYPE	TOPIC	TITLE	AUTHORS	RESEARCH SITES	PUBLICATION	YEAR	ABSTRACT
67	Peer reviewed article	Hair Removal with IPL	High-Intensity Flashlamp Photoepilation, a Clinical, Historical and Mechanistic Study in Human Skin	Neil S. Sadick, M.D. <sup>1</sup> ; Christopher R. Shea, M.D. <sup>2,3</sup> ; James L. Burchette, H.T.(ASCP) <sup>2</sup> ; Victor G. Prieto, M.D., Ph.D. <sup>2,3</sup>	<sup>1</sup> Department of Dermatology, New York Hospital–Cornell Medical Center, New York; and the Departments of <sup>2</sup> Pathology and <sup>3</sup> Medicine, Duke University Medical Center, Durham, NC.	Archives of Dermatology, 1999; Vol. 135: 668-676.	1999	<p><b>OBJECTIVE:</b> To examine the clinical, histological, and immunohistological effects of flashlamp photoepilation.</p> <p><b>DESIGN:</b> Nonrandomized control trial with blinded histological study and follow-up of 1 to 20 months.</p> <p><b>Setting:</b> Private academic practice.</p> <p><b>SUBJECTS:</b> Sixty-seven subjects (10 males and 57 females) with areas of excess body hair.</p> <p><b>INTERVENTIONS:</b> Single (9 subjects) or multiple (58 subjects) treatments (noncoherent, 590-1200 nm, 2.9-3.0 milliseconds, 40-42 J/cm<sup>2</sup>) to hairy skin. From subjects given a single treatment, biopsy samples were taken immediately after treatment and at different intervals for up to 20 months.</p> <p><b>MEAN OUTCOME MEASURES:</b> Clinical measures include hair counts and morphologic features before and after treatment. Histological measures include terminal-vellus and anagen-other ratios, hair shaft diameter, and morphologic features (routine and immunohistochemical detection of bcl-2, bax, p53, Ki67, cyclin D1, and hsp70) before and after treatment.</p> <p><b>RESULTS:</b> Mean hair loss after photoepilation was 49%, 57%, and 54% for a single treatment and 47%, 56%, and 64% for multiple treatments at follow-up of less than 3 months, 3 to less than 6 months, and 6 months or longer, respectively (P&lt;.05 for all comparisons). Transient erythema was seen in all subjects; no scarring occurred. Histologically, treatment caused morphologic damage confined to hair follicles and shafts. Terminal-vellus and anagen-telogen ratios, mean hair shaft diameter, and immunohistochemical profiles were not significantly modified by treatment. Treatment did not alter other skin adnexa, epidermis, or vessels.</p> <p><b>CONCLUSIONS:</b> Flashlamp treatment leads to significant, long-lasting epilation. The predominant mechanism seems to be via selective photothermal damage to large, pigmented hair follicles rather than induction of a programmed state of follicular cycle arrest or follicular miniaturization.</p>
68	Peer reviewed article	Hair Removal with IPL	Theoretical Considerations in Laser Hair Removal	E. Victor Ross, M.D. <sup>1</sup> , Zvi Ladin, Ph.D. <sup>2</sup> , Michael Kreindel, Ph.D. <sup>2</sup> , Christine Dierickx, M.D. <sup>3</sup>	<sup>1</sup> Naval Hospital at San Diego; and Division of Dermatology, University of California at San Diego, San Diego, California, <sup>2</sup> ESC Medical Systems, Yokneam, Israel, <sup>3</sup> Harvard Medical School; Wellman Laboratories of Photomedicine; and Department of Dermatology, Massachusetts General Hospital, Boston, Massachusetts	Dermatologic Clinics, 1999; Vol. 17(2): 333-355.	1999	<p>Recent clinical trials have underscored the possibility of using light to selectively destroy hair follicles. Although there are many systems in various configurations, at present, the procedure has not resulted in predictable permanent follicular destruction of an entire operative field. Permanent removal that does occur using these systems appears to be a result of multiple treatment sessions. In this article we will examine the biological and physics bases of laser hair removal. The first section gives an overview of the anatomy and biology of the follicle, particularly within the context of designing optimal laser parameters for effective laser hair removal. The second section deals primarily with physical considerations but constantly attempts to relate optical-thermal phenomena of light-based hair epilation to the unique anatomic and physiologic features of the hair follicle.</p>

