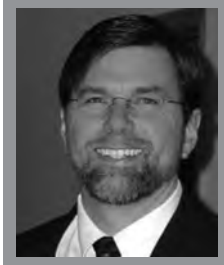
Clinical Bulletin

Rethinking Selective Photothermolysis in Hair Removal

Thomas A. Sult and Robin Sult

Thomas A. Sult, MD, co-runs a private practice in Minnesota where he provides a wide variety of surgical and laser-based procedures and is actively involved in laser clinical research and protocol development. Dr. Sult is a faculty member of the Institute for Functional Medicine and Aesthetic Lasers, Inc. and a member of the American Society for Lasers Medicine and Surgery.



Robin A. Sult, RN, co-runs Aesthetics Inc., an aesthetic laser practice, as Director of Laser Services. She is actively involved with clinical research and protocol development in laser aesthetics and a frequent presenter in both domestic and international laser conferences.

It is often difficult to achieve consistent results in laser hair removal. In an effort to improve results we conducted a study, based on the assumption that targeting follicle blood supply is more effective than targeting the follicle itself.

Several studies suggest it is the dermal papillae that must be destroyed to prevent hair regrowth. Studies also show that the follicular melanocytes are located primarily in the upper half of the bulb, well above the papillae. In addition, melanin is a poor chromophore at the 1064nm wavelength, having a slightly lower absorption coefficient than water. Both deoxy- and oxyhemoglobin are better chromophores at this wavelength. Furthermore, it is known that the papilla and follicle neurovascular bundle runs via the Arao-Perkins body at the base of the bulb into the dermal papillae.

Over a two-year period two groups, of 50 patients each, were chosen to compare the results in hair removal efficacy and validate the measurement method. Both groups were treated with a Nd:YAG laser system; the trial group using a Fotona XP MAX with S-11 scanner at a 6 mm spotsize. Zimmer Cryo cooling was used with Optical/Thermal Gel to improve cooling. The control group was treated using "standard" settings, the trial group was treated using the Fotona recommended settings aimed at primarily targeting the feeding blood vessel of the neurovascular bundle at the base of the hair follicle (see table). Because Nd:YAG lasers have some affinity for melanin, fluence settings of 50 J/cm^2 were used for skin types II-III, 40 J/cm^2 for skin types IV and 30 J/cm^2 for skin types.
Using a patient-conducted visual analog scale, hair loss was determined in both groups. Neither group had significant side effects. Differences were noted in the percentage of hair loss and time for hair to regrow; which was found to be longer when the hair was treated with the Fotona VSP settings.

	Spotsize	Pulsewidth	Fluence	Hair reduction
Standard	4 mm	40 ms	30 – 50 J/cm^2	37 %
Fotona VSP	6 mm	15 ms	30 – 50 J/cm^2	95 %

Our study shows that the Fotona VSP settings are far more efficacious than the "standard" control settings, allowing us to achieve double the amount of hair removal and extending the timeline between hair regrowth. We conclude that the Fotona VSP settings, combined with the large scan area of the S-11 scanner, provides excellent results in laser hair removal treatments at high skin coverage rates, also suggesting that manual spotsizes larger than 6 mm do not represent a substantial practical benefit when a scanner is available. Our clinical experience suggests that these new settings have made the treatment of unwanted hair much more predictable and enjoyable for our patients.

We feel the large degree of safety with this technique is due to Fotona Variable Square Pulse Technology. In other systems without VSP Technology support and a less well-defined beam profile, significant side effects have been observed, including blistering and burns. Therefore the results of the study apply only to Nd:YAG, VSP Technology supported laser systems.

Clinical Bulletin

Combined Use of Nd:YAG and Er:YAG in Acute Cystic Acne Treatments – A Case Study

Paraskevas Kakas

P. Kakas, M.D., Ph.D. is a specialist surgeon in laser rejuvenation, vaginal rejuvenation techniques, laser surgery and body sculpting. He founded the Center of Advanced Plastic Surgery (CAPS) and is the C.E.O. of the Center of Advanced Plastic Surgery in Thes-saloniki, Greece. He uses the Fotona XP MAX, DualisXS, and XP-2 Focus laser systems to perform procedures.

