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Successful Treatment with UVA 1 Laser of Non - Responder Vitiligo Patients

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Abstract

The Authors discuss their experience in treating non-responder vitiligo patients with a UVA-1 laser. Laser Alba 355® is an innovative device of target UVA - 1 phototherapy. The present report suggests that UVA1 laser could be an applicable therapeutic option in patients with vitiligo, also for the ones who did not respond to the more conventional phototherapies.

Introduction

Vitiligo is an important cutaneous pigmentary disorder, characterised by the progressive loss of melanocytes and/or by their dysfunction, resulting in hypopigmented skin areas which progressively become amelanotic. Despite new researches and progress, the pathogenesis of vitiligo is still enigmatic. Nowadays most evidence support that vitiligo is a T - cell-mediated autoimmune disease, maybe triggered by oxidative stress, and associated with an underlying genetic predisposition [1][2][3][4].

Clinically, the condition is characterized by milk-white macules and patches, varying in size, form, and distribution. Because of the clinical appearance of the patients, vitiligo is often associated with psychological distress and reduction of patient's life quality index [5].

Classically, vitiligo treatments are unsatisfactory and challenging. Despite the continuous introduction of innovative medical and surgical therapies, phototherapy is the mainstay of vitiligo repigmentation (Table 1) [6].

Table 1: Conventional phototherapies available for vitiligo treatment

Phototherapies
Broadband UVA
PUVA therapy
Topical PUVA
PUVA sol therapy
Bath PUVA
Broadband UVB
Narrow band UVB

The aim of this multicenter observational study was to evaluate the efficacy and safety of Laser Alba 355 in the treatment of 21 patients affected by vitiligo vulgaris, who had been unsuccessfully treated with other conventional phototherapies.

Patients and Methods

We evaluated 21 subjects (14 female, seven male), aged from 23 to 48 years, who suffered from stable or active vitiligo vulgaris for more than three years and less than six years. Lesions were variously localised (Table 2).

Table 2: Distribution of vitiliginous macules in our patients

Side of Lesion	Number of Patients
Face	17
Trunk	9
Arm	13

In the past, all of them have been treated with different phototherapies, without good clinical results. In details, 18 patients had been treated with a complete session of PUVA therapy; the other 3 stopped the treatment because of the gastric toxicity of psoralen. Successively, all patients completed the treatment with UVB broadband of clinical responses; patients had been successively treated with narrow-band UVB (311nm) total body. None of them achieved a repigmentation rate more than 30%. In the recent past (5 months), none of them had been treated for the cutaneous disease.

We decided to treat the patients with UVA - 1 laser using Laser Alba 355®, a laser technology based on UVA - 1 spectrum with a wavelength of 355 nm (Table 3). They had been irradiated once a week at a dosage of 120 J/cm², for 24 weeks.

Table 3: Laser Alba 355 ® technical features [7]

Laser Source	Solid state pumped laser diode (DPSS)
Active Material	Neodymium-doped yttrium orthovanadate (Nd: YVO4)
Wavelenght	355 nm
Maximum Output	7W
Beam Size	2.5 mm
Beam Quality	TEM00
Beam Divergence	1.5 mrad
Power Stability	<1%
Repetition Pulse Rate	20-25 kHz
Maximum Energy per Pulse	0.35 mJ
Pulse Width	10-15 ns
Brightness	For 20000 hours
Cooling System	Air

The time of emission and spot diameters were regulated by the operator, based on the clinical characteristics of the patients.

For all patients, digital photographs of the vitiliginous lesions have been obtained before the start and at each treatment session. The response to the treatment was determined by assigning to each lesion a 0% score before therapy and a second percentage value at the end of the same, to represent the level of repigmentation (Table 4).

Table 4: Classification of clinical response by the repigmentation rate

Clinical response	Repigmentation rate
Excellent	>75%
Marked	50-75%
Moderate	25-50%
Minimal	< 25%

Results

At the end of the treatment, we evaluated the repigmentation rate achieved by every single patient treated with Laser Alba 355®. 17 patients (81%) achieved excellent results, with a re - pigmentation rate bigger than 75%. Three patients (14%) achieved a marked improved of the clinical findings with a repigmentation rate between 50-75%. Only one patient showed minimal response to the phototherapeutic treatment.

No differences in repigmentation had been described for the different localisation of the lesions.

In general, the treatment had been well tolerated by all patients. Besides a mild, transient, post-therapy erythema and itching sensation, we did not observe other side effects.

Discussion

In this multicenter study, we evaluated the treatment of 21 patients affected by a stable or active form of localised vitiligo with Laser Alba 355®, an innovative targeted phototherapy device, with a peak of emission of 355 nm [7].

Like common UVA - 1 device, the biological effects of UVA - 1 laser are mainly mediated by the formation of reactive oxygen intermediates, during the mitochondrial oxidative phosphorylation, which may damage DNA, lipids, proteins and cellular organelles. This fact may exert different biochemical effects, such as inhibition of immune responses and stimulation of melanocytes [8][9].

The most important advantage in the use of Laser Alba 355®, is the possibility to treat only skin lesions, sparing uninvolved skin areas. This fact allows the operator to use higher doses achieving better results in less time and in a safer way, reducing the side effects due to radiation.

In conclusion, laser Alba 355® is an

innovative device of target UVA - 1 phototherapy. The present report suggests that UVA1 laser could be an applicable therapeutic option in patients with vitiligo, also for the ones who did not respond to the more conventional phototherapies.

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