STUDY	TYPE	TOPIC	TITLE	AUTHORS	RESEARCH SITES	PUBLICATION	YEAR	ABSTRACT
69	Peer reviewed article	Hair Removal with IPL	Hair Removal in 40 Hirsute Women with an Intense Laser-Like Light Source	Schroeter CA, M.D., Raulin C, M.D., Thürlimann W, M.D., Reineke T, M.D., De Potter C, M.D., Neumann HA, M.D.	Department of Lasertherapy, Medical Centre Maastricht, Becanusstraat 17, 6216 BX Maastricht, The Netherlands	European Journal of Dermatology, 1999; Vol. 9: 374-379.	1999	Until recently, previously applied methods to remove hair have ultimately proven ineffective or resulted in the formation of scars and small wounds. Different methods for removing hair in a more or less permanent way have been used: electrolysis, thermolysis and the blend method. In this study we describe the removal of hair without side-effects by means of non-laser incoherent emitted light, produced by the ILS flashlamp. In a multicenter study we treated 40 women with a median age of 38.6 years with hirsute hair growth of different hair colours on the upper lip and chin. In general 76.7% of the hair was removed within 6 treatments, with an average fluence of 38.7 J/cm <sup>2</sup> and a mean wavelength of 585 nm per patient. A correlation was found between the percentage reduction of hairs and the number of treatments and between hair removal and needle epilation before treatment. Furthermore, a correlation was seen between hair reduction and wavelengths of 570 nm and 550 nm. No association was found between hair removal and clinical data of the patients, nor between hair reduction and technical data of the device. This study presents a new alternative for hair removal.
70	Peer reviewed article	Hair Removal with IPL	Effective Treatment of Hypertrichosis with Pulsed Light: A Report of Two Cases	Christian Raulin, M.D. <sup>1</sup> , Saskia Werner, M.D. <sup>1</sup> , Wolfgang Hartschuh, M.D. <sup>2</sup> , Matthias P. Schonemark, M.D. <sup>3</sup>	<sup>1</sup> Center for Dermatologic Laser Therapy, Karlsruhe, Germany; the <sup>2</sup> Department of Dermatology, University Hospital of Heidelberg, Heidelberg, Germany; and the <sup>3</sup> Department of Medicine, Dartmouth Medical School, Hanover, NH, and Department of Otolaryngology/Head and Neck Surgery, Hannover Medical School, Hannover, Germany	Annals of Plastic Surgery, 1997; Vol. 39(2):169-173.	1997	Hypertrichosis is an often stigmatizing cosmetic problem not only for women but also for male-to-female transsexual patients. The hitherto described therapeutic measures include chemical epilation, razoring, camouflage, electrolysis and thermolysis, and waxing. All of these measures are transient, more or less painful, and may lead to severe side effects (e.g., inflammatory responses and scarring). We report the successful treatment of the perioral and mandibular area of two transsexual patients (male to female), who we treated with a recently introduced intense, pulsed light source--the PhotoDerm VL. Two days after the nearly painless treatment, hair could be epilated easily with forceps. Biopsies of the treated area show an atrophy of the follicles, which can be contributed either to direct thermal injury or to an indirect photothermolytic effect. Six months after the last treatment, there is no local recurrence and no side effects.

STUDY	TYPE	TOPIC	TITLE	AUTHORS	RESEARCH SITES	PUBLICATION	YEAR	ABSTRACT
71	Peer reviewed article	Hair Removal with IPL	Long-Term Epilation Using the Epi-Light Broad Band, Intense Pulsed Light Hair Removal System	Michael H. Gold, M.D., Michael W. Bell, M.D., Teresa D. Foster, R.N., Sherri T. Street, C.C.E.	Gold Skin Care Center, Nashville, Tennessee, USA	Dermatologic Surgery, 1997; Vol. 23: 909-913.	1997	<p><b>BACKGROUND:</b> The long-term epilation of hair is the goal of several lasers and intense pulsed light systems.</p> <p><b>OBJECTIVE:</b> The purpose of the study is to use the EpiLight Hair Removal System to assess long-term epilation and to assess its safety profile following a single treatment session.</p> <p><b>METHODS:</b> Patients received a single treatment with the EpiLight Hair Removal System after entering the patient's skin type, skin color, hair color, and hair density into the system's computer software. Treatment parameters include various wavelengths of light, pulse duration, pulse delay, and energy fluence. Thirty-seven subjects received a single treatment using one of four cut-off filters consisting of two to five pulses with energies of 34-55 J/cm<sup>2</sup>.</p> <p><b>RESULTS:</b> The results of a single treatment show hair clearances occurring immediately and over a 12-week study period. Approximately 60% hair removal was noted at 12 weeks.</p> <p><b>CONCLUSIONS:</b> The EpiLight Hair Removal System is an effective and safe method for long-term epilation of unwanted hair.</p>
72	Peer reviewed article	Leg Veins with IPL and Nd:YAG	A Side-by-Side Prospective Study of Intense Pulsed Light and Nd:YAG Laser Treatment for Vascular Lesions	Fodor L, M.D., Ramon Y, M.D., Fodor A, M.D., Carmi N, M.D., Peled IJ, M.D., Ullmann Y, M.D.	Department of Plastic and Reconstructive Surgery, Rambam Medical Center, Faculty of Medicine, Technion-Israel Institute of Technology, Haifa, Israel.	Ann Plast Surg, Feb 2006; 56(2):164-170.	2006	<p>Recently, lasers and light systems are used more for the treatment of vascular lesions due to their noninvasiveness, ease of use, and short recovery time. This side-by-side prospective study compares results, satisfaction, and complications after intense pulsed light (IPL) and Nd:Yag laser treatment of small vascular lesions. Twenty-five patients with telangiectases, leg veins, or cherry angiomas underwent treatment of the same category of lesion in the same area. One year after completing treatment, patients were asked to report their satisfaction level after comparing digital photos before and after treatment; 72% felt they had good to excellent results after Nd:Yag treatment, while only 48% felt the same after IPL. The most common side effect after Nd:Yag was hyperpigmentation. Satisfaction level was significantly higher after Nd:Yag than after IPL. Patients with telangiectases, cherry angiomas, or leg veins &lt;1 mm were more satisfied after IPL, while those with leg veins &gt;1 mm were more satisfied after Nd:Yag. Overall, satisfaction with treatment of vascular lesions was greater with Nd:Yag although this method was more painful.</p>