Cystic acne is a very unpleasant and painful form of acne and manifests as inflamed pustules filled with pus. The cause of acne cysts is wide-ranging; main causes are hormonal changes or imbalances, and a collection of dirt on the skin that causes inflammation in the pores. It is generally a hereditary condition. In the treatment of acute cystic acne outbreaks it is important to realize that the inflamed cysts are merely symptomatic of a systemic condition. Conventional therapy advises to leave cysts undisturbed as to intensify the inflammation and to avoid developing new cysts by irritating neighboring pores. To alleviate discomfort associated with cystic acne, Dr. Kakas has developed a procedure that combines the Fotona Nd:YAG and Er:YAG lasers. The following case study describes Dr. Kakas' technique.

A young male presented with persistent acne and several acutely inflamed acne cysts in the face which caused discomfort. After examination a cyst left side of the nose were found to be indicated for the laser combination treatment. The cyst was swollen, red and palpation indicated that pus build-up was putting significant stress on the upper skin layers; causing pain.

In a first step, Dr. Kakas used the Fotona Nd:YAG laser, with fluence 50 J/cm2, pulsewidth 35 ms and frequency 1.0 Hz settings and a 6 mm spotsize. These parameters provide disinfection of the general area in and around the cyst, through the laser's thermal effects.

In a second step, the thinnest part of the cyst is located. Using the R08 Er:YAG handpiece and 0.1 J energy, VSP mode and 20 Hz frequency Er:YAG laser settings, Dr. Kakas drills a miniscule hole in the side of the cyst. Almost immediately the pus is expelled from the cyst and pressure on the skin is relieved. With gentle manual pressure pus is further removed from the cyst until blood appears.

In a third step Dr. Kakas uses the Fotona Er:YAG's longer pulse modes' coagulation properties to limit bleeding. For this step the following parameters are selected; 0.2 J energy, XLP mode, 5.0 Hz frequency with the R08 Er:YAG handpiece. In addition to coagulation, the heat generated also provides superficial disinfection, thereby limiting the risk of reoccurrence.

Dr. Kakas has been performing the procedure in several hundred cases without any significant side effects. In this case the patient noticed immediate pain relief. After 24 hours the lesion was less inflamed and after a week the cysts showed no apparent inflammation.


Before


Immediately After


24 Hours After

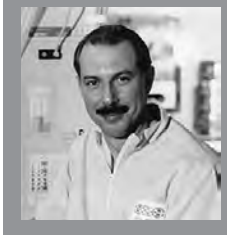

1 Week After

Clinical Bulletin

SPF-RR with VSP ER:YAG Laser and Scanner-Assisted Nd:YAG Laser

Leonardo Marini

Leonardo Marini, MD is the Director of the "The Skin Doctors' Centre" in Trieste (Italy). He is a former President of the ESLD and ESCAD, and Vice-Chairman of the EADV Task Force for Laser Dermatology. Dr. Marini has conducted numerous studies and published various papers on the application of light-based technologies in dermatology. He is a freq-uent lecturer and speaker on high-profile industry events. He is also a frequently Invited Lecturer at the Laser and Health Academy.



Numerous light-based treatment modalities claim clinical efficacy and unique advantages in skin rejuvenation. Yet every modality has inherent disadvantages especially considering that all three components (vascular, pigment and collagen) of skin alterations need to be addressed while balancing patient acceptability parameters (downtime, intra/post-operative discomfort) and clinical results. In this respect combination techniques have always proven to be more effective than single treatment modality techniques.

