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Rethinking Selective Photothermolysis in Hair Removal

Dr. Thomas A. Sult, MD, and Robin Sult, RN

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.

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