STUDY	TYPE	TOPIC	TITLE	AUTHORS	RESEARCH SITES	PUBLICATION	YEAR	ABSTRACT
73	Peer reviewed article	Leg Veins with IPL and Nd:YAG	A Dual Wavelength Approach for Laser/Intense Pulsed Light Source Treatment of Lower Extremity Vein	Neil S. Sadick, M.D., F.A.C.P.	Sadick Aesthetic Surgery & Dermatology, New York, New York, USA.	Journal of American Academy of Dermatology, 2002; Vol. 46(1): 66-72.	2002	<p><b>BACKGROUND:</b> Consistent reproducible aesthetic results are a desired component of laser/intense pulsed light (IPL) treatment of lower extremity blood vessels. In this regard, shorter wavelengths may be used to treat fine red telangiectases, whereas longer wavelengths may be used to treat larger diameter blue venulectasia and small reticular veins.</p> <p><b>OBJECTIVE:</b> The purpose of the present study was to demonstrate that a bimodal wavelength approach to laser/IPL source treatment for lower extremity vessels up to 8 mm in diameter produces results superior to previously described photothermolytic approaches for eradication of unwanted lower extremity blood vessels.</p> <p><b>METHODS:</b> Fifty female patients (mean age, 37 years) were treated in a private practice setting with class I-III red telangiectasia, blue venulectasia, and reticular veins (0.1-4.0 mm in diameter) on the inner or outer thighs. A combined approach of laser/IPL treatment was used; patients had up to 3 treatments at 6-week intervals on a 5-cm<sup>2</sup> surface area of vessels with the use of an IPL source wavelength of 550 nm, fluence of 40 J/cm<sup>2</sup>, for treatment of red telangiectases less than 1 mm in diameter, while a 1064-nm Nd:YAG laser at a fluence of 140 J/cm<sup>2</sup> was used to treat venulectases and reticular vessels that were 1.0 to 4.0 mm in diameter. Results were analyzed by macrophotographic imaging, double-blinded observer evaluation, optical chromatography, and a patient evaluation scale.</p> <p><b>RESULTS:</b> An average of 2(1/2) patient sessions produced significant clearing (75%-100%) in 80% of patients. The mean erythema index showed significant lightening (35.3+dl) in the study population. Finally, 76% of patients reported great satisfaction with the treatment results.</p> <p><b>CONCLUSION:</b> A bimodal wavelength approach utilizing both short and long wavelengths produces significant clearing of the variably colored, multiple-diameter/depth array of vessels, which commonly presents a therapeutic challenge to the vascular laser surgeon.</p>



STUDY	TYPE	TOPIC	TITLE	AUTHORS	RESEARCH SITES	PUBLICATION	YEAR	ABSTRACT
74	Peer reviewed article	Leg Veins with IPL and Nd:YAG	Advances in Laser Surgery for Leg Veins: Bimodal Wavelength Approach to Lower Extremity Vessels, New Cooling Techniques, and Longer Pulse Durations	Neil S. Sadick M.D., F.A.C.P., F.A.A.C.P. <sup>1</sup> , Robert A. Weiss M.D. <sup>2</sup> , Mitchel P. Goldman M.D. <sup>3</sup>	<sup>1</sup> Department of Dermatology, Cornell-Weill University Medical College, New York, New York, <sup>2</sup> Department of Dermatology, Johns Hopkins University Medical School, Baltimore, Maryland, and <sup>3</sup> University of California, San Diego, San Diego, California	Dermatologic Surgery, 2002; Vol. 28(1): 16-20.	2002	<p>The Utilization of lasers and intense pulsed light (IPL) sources for the treatment of lower extremity veins has gained increased popularity over the past 5 years. This technology, driven by consumer demand, has been effective in treating vessels that are refractory to sclerotherapy treatment, vessels that arise from prior surgical or sclerotherapy treatment (telangiectatic matting or angiogenic flushing), and needle-phobic patients. The rapid growth of effective photothermal vascular technologies, lasers, and IPL sources has demonstrated therapeutic efficiency as a substitute for sclerotherapy as long as hydrostatic pressure is addressed. The problem is that it is inherently more difficult to get photons safely and in sufficient numbers through several layers of blood vessel wall into the target chromophore, that is, oxygenated and deoxygenated hemoglobin. Injections directly into the target seem more efficient. A summary of these considerations is noted in Table 1.</p> <p>The quest for continued development of improved laser and IPL technologies has been driven by both physician and consumer demand. This has led to the development of optimal parameters for achieving gentle, selective photothermolysis (Table 2 and Figure 1).<sup>1</sup></p> <p>The ideal aspects of such a technology include a wavelength that can penetrate to the full depth of the target vessel and deliver sufficient energy to the target blood vessel to coagulate the entire wall without damaging perivascular tissues or overlying skin.<sup>2</sup> Delivering this energy should occur without a shock wave, inducing gentle cavitation, in order to prevent post-treatment hemorrhage and purpura.<sup>3</sup> It should produce an epidermal bypass to protect this structure from deleterious thermal effects. In order to accomplish these goals, a number of technologic modifications of laser/IPL treatment of lower extremity vessels have evolved (Table 3).<sup>4</sup></p> <p>This article discusses three of these major advances in laser IPL treatment of large veins: the bimodal wavelength approach, new cooling techniques, and extended pulse durations. We conclude with speculations about future advances in technology.</p>