Sequential Photo-Thermal Fractional Resurfacing and Remodeling, or SPF-RR, can be used as a full face skin rejuvenation technique that combines Fotona's Nd:YAG and Er:YAG lasers. In a single treatment session patient skin is sequentially exposed to two wavelengths and, four energy packing and delivery modalities (respectively FRAC3 and T3 with Nd:YAG, and fractional ablation with Er:YAG 1,2).

SPF-RR requires regional nerve block anesthesia combined with local lateral anesthesia in the cheek area. The use of corneal eye-shields allows unrestricted full face treatment, including the treatment of both the upper and lower eyelids. The following parameters are recommended for the sequential passes.

	1st Pass	2nd Pass	3rd and 4th Pass
Laser source:	Nd:YAG	Nd:YAG	Er:YAG
Pulsewidth:	0.3 ms	35.0 ms	LP mode
Fluence:	35.0 J/cm^2	50.0 J/cm^2	3.9 J/cm^2
Frequency:	26.0 Hz	7.0 Hz	5.0 Hz
Handpiece/scanner:	S-11	S-11	PS02
Spotsize:	3 mm	3 mm	7 mm
Scanning mode:	OP	OP	n/a

Immediately after the treatment the skin is rehydrated with a chilled thermal spring water spray. Then cooling with chilled ice-packs is performed for 5-10 minutes. Patients report a burning sensation immediately after the treatment. During the post-operative recovery period erythema, dryness, moderate tenderness, periocular oedema, superficial pinpoint micro-crusting and moderate itching are the most common adverse effects and generally disappear within 7-10 days after the treatment. Patients are prescribed a post-operative anti-viral and anti-bacterial medication regime and are instructed on a sun protection program with broad-spectrum sunscreens and a post-operative skin care program.

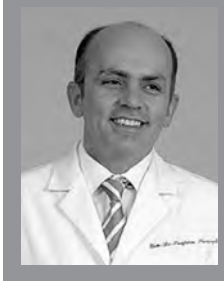
SPF-RR is well accepted by patients, with substantial to excellent results reported within 30 days post-op and lasting for prolonged periods of time. The procedure can be repeated at regular intervals to effectively and credibly control skin aging as part of a more holistic anti-aging program.

Clinical Bulletin

Removal of Nevus of Ota Using Q-Switched Nd:YAG

Serafettin Saraçoglu

Serafettin Saraçoglu, MD has been actively involved in developing and administering laser-based treatments for over 10 years. His laser experience encompasses almost all medc-cally relevant wavelengths. He currently operates a private practice at the Ethica Medical Clinic at the Bakirkoy in Istanbul, Turkey. He uses the Fotona QX, the Fotona XP MAX, and the Fotona Dualis systems.



The patient presented with a Nevus of Ota on the left side of the face. Discoloration was more pronounced around the eye socket and faded toward the outer regions of the face. A series of six treatments was undertaken to lighten the Nevus of Ota with the Fotona QX.
Before each treatment, topical anesthetic was applied (EMLA or Ela-Max) and cooling was performed with a cryo air cooling unit set at cooling level 5 or 6. During the treatment, the handpiece was held perpendicular to the treatment area as it was moved across the treatment area. The fluence settings were determined for each treatment based on the desired end effect. First a low, 2 J/cm² fluence was used and then increased in 0.5 or 1 J/cm² increments until the treated area began to turn white and crusty. Adequate time for recovery was allowed for between treatment sessions. During the last two treatments a large spotsize and low fluence were used at frequency settings, to deliver a clinically significant amount of energy and at the same time obtain wide area rejuvenation. Fluence settings between 2 12.5 J/cm² have been used to successfully treat Nevus of Ota. The results were very satisfactory; a vast improvement in skin color at the end of treatment was obtained.