STUDY	TYPE	TOPIC	TITLE	AUTHORS	RESEARCH SITES	PUBLICATION	YEAR	ABSTRACT
75	Peer reviewed article	Reticular Veins and Blue Venulectasia with Nd:YAG	Long-Term Results with a Multiple Synchronized-Pulse 1064 nm Nd:YAG Laser for the Treatment of Leg Venulectasias and Reticular Veins	Neil S. Sadick, M.D., F.A.C.P.	Joan and Sanford I. Weill Medical College and Graduate School of Medical Sciences, Cornell University, New York, New York	Dermatol Surg 2001;27:365-369.	2001	<p><b>BACKGROUND:</b> The long-pulsed Nd:YAG (1064 nm) laser has been shown to be effective in the treatment of blue venulectasias and reticular veins.</p> <p><b>Objective:</b> The present study examined the clinical efficacy and long-term follow-up (12 months) of patients treated with the 1064 nm Nd:YAG laser technology.</p> <p><b>METHODS:</b> Twenty-five female patients (mean age 37.6 years, Fitzpatrick skin types II-V) were treated with up to three treatment sessions at 6-week intervals on a 5 cm<sup>2</sup> surface area of vessels utilizing the 1064 nm Nd:YAG laser with a circulating cooling device. Treatment parameters were vessel size 0.2-2.0 mm treated with a double pulse of 7 msec at 120 J/cm<sup>2</sup> and vessel size 2.0-4.0 mm treated with a single pulse of 14 msec, fluence 130 J/cm<sup>2</sup>, with a spot size of 6 mm. Improvement was judged by double-blinded observer evaluation, macrophotographic imaging, optical chromatography, and a patient evaluation scale.</p> <p><b>RESULTS:</b> Sixty-four percent of patients treated in the present study achieved 75% or greater clearing of vessels after a maximum of three treatment sessions. Optical chromatography revealed statistically significant decreased chromophore intensity (mean blueness reduction index of 41.2b-). Sixty-four percent of patients were greatly satisfied with the results of the laser treatment. Two patients manifested vessel recurrence when examined at 6 and 12 months, respectively.</p> <p><b>CONCLUSION:</b> The 1064 nm Nd:YAG laser can produce effective long-term photosclerosis of blue venulectasia and reticular veins. The potential for recurrence should be recognized by the vascular laser surgeon.</p>





STUDY	TYPE	TOPIC	TITLE	AUTHORS	RESEARCH SITES	PUBLICATION	YEAR	ABSTRACT
76	Peer reviewed article	Leg Veins with Nd:YAG	Clinical and Pathophysiologic Correlates of 1064-nm Nd:YAG Laser Treatment of Reticular Veins and Venulectasias	Neil S. Sadick, M.D.; Victor G. Prieto, M.D.; Christopher R. Shea, M.D.; Judith Nicholson, R.N.; Tim McCaffrey, Ph.D.	Department of Dermatology, Weill Medical College of Cornell University, New York, NY, USA.	Archives of Dermatology, 2001; Vol.137: 613-617.	2001	<p><b>BACKGROUND:</b> The goal of sclerotherapy, laser therapy, and intense pulsed-light therapy is to produce long-term, cosmetically significant elimination of disfiguring leg veins. This study examines the histologic and clinical effects of using a 1064-nm Nd:YAG laser system on lower extremity vessels.</p> <p><b>DESIGN:</b> A single treatment using the following parameters: wavelength, 1064 nm (multiple synchronized pulsing); spot size, 6 mm; pulse duration, 14 milliseconds (single pulse); and fluence, 130 J/cm<sup>2</sup>.</p> <p><b>SETTING:</b> Private dermatology practice.</p> <p><b>Patients:</b> Thirteen women (mean age, 38.5 years) with blue venulectasia, 0.5 to 1.5 mm in diameter (class 2), and reticular veins, 1.5 to 3.0 mm in diameter (class 3), on the thighs.</p> <p><b>MAIN OUTCOME MEASURES:</b> Examination of treated and untreated areas by 2 masked observers using macrophotography (1, 2, 3, and 6 months after treatment), Doppler, and optical chromatographic changes. Findings from three 2-mm punch biopsies from treated (immediately and 4 weeks after treatment) and untreated sites. Routine histologic examination; special stains (for elastic and connective tissue and for mucopolysaccharides); and immunohistochemical analysis for expression of the heat shock protein hsp70, tie2 (an endothelial cell-specific receptor tyrosine kinase), and transforming growth factors <math>\beta</math>1 and <math>\beta</math>2.</p> <p><b>RESULTS:</b> Eight patients (62%) manifested 75% to 100% clearing of treated vessel surface area. Treated areas revealed perivascular hemorrhage, thrombi, fragmentation and homogenization of elastic fibers, and eosinophilia of vessel walls. Expression of hsp70 and transforming growth factor <math>\beta</math> was increased in treated vessels.</p> <p><b>CONCLUSIONS:</b> Our data confirm the effectiveness of 1064-nm Nd:YAG laser treatment in clearing dilated lower extremity veins, probably by heat-induced vessel damage and subsequent fibrosis. Maintenance of clearing was achieved for up to 6 months. However, the presence of recanalized thrombi in some of the specimens suggests the potential for long-term vessel reappearance.</p>
77	Peer reviewed article	Leg Veins with IPL and Nd:YAG	Treatment of Deep Underlying Reticular Veins by Nd:YAG and IPL Source	S. Colaiuda, F. Colaiuda, M. Gasparotti	Chirurgia Plastica ed Estetica, Università degli Studi di Roma Tor Vergata, Roma.	Minerva Cardioangiologica, 2000; Vol. 48: 1-4.	2000	<p><b>BACKGROUND:</b> The purpose of this paper is to estimate the efficacy of Nd:Yag laser and IPL combined action for the treatment of deep (up to 5 mm) and large (up to 3 mm in diameter) reticular varicosity of the lower extremity.</p> <p><b>METHODS:</b> A group of 38 subjects (2 male and 36 female) aged from 34 to 65 years were treated for deep reticular varicosity of the legs. All patients underwent various clinical analyses in order to evaluate and exclude pre-existing cardiovascular pathology, coagulation disorders as well as pathology due to saphena incontinence. Also, for the first three months they underwent ambulatory specialistic treatments at 21-days intertreatment interval.</p> <p><b>RESULTS:</b> A reduction of venous network of 80-90% after 2 treatment sessions with Nd:Yag laser was obtained in 84% of subjects. Successive 3 treatment sessions with IPL have achieved complete vanishing of the treated venous network in 36 patients (95%).</p> <p><b>CONCLUSIONS:</b> A combined action of Nd:Yag laser and IPL has demonstrated its particular efficacy in non-invasive treatment of deep and extensive reticular varicosity of the lower extremity, considering also that it is well tolerated by patients and applicable in each single case on out patient basis.</p>



STUDY	TYPE	TOPIC	TITLE	AUTHORS	RESEARCH SITES	PUBLICATION	YEAR	ABSTRACT
78	Peer reviewed article	Leg Veins with Nd:YAG	Early Clinical Results with a Multiple Synchronized Pulse 1064 nm Laser for Leg Telangiectasias and Reticular Veins (Brief Communication/Case Report)	Robert A. Weiss M.D., Margaret A. Weiss M.D.	Johns Hopkins University School of Medicine, Baltimore, Maryland, USA.	Dermatologic Surgery, 1999; Vol. 25: 399-402. (AR2000016)	1999	<p><b>BACKGROUND:</b> The 1064 nm wavelength penetrates tissue and blood vessels with little absorption by melanin.</p> <p><b>OBJECTIVE:</b> To perform a study examining the effects of 1064 nm laser used in pulses from 4 msec to 16 msec on leg telangiectasias ranging in size from 0.5 to 3 mm.</p> <p><b>METHOD:</b> In this initial trial, 50 sites on 30 patients were enrolled and treated with a multiple synchronized pulse laser at 1064 nm. The primary parameter utilized was a single 10-16 msec pulse. Improvement was judged by comparison of digital images at 1 month, 2 months, and 3 months posttreatment. Improvement was judged, based on size and number of vessels remaining. Side effects were noted as present or absent at each visit.</p> <p><b>RESULTS:</b> Immediate contraction or darkening followed by urtication and visible total vessel closure as indicated by absence of blanching and visual elimination of the vessel border occurred in most of the treated sites. Two 3 mm diameter vessels were confirmed to be closed without flow by Duplex ultrasound visualization, using a 10 MHz transducer. Bruising from vessel rupture was seen in approximately 50% of the cases. No epidermal injury was noted in any sites, even in Fitzpatrick skin Types IV. At 3 months follow-up, 75% improvement was noted at treatment sites.</p> <p><b>CONCLUSIONS:</b> Initial clinical results with a new multiple synchronized pulsed 1064 nm laser indicate that this longer wavelength supplied at pulses of up to 16 msec appears to be a valuable modality for immediate closure and subsequent elimination of leg ectatic veins. Epidermal injury is unlikely, as the near infrared wavelength has minimal interaction with melanin.</p>
79	Peer reviewed article	Leg Veins with IPL and Nd:YAG	The Role of Lasers and Light Sources in the Treatment of Leg Veins	Jeffrey S. Dover, M.D. <sup>1</sup> , FRCPC, Neil S. Sadick, M.D. <sup>2</sup> , FACP, and Mitchel P. Goldman, M.D. <sup>3</sup>	<sup>1</sup> Departments of Dermatology, Beth Israel Deaconess Medical Center and Harvard Medical School, Boston, Massachusetts, <sup>2</sup> Department of Dermatology, Cornell University Medical College, New York, New York, and <sup>3</sup> Dermatology Associates of San Diego County Inc., San Diego, California	Dermatologic Surgery, 1999; Vol. 25: 328-336.	1999	<p>Telangiectasia of the legs occurs in 29% to 41% of women in the United States. The variation in size, flow, depth, and type preclude the possibility of a single effective treatment modality. When a systematic approach is used where feeder vessels are first surgically removed and sclerotherapy proceeds from largest to smallest vessels, 80-90% of vessels respond to a single sclerotherapy treatment. Because of the relatively modest results demonstrated with lasers and light sources and the high rate of success and the relatively low cost of ambulatory phlebectomy, compression sclerotherapy and superficial sclerotherapy, we generally recommend using lasers and light sources only for vessels that remain after this treatment approach. Lasers and light sources should be considered prior to sclerotherapy in patients who are fearful of needles, who do not tolerate sclerotherapy, who fail to respond to sclerotherapy, or who are prone to telangiectatic matting. Carefully monitored, controlled studies are essential to better define the role of the available laser and light sources in the treatment of leg veins.</p>