Recommended Parameters:

Laser source: Q-Switched Nd:YAG (1064 nm)

Treatment	Fluence (J/cm²)	Spot Size (mm)	Frequency (Hz)
1	4	4	2
2	6	4	2
3	7.2	4	2
4	7.6	4	2
5	3	6	8
6	3.3	6	8

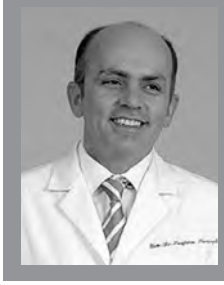
Courtesy of Dr. Şerafettin Saraçoğlu

Clinical Bulletin

Removal of Nevus of Ota – A Two Month Follow Up

Serafettin Saraçoglu

Serafettin Saraçoglu, MD has been actively involved in developing and administering laser-based treatments for over 10 years. His laser experience encompasses almost all medc-cally relevant wavelengths. He currently operates a private practice at the Ethica Medical Clinic at the Bakirkoy in Istanbul, Turkey. He uses the Fotona QX, the Fotona XP MAX, and the Fotona Dualis systems.



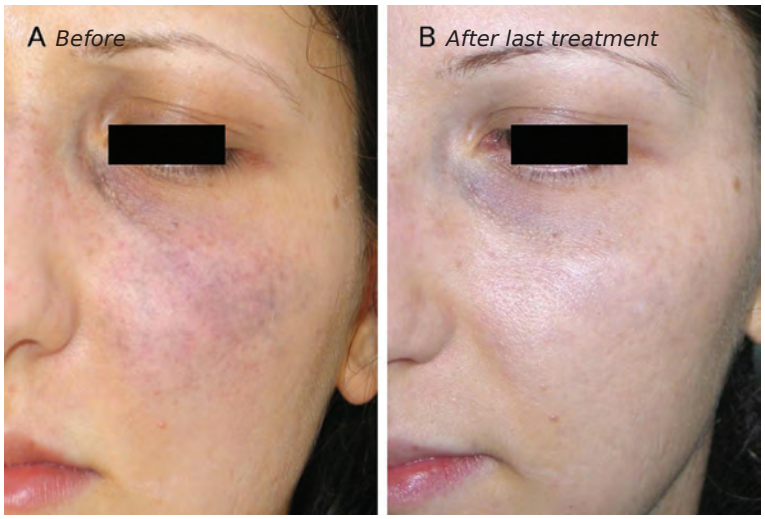
The patient presented with a Nevus of Ota on the left side of the face. During and after a series of three treatments the skin discoloration was almost eliminated. Two month follow-up after the third treatment showed that the results remained stable. The treatment was performed with a Fotona QX; a Q-switched Nd:YAG laser.

Before each treatment topical anesthetic was used (EMLA or Ela-Max) and cooling was performed with the cryo cooling unit set at cooling level 5 or 6. During the treatment, the handpiece was held perpendicular to the treatment area as it was moved across the treatment area. The fluence settings for treatment were determined for each treatment based on the desired end effect. First a low, 2 J/cm² fluence was used and was increased in 0.5 or 1 J/cm² increments until the treated area began to turn white and crusty. Adequate time for recovery was allowed for between treatment sessions. In general, fluence settings between 2-12.5 J/cm² have been used to successfully treat Nevus of Ota.

Recommended Parameters:

Laser source:	Q-Switched Nd:YAG (1064 nm)
Air Cooling	Level 5 or 6 on the cryo cooling unit (Zimmer)
Anesthetic	EMLA

Treatment	Fluence (J/cm²)	Spot Size (mm)	Frequency (Hz)
1	4	4	2
2	6	4	2
3	7.2	4	2