STUDY	TYPE	TOPIC	TITLE	AUTHORS	RESEARCH SITES	PUBLICATION	YEAR	ABSTRACT
80	Peer reviewed article	Hemangioma	Pulsed 1064 nm Nd:YAG Laser Therapy for Noninvasive Treatment of a Massive Hemangioma: Case Report	David Wilder, M.D.	Augsberg, Germany	Journal of Clinical Laser Medicine and Surgery, 1999.	1999	<p><b>OBJECTIVE:</b> The author determined whether cutaneous Nd:YAG laser therapy is a viable treatment option for a massive hemangioma located in the musculus soleus muscle of a patient's left leg.</p> <p><b>SUMMARY BACKGROUND DATA:</b> Giant hemangiomas generally require aggressive medical or surgical therapy to address complications. Because of the size of the lesions, there are risks inherent with conventional treatment options. In selected patients, Nd:YAG laser therapy is a noninvasive approach to treating large, subcutaneous hemangiomas.</p> <p><b>METHODS:</b> A 59-year-old female patient, who was diagnosed with a large, venous-type hemangioma in the musculus soleus muscle of the left leg, was treated during two treatment sessions with Nd:YAG laser therapy. A Plexiglas ring was placed on the leg, over the hemangioma, to force the hemangioma closer to the surface and laser irradiation was applied to the skin. Results: At 6-month follow-up after the second treatment, magnetic resonance imaging (MRI) demonstrated 75%–80% reduction in lesion size. There were no permanent adverse effects encountered with the treatment method.</p> <p><b>CONCLUSIONS:</b> The author concludes that in carefully selected cases Nd:YAG laser therapy can be used to treat large hemangiomas whose size poses risks with surgical and other treatments.</p>
81	Peer reviewed article	Telangiectatic Veins with IPL	Clinical Significance of an Intense Pulsed Light Source on Leg Telangiectasias of up to 1mm Diameter	C.A. Schroeter, M.D., D. Wilder, M.D., T. Reineke, M.D., W. Thürlimann, M.D., C. Raulin, M.D., H.A.M. Neumann, M.D.	Centrum Maastricht Annadal, Lasercentrum, Becanus- straat 17, Maastricht, T Centrum Maastricht Annadal, Lasercentrum, Becanus- straat 17, Maastricht, The Netherlands.	European Journal of Dermatology, 1997; Vol. 7: 38-42.	1997	<p>Telangiectasias on the legs are difficult to treat in contrast to those on the face. Sclerotherapy is widely used but often results in hyperpigmentation. Procedures such as argon, pulsed dye and copper vapor laser treatment may lead to scarring. Forty female patients with blue and red telangiectasias on the legs were treated with a new, intense light source, the PhotoDerm® VL, developed by Energy Systems Corporation Inc (ESC), Boston, USA. The diameter of the vessels was between 0.2 mm and 1 mm. The average age of the patients was 41.7 years, the youngest was 24 years and the oldest 72 years. Patients were treated within the spectrum of 515 nm to 590 nm with varying pulse durations. Energy varied from 20 to 70 J/cm<sup>2</sup>. Reticular and feeding veins were treated first. Immediate clearing was achieved in 73.6% of the patients and in 84.3% of the patients after four weeks. Concerning the immediate response, 82.0% clearing was seen in the group with veins of up to 0.2 mm diameter, 78.9% was seen in the group from 0.2 up to 0.5 mm and 59.7% was seen in the group from 0.5 to 1 mm. After 1 month, clearing was seen in 92.1% in the first group, 80.0% in the second group and 81.0% in the third group of patients. Cosmetic results were excellent, neither telangiectatic matting nor scarring was seen. There was no recurrence in the follow-up period of 1 year. Our results show that treatment of telangiectatic veins of the leg with the PhotoDerm® VL is an effective treatment with minimal damage to the skin.</p>
82	Peer reviewed article	Leg Veins with IPL and Nd:YAG	Leg Veins and Stretch Marks	Leonard M. Dzubow, M.D.		American Society for Dermatologic Surgery, 1996; Vol. 22(4): 321.	1996	