Courtesy of Dr. Şerafettin Saraçoğlu

Clinical Bulletin

Removal of Retro-auricular Keloids

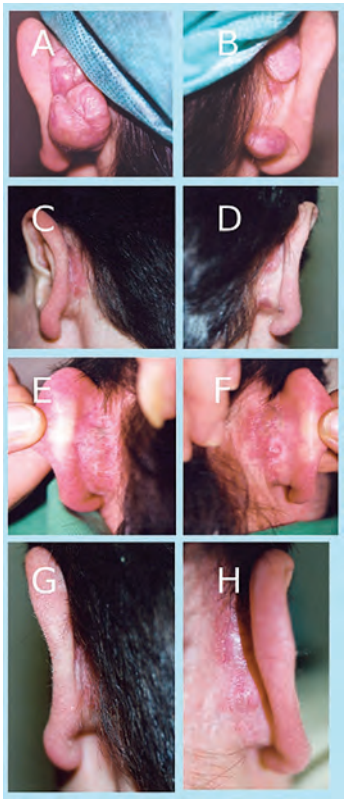
Jasmina Kozarev

Jasmina Kozarev, MD has over fifteen years of experience in derm atology and skin disease treat ment. She has performed over 2500 skin laser surgeries. Throughout her career Dr. Kozarev has gained a tremend- -ous amount of experience using lasers on a daily basis. Through her long-standing links with Fotona she has worked with virtually all of Fotona's laser systems in the aesthetic and surgery range and currently owns the Dualis^{SP}

Anamnesis:
A 19 year old male patient presented with 2 retro-auricular keloids behind each ear. The 4 keloid scars resulted from several surgeries undertaken to correct the ear (A and B in the figure).

Procedure:
The keloids were excised using short pulses (300 µsec), high fluence (19 J/cm²) and a moderate repetition rate 15 Hz. These settings caused 'cold ablation', i.e. ablation occurred so fast that there was no significant heating of the surrounding tissue.
A histopathological analysis of the keloid tissue showed an increase in connective tissue. The collagen structure of the excised tissue exhibited larger fibers with closely packed fibrils. Orientation of the fibers was random to the epidermis. There was an increase in the density of the blood vessels and the number of cells with respect to normal conditions.
After surgery 0.05% retinoic acid cream was applied daily and 5% imiquimode cream was applied nightly for three months. The patient was seen for follow up on the seventh day (C and D in the figure), and after 3, 6, 12, and 24 months.
Discussion:
Excellent results were achieved using a Er:YAG 'cold ablation' regime coupled with topical retinoin and imiquimode. No follow up treatment was necessary.

There was no recurrence of keloid scarring at the 2 year follow up after surgery. The wound healed well and rapidly.



A, B	before
C, D	7 days after
E, F	3 months after
G, H	2 years after

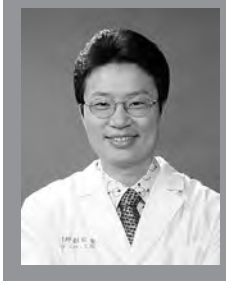
Laser source:	Er:YAG (2940 µm)
SP Mode:	300 µsec
Fluence:	19 J/cm²
Frequency:	15 Hz
Handpiece:	R09

Clinical Bulletin

Skin Rejuvenation with Pore Size Reduction

Chao-Hong Liu

Chao-Hong Liu, MD is a specialist in Cosmetic Dermatology. He has performed skin rejuvenation treatments with a wide range of different laser types, as well as with intense pulsed light, radiofrequency, and by chemical methods. He works at the Department of Dermatology, at Yuan General Hospital in Kaohsiung Taiwan.



The three step procedure given in the table above has been successfully used in a number of different clinical contexts to effect skin rejuvenation: fine line and pore size reduction, acne treatment, and improvement of discoloration. Experience suggests that by performing these steps in a sequence of treatments greater efficacy can be achieved then if the entire procedure is done with one set of parameters. The case presented was performed on a patient with skin type III-IV, with mild skin discolorations and enlarged pores. The three step protocol above was done in one treatment session according to the steps presented in the table. No complications were observed. The patient healed well, the figure shows the treatment area before and shortly after treatment. The tightness of the skin usually continues to improve for a few days after treatment as the body continues naturally remodeling the collagen in response to the LP mode passes performed in step 3.