STUDY	TYPE	TOPIC	TITLE	AUTHORS	RESEARCH SITES	PUBLICATION	YEAR	ABSTRACT
83	Peer reviewed article	Leg Veins with IPL - 159 Patients	Photothermal Sclerosis of Leg Veins (ESC PhotoDerm VL Cooperative Study Group)	Goldman MP, M.D., Eckhouse S., PhD	Dermatology Associates of San Diego County	Dermatologic Surgery, 1996; Vol. 22(4): 323-330.	1996	<p><b>BACKGROUND:</b> The flashlamp-pumped pulse dye laser at 585 nm has previously been reported to be somewhat effective in treating leg telangiectasia with diameters less than 0.2 mm. A pulsed photothermal device (intense pulsed light source [IPLS]) has been developed to treat leg veins ranging in size from 0.1 to 3 mm in diameter. Vessel necrosis occurs from an intense pulsed light that penetrates through the skin and is absorbed by the blood vessels based on the principle of selective photothermolysis.</p> <p><b>OBJECTIVE:</b> To determine the effectiveness of this novel device on treating leg veins.</p> <p><b>METHODS:</b> One hundred fifty-nine patients with 369 lesions were treated with the IPLS in a multicenter trial.</p> <p><b>RESULTS:</b> Clearance of 75-100% was achieved in 79% of treated lesions. Better than 50% clearance was achieved in 94% of completed cases. A very low rate of adverse effects occurred.</p> <p><b>CONCLUSION:</b> The IPLS is a safe and effective modality to treat leg veins ranging in size from 0.1 to 3 mm in diameter.</p>
84	Peer reviewed article	Infraorbital Dark Circles with Nd:YAG	Treatment of Venous Infraorbital Dark Circles Using a Long-Pulsed 1,064nm Neodymium-Doped Yttrium Aluminum Garnet Laser	Gang Ma M.D., Xiao-Xi Lin M.D., Xiao-Jie Hu M.D., Yun-Bo Jin M.D., Hui Chen M.D.	Department of Plastic and Reconstructive Surgery, Shanghai Ninth People's Hospital, School of Medicine, Shanghai Jiaotong University, Shanghai, China	Dermatologic Surgery, 38: 1277-1282.	2012	<p><b>BACKGROUND:</b> Infraorbital dark circles are a common cosmetic problem with multiple causative factors and few studies into the different treatment options.</p> <p><b>OBJECTIVE:</b> To assess the effectiveness and safety of long-pulsed 1,064-nm neodymium-doped yttrium aluminum garnet (Nd:YAG) laser therapy for infraorbital dark circles caused by visible prominent veins.</p> <p><b>PARTICIPANTS AND METHODS:</b> Twenty-six patients with venous infraorbital dark circles were treated with a Nd:YAG laser (fluence, 130-140 J/cm<sup>2</sup>; spot size, 6 mm) in double-pulse mode (pulse width, 6-10 ms; interpulse interval, 20 ms). Patients were examined 12 months after the final treatment. Results were ranked in five categories based on percentage clearance (5 = 100%, 4 = 75-99%, 3 = 50-74%, 2 = 25-49%, 1 ≤ 25% clearance). Patient satisfaction was ranked on a scale of 1 to 3 (1 = minimal improvement; 3 = completely satisfied), and pain was ranked on a scale of 1 to 10 (1 = mild pain; 10 = severe pain).</p> <p><b>RESULTS:</b> Twenty-six patients completed the study. Objective improvement scores were 5 in all patients, and all patient satisfaction scores were 3. All patients tolerated the moderate pain (mean score 3.6). Transient erythema was observed in all patients.</p> <p><b>CONCLUSION:</b> Long-pulsed 1,064-nm Nd:YAG-laser treatment appears effective and safe for the treatment of venous infraorbital dark circles and selectively removes visible prominent veins.</p>

# Testimonials

“Lumenis IPL systems have always been the gold standard of IPL’s. The M22 is Lumenis’ latest advancement in IPL technology, offering efficacy that is second to none, improved patient comfort, speed, versatility and reliability that Lumenis is known for. This translates into increased patient satisfaction and increased profitability.”