Recommended Parameters:

Laser source:	Er:YAG (2940 nm), PS01 Handpiece
Frequency:	5 Hz
Anesthesia:	None needed
Spot Size:	10 mm

Step	Purpose	Mode	Energy	Pixel Level	Passes	End Point
1	Polish skin: Remove old or dead keratin	MSP	500 mJ	Pixels not used	1	Light Skin Immediately
2	Smooth Skin /Base Pass: heat skin, stimulate collagen rejuvenation	SP	500 mJ	2	2	Warmth and Slight Redness
3	Smooth and Enhance Pass: Shrink pore size and fine wrinkles	LP	800 mJ	2	1	Warmth and Redness

Courtesy of Dr. Chao-Hong Liu

Clinical Bulletin

Facial Skin Rejuvenation

Chao-Hong Liu

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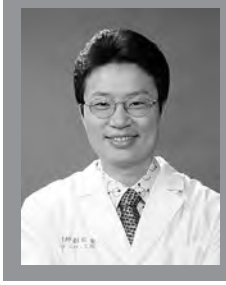
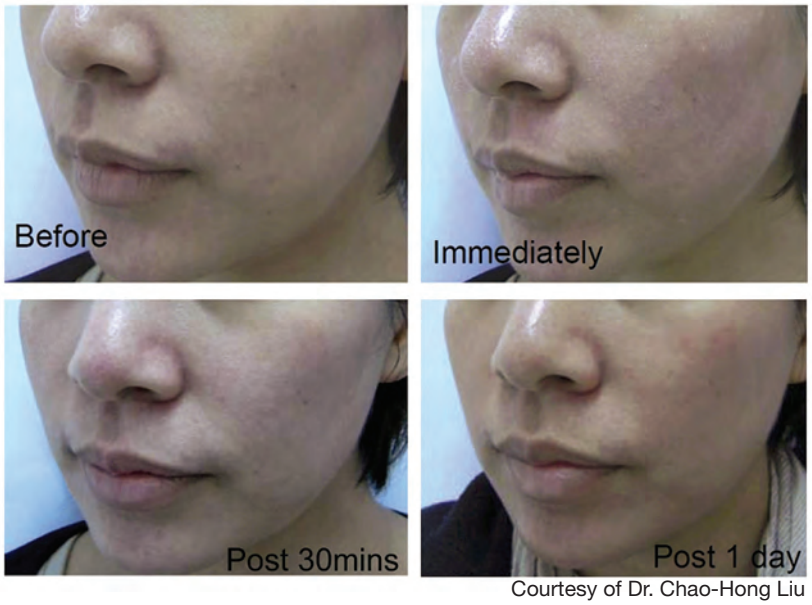


The minimally ablative treatment protocol outlined in the table above has been used successfully to treat patients presenting with a number of different skin rejuvenation indications: wrinkles, fine lines, sun damaged skin, etc. The case pictured below is an example of general facial rejuvenation. During the first step, 1 pass is made across the full face in MSP Mode to cause minimal ablation. The slight ablation removes the old keratin from the skin and lightens the skin immediately. The second step of treatment was comprised of 2 passes of fractionated, short pulse (SP) passes to stimulate collagen rejuvenation: these passes were performed across the cheeks and nose. In step three, 1 further higher-energy, fractionated long pulse (LP) pass was used to rejuvenate and increase thermal effect directly around the nose and under the eyes. The size of this patients' pores was reduced in one treatment, usually patients need four or five treatments to achieve full pore reduction.

Recommended Parameters:

Laser source:	Er:YAG (2940 nm), PS01 Handpiece
Frequency:	5 Hz
Anesthesia:	None needed
Spot Size:	10 mm

Step	Purpose	Mode	Energy	Pixel Level	Passes	End Point
1	Polish skin: Remove old or dead keratin	MSP	500 mJ	Pixels not used	1	Light Skin Immediately
2	Smooth Skin /Base Pass: heat skin, stimulate collagen rejuvenation	SP	500 mJ	2	2	Warmth and Slight Redness
3	Smooth and Enhance Pass: Shrink pore size and fine wrinkles	LP	800 mJ	2	1	Warmth and Redness



Courtesy of Dr. Chao-Hong Liu