Mitchel P. Goldman, M.D., Founder and Medical Director of Goldman, Butterwick, Keel Cosmetic Laser Dermatology and Volunteer Clinical Professor of Dermatology/Medicine at UC San Diego.

“This system has replaced two lasers in my office, which decreases space needed for equipment and maintenance costs. This is a major advantage over other devices.”

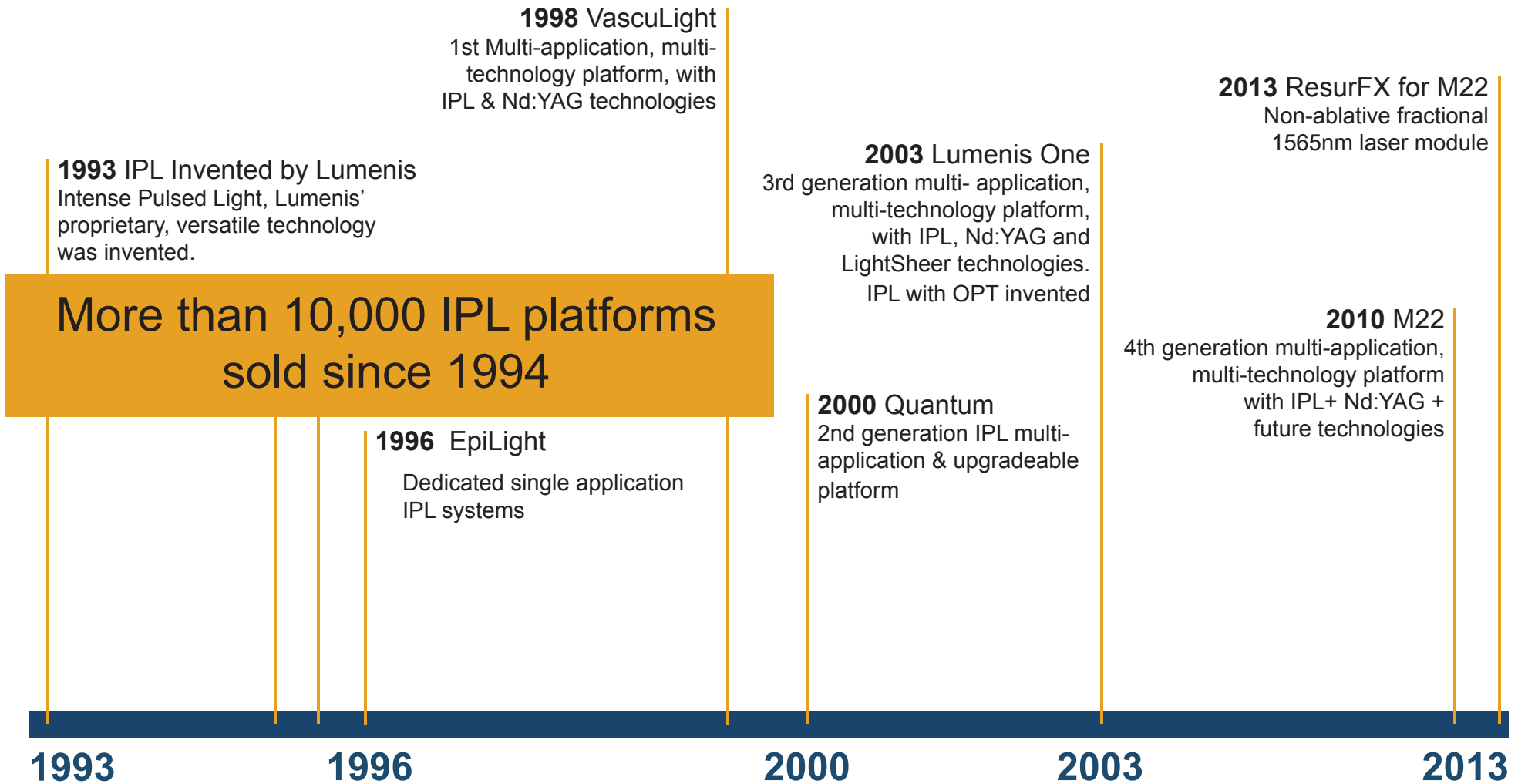
Tristan Guevara, D.O., of the Skin and Laser Center of Grosse Pointe (Grosse Pointe, Mich.)

“A great feature of M22 is that the ExpertFilters (for the Universal IPL handpiece) are right there in front of you, so if you wanted to take this patient from a Fitzpatrick III to a Fitzpatrick II you needed to change from a 560nm to a 515nm ExpertFilter, which is right there in front of you. And its quite literally as easy as pressing ‘standby’, changing up a filter, pressing ‘go’, and you are on. There’s nothing to change out, you don’t need to shut the system down, replacing treatment head, telling the patient to wait a second. You can make these decisions on the fly.”

Robert J. Noecker, MD, MBA